

**INVESTIGATING THE WEB SEARCH BEHAVIORS
OF TRANSLATION STUDENTS:
AN EXPLORATORY AND MULTIPLE-CASE STUDY**

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So much has already been written about everything
that you can't find anything about it.

James Thurber

ABSTRACT

The translator's role as an information user, processor, and producer in today's multi-lingual and multicultural society emphasizes the need for the development of information skills that can be used both for problem solving in domain-specific translation and knowledge acquisition in a number of fields of expertise. The empirical study of dictionary use by (student) translators, for example, represents a significant area of research in Translation Studies. So does the study of additional online and offline resources. Yet, research into the use of the Web as an external aid has frequently occupied a secondary position in the investigation of translation processes. Moreover, there are hardly any studies addressing the information behavior of (student) translators within the domains of documentation, user studies, and information literacy.

This essentially exploratory and multiple-case study aims at bridging this gap in the literature by exploring the Web search behaviors of a total of six participants. These include a naturally occurring sample of four postgraduate translation trainees (in their first year of studies) who enrolled in an introductory course on technical and scientific translation, and two additional subjects (a PhD student of translation with three years of casual professional translation experience and a translation teacher with over 15 years of experience in the discipline) who participated in a pilot study conducted prior to the main study. Given that the need to seek, retrieve, use, and generate translation information depends on the type of users and the translation tasks performed, the study focuses on two specific tasks dealing with the translation of two popular-science texts from Spanish into English. In particular, the study examines the online search behaviors of all participants in relation to a number of translation task attributes (text type and translation brief) as well as user attributes (translation expertise, Web search expertise, and domain knowledge). While for the first task data was obtained from all six research participants, the second task was only carried out by the four translation trainees.

The participants' Web search behaviors embedded in translation are monitored on the basis of the notion of "Web search task," which in turn is conceptualized as involving four main information-seeking/problem-solving stages, or units of analysis: (a) The *search need*, or recognition of an information need as perceived within the context of translation problem solving; (b) the *search goal(s)*, or type(s) of information required to potentially satisfy a specific information need; (c) the *search process*, or online actions carried out within one or more search sessions that may address single or multiple infor-

mation needs; and (d) the *search outcome(s)*, or type(s) of information potentially selected and/or used to (a) satisfy a search need, and (b) eventually solve a translation problem.

For the in-depth study of the participants' Web search tasks, this investigation uses case study research and combines various qualitative and quantitative sub-methods, data-collection tools, and data sources for triangulation purposes. In particular, the study employs direct observation via screen recording and survey research using two types of questionnaires (a background questionnaire and an online search report) as well as semi-structured interviewing. The data sources include the completed background questionnaires, the translated texts obtained from the two translation tasks, the online search reports completed for each task, the corresponding screen recordings, and the one-to-one interviews conducted with the student participants. Qualitative analyses supported by descriptive statistics are used to process the data and provide a multi-faceted overview of the participants' Web search behaviors concerning their depth and range of research, their degree of iterative (repetitive) behavior, as well as their query construction and query modification patterns, among others.

The main findings of this study suggest that participants' level of translation expertise had a bearing on their choice of information sources, which, in turn, seemed to affect their degree of iterative online search behavior. A look at task-related factors—in particular the degree of specialization—suggests that increased task complexity (along with increased translation experience) also influenced the participants' choice of resources. Furthermore, task-related attributes appear to have had a bigger impact on the participants' range of search behavior than on their depth of research. In addition, it was generally observed that the lower the level of Web search expertise (and translation expertise), the more basic and unplanned the search statements and the less sophisticated the refinement of queries. Finally, both domain knowledge and task-related factors appeared to have had a combined effect on the participants' amount and type of information needs. In general, it was noted that the higher the level of perceived domain knowledge, the lower the number of information needs and the less specialized the nature of these needs. Furthermore, both the type of research and the amount of time spent online seemed to have had an impact on translation quality. Overall, the more in-depth the nature of research and the higher the increase in research time, the higher the level of translation quality.

Keywords: Web searching, online information behavior, information seeking and retrieval, documentary research, information literacy, information competence, exploratory research, case study research.

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1. Introduction

To say that in today's knowledge society, information and communication skills are at the very core of any professional activity involving a critical and informed approach to decision making is almost a superfluous statement to make. That translation is one such activity, which is foremost knowledge-based (Austermühl 2001) and "which constantly requires information" as well as constant decision making (Pinto Molina and Sales Salvador 2007: 532), can, to my mind, not be emphasized enough. The global demand for knowledge dissemination as well as the development of new information and communication technologies (ICT), among others, have largely contributed to continue to shape translators' role as "information users, processors, and producers" (Pinto Molina 1999; 2000; 2001). The multilingual, multicultural, and technological environment within which many of these professionals operate thus strengthens the role that documentary research plays as "a vital instrumental link in the chain of mediation and knowledge transfer that makes up translation, [i.e. as] an indispensable part of translational know-how" (Pinto Molina and Sales Salvador 2007: 532).

Translators' documentary competence—also referred to as "research competence" or "instrumental competence" in the translation studies literature—is situated within the broader notion of translation competence. The importance that the former is given within the latter varies according to different multicomponent models of translation competence (see, for example, PACTE 2000; 2002; 2003; 2005; Kelly 2002), which, in turn, draw on various notions of translation. For Mayoral Asensio, for instance, "translation is above all a problem of documentation" (1994: 118). From the perspective of documentary research applied to translation, Palomares Perraut and Pinto Molina define documentary competence as "las habilidades y destrezas específicas del traductor para saber manejar con precisión y rapidez las fuentes de información de cualquier tipo y en cualquier formato necesarias para su quehacer traductor" (2000: 100). That is, documentary competence primarily entails the ability to efficiently *use* and *manage* different sources of information.

A notion similar to documentary competence is that of "information literacy." This concept, however, is more widely used within the area of higher education in connection with the instruction of information skills that may form the basis for lifelong learning. That is, it is a concept common to all disciplines and all types of learning environments. According to Pinto Molina and Sales Salvador (2008b: 415), the "most

frequently cited definition [of information literacy] is probably that provided by the American Library Association.” According to the ALA, information literacy “is an understanding and set of abilities enabling individuals to recognize when information is needed and have a capacity to locate, evaluate, and use effectively the needed information” (cited in Pinto Molina and Sales Salvador 2008b: 415; cf. Pinto Molina and Sales Salvador 2007: 535). Pinto Molina and Sales Salvador further state that “knowing how to select and make sense of information and use it in order to solve problems, deal with new situations and continue learning are key issues in the teaching and learning scenario in contemporary society, above all in universities and as currently recognised in the context of the European Higher Education Area (EHEA)” (2008b: 415-416). For them, basic skills in information literacy include “understanding information,” “identifying and defining information needs,” “locating and evaluating information,” “integrating, synthesizing and using information,” “sharing information,” and “generating information while respecting intellectual property” (ibid: 416).

In addition to documentary competence and information literacy, the notion of “information behavior” (IB) is typically used within the disciplines of library and information science (LIS), information studies, user studies, and documentation. Although information behavior, like documentary research, is not necessarily linked to the instruction of information skills, it does involve “those activities a person may engage in when identifying his or her own needs for information, searching for such information in a way, and using or transferring that information” (Wilson 1999: 249). Similarly, Fischer, Erdelez, and McKechnie conceptualize information behavior as “involving how people need, seek, manage, give, and use information in different contexts” (2005: xix, building on Wilson 1999 as well as Pettigrew, Fidel, and Bruce 2001: 44). Furthermore, information behavior, like documentary competence and information literacy, is a rather broad concept that may apply to a wide range of information sources (in various formats) and formal channels like traditional libraries or the Internet, among others.

Although external sources of consultation in non-digital format are available to, and are indeed widely used by translators, today the Internet is probably the resource most frequently used by these professionals. Perraut Palomares and Pinto Molina’s (2000: 111) survey on the information needs, habits, and resource use of professional translators shows that already in 1999 the Internet was the most frequently used source

of consultation, following translators' personal archives. While 50.5% of the respondents stated that they were always using the Internet, 27.4% claimed to use this resource regularly, followed by 21% who said they used it sometimes, and 0.1% who stated they never used this resource (ibid: 112). In addition, of the different types of services available on the Internet, e-mail was the most popular one, followed by the World Wide Web,¹ distribution lists, File Transfer Protocol (FPT) services, and chats, among others (ibid: 113). Statements made by professional translators concerning the impact that the Internet has had on their research activities are numerous and can be found in the relevant literature. In the *Manual de Documentación y Terminología para la Traducción Especializada* edited by Gonzalo García and García Yebra (2004), for instance, Castro Roig states that

en 1995, yo hacía aproximadamente el 10% de mis consultas sobre traducción en Internet. Hoy en día resuelvo el 95% de mis dudas por este medio. Internet ha variado drásticamente mi inventario de obras de referencia. Un 75 % de las obras de consulta que empleo están en Internet o en formato electrónico (2004: 400).

The impact and penetration of the Internet have indeed dramatically transformed the way translators carry out their documentary research and address their information needs. Among others, it has eliminated previous constraints of time and space regarding the acquisition of information. Nevertheless, its ubiquity and structure along with the dispersed and dynamic nature of the information available on the Web pose a set of challenges concerning the critical evaluation, selection, and use of credible sources of information. This concern is also voiced by Pinto Molina and Sales Salvador, who point out that, “[f]rom the user’s viewpoint, what matters is that today the problem is not so much accessing as locating the information needed to resolve a concrete problem or take a particular decision relating to one’s work or daily life, realizing the needs of quality, rigour, suitability, depth and specificity” (2007: 534).

With the increasing global demand for translation and the critical role that the Internet and, in particular, the World Wide Web play as a source of consultation for translation problem solving and decision making, “the time is opportune to study information needs and behaviors of professional translators” (White, Matteson, and Abels 2008: 576). This

¹ This is in line with the results of more recent surveys conducted among regular Internet users (see, for example, the 2010 Pew Internet & American Life Project survey and the 2010 UK National Statistics Omnibus Survey), which clearly show that searching for information is the second most popular Internet activity following e-mail (see 6.1.4.1 for more details).

study makes such an attempt. Given its pedagogical interest, the study particularly aims at researching the Web search behaviors of a small cohort of four student translators—as well as of two professional translators with different levels of experience who took part in the pilot study of this project—with the ultimate goal of drawing implications for the teaching and learning of online information skills applied to translation. To this end, a multiple-case study was implemented within a real pedagogical setting that was facilitated by an introductory course on scientific and technical translation (with English and Spanish) offered within a postgraduate translation program in an English-speaking environment. This setup is in line with the views of Pinto Molina and Sales Salvador, who point out that

in order to improve instruction regarding the management, processing and use of information, it is now vital to obtain an in-depth knowledge of the users, their information requirements in given situations, the circumstances and contexts in which their information needs arise, the action[s] users take to resolve matters, and the use they make of the information once found (2007: 534).

The importance of developing information skills that can be used both for problem solving in domain-specific translation and knowledge acquisition in a number of fields of expertise is not only visible in the professional activities of modern translators but also in the translation curriculum of tertiary institutions worldwide. In Spain, for example—a country with a significant number of translator training institutions²—the acquisition of information literacy takes place within a core course called “Documentary Research Applied to Translation” (*Documentación Aplicada a la Traducción*) that has been part of the four-year undergraduate degree in translation and interpreting ever since it was first introduced in 1991. Credits corresponding to both the core and optional courses are distributed within this four-year degree across a two-year first cycle followed by a two-year second cycle. Documentary research applied to translation is mostly taught in the second year of the first cycle and is typically worth four credits (out of 240 credits needed to complete the degree). Although universities can vary slightly the number of credits in each specific area, the core content in translation and interpreting degrees remains practically the same throughout the entire

² As of January 2011, the Spanish Ministry of Education and Science lists a total of 22 universities offering undergraduate programs in translation and interpreting studies (Spanish Ministry of Education and Science 2011).

Spanish university system.³ Despite the apparent rigidity of this system, additional instruction aimed at developing information skills may also take place within optional courses that make up the curriculum, such as “Computer Science (or IT) Applied to Translation,” “Terminology,” or “Electronic Tools and Resources for Translation,” among others.

Instruction in information skills via optional courses (as opposed to a specific course on information science and documentary research) seems to be the general case in most undergraduate translation and interpreting degrees across Europe.⁴ It also seems to be the case in countries—especially in Anglo-Saxon countries—where translation and/or interpreting studies are only offered at the postgraduate level. In postgraduate programs of translation—like the University of Auckland’s one-year program providing the research framework for this study—course availability and time restrictions may not always allow for a core subject exclusively dedicated to the development of information skills. Furthermore, as Pinto Molina and Sales Salvador state, in the teaching of “documentation as applied to different degree programmes in the context of higher education, the marriage between the teaching plans and the real needs of a community of actual students still leaves much to be desired in most cases” (2007: 531). In addition, as Massey and Ehrensberger-Dow (forthcoming) point out, “the relative weight accorded to information literacy by translation practitioners, trainers and scholars has yet to be underpinned by a significant body of research.”

A look at previous research into translation processes (see Chapter 2), where one would expect to find empirical studies addressing the (online) information behaviors of (student) translators, confirms that in this field of research there are indeed hardly any such studies. This is not to say, however, that translation process research has not produced a wealth of studies concerning the use of translational aids as external sources of consultation. It is above all the study of dictionary use (as well as other types of resources) that represents a significant area of research in our discipline (see, for example, Atkins and Varantola 1988; Varantola 1998; Mackintosh 1998; Livbjerg and

³ See Kelly (2005: 66-68) for a discussion of the shortcomings of this centralized curriculum and its implications for translator training.

⁴ While in Spain most undergraduate programs in translation and interpreting still maintain the four-year course structure following the adaptation to the European Higher Education Area (EHEA), undergraduate programs in translation and interpreting offered by other European institutions typically consist of three years of study.

Mess 1999, 2002, 2003; Ronowick 2005). A thorough review of think aloud protocol (TAP) research (see Chapter 3) shows that there are in fact a number of empirical studies that have examined, to a greater or lesser extent, the use of reference material in translation (e.g. Krings 1986a, 1986b; Jääskeläinen 1987, 1989b; Gerloff 1988; Kiraly 1995; Luukkainen 1996; Dancette 1997; House 2000). Yet, as these studies were mostly carried out in the 1980s and 1990s, their focus is primarily on the use of printed dictionaries and other reference material as opposed to electronic and/or Web resources, despite the fact that the latter have been available to translators since the early 1990s. This phenomenon is most likely related to the type of data collection tools available at the time in combination with TAPs, such as video cameras and retrospective interviews. Despite this and other limitations associated with the use of thinking aloud as a research method, TAP research has significantly brought our discipline forward, including the study of resource use.

Nevertheless, as the review of studies using alternative methods and tools for research into translation processes in Chapter 4 shows, even in the first decade of the 21st century we find almost no process-oriented studies that combine more sophisticated methods and tools such as Internet logs, keystroke logging, screen recording and/or eye tracking. These methods would be more appropriate to examine the use of electronic and/or Web resources in translation. As I will explain, the several empirical studies that do examine the use of these resources (e.g. Lauffer 2002; Asadi and Séguinot 2005; Pavlović 2007) do not address the information behaviors of (student) translators as their main object of research. Among the few researchers who “have only recently begun to systematically examine information behavior in the translation processes of students and professionals to determine how information literacy develops” are Massey and Ehrensberger-Dow (forthcoming).⁵ Their preliminary findings on translators’ information behaviors (see Massey and Ehrensberger-Dow 2010a and forthcoming) are part of a longitudinal and ongoing research project called *Translation Tools in the Workplace*. This project, in turn, is part of a larger scale project named *Capturing Translation Processes*, which, since 2009, has been conducted at the Zurich University of Applied Sciences with the aim of exploring translation processes and the development of translation competence.

⁵ As I will further discuss below, Pinto Molina and Sales Salvador (2007, 2008a, 2008b) also examine translators’ information literacy, albeit from the perspective of documentary research applied to translation. Similarly, White, Matteson, and Abels (2008) address professional translators’ information behaviors within the domain of information science.

Similarly, the University of Graz's *TransComp* project, which was launched in 2007, also explores translation processes and competence acquisition, including the use of resources for translation problem solving (see Göpferich 2009 and Göpferich and Jääskeläinen 2009 for details). Another ongoing research project—called *Observing Uses of Language Technology* (OPLT, or *Observation des Pratiques Linguagières Technologisées*)—is the joint project carried out by researchers from the National Research Council (NRC) of Canada and translation studies researchers from the Université du Québec en Outaouais. As part of this project, which “aims at better understanding the technological practices and needs of professional translators” (Désiltes, Barrière, and Quirion 2007: n.p.), research on the attitudes and work-related practices with regard to translators' use of wiki resources (in particular Wikipedia, Wiktionary, and OmegaWiki) has been conducted by observing and interviewing professionals in their own workplaces (see also Désilets 2007, 2010). Furthermore, a growing number of conference papers on the (online) information behavior of translators (e.g. Salmi and Chevalier 2010; Ehrensberger-Dow and Massey 2009a, 2009b; Massey and Ehrensberger-Dow 2009, 2010b; Hofer and Ehrensberger-Dow 2010) testify to the growing interest in this field of research. At the same time, we seem to be witnessing a shift away from solo researchers to research teams—a consequence of the application of multi-method approaches to the study of translation processes and the explosion of data resulting from these approaches.

A cursory look at previous studies within the areas of library and information science (LIS), user studies, and documentation shows a wealth of research into the information behaviors of various user communities. While translators are not a major target group of research within these areas of study, there are nevertheless a number of studies addressing their information behaviors. These are Palomares Perraut and Pinto Molina's (2000) survey mentioned above, Pinto Molina and Sales Salvador's (2007, 2008a) case studies, and White, Matteson, and Abels' (2008) focus group study. In particular, Palomares Perraut and Pinto Molina address the information needs and information seeking behaviors of a sample of 96 professional translators who completed an electronic questionnaire. Pinto Molina and Sales Salvador's case studies are part of a broad research project aimed at describing “students' conceptions of information needs, search and use (that is, their information behaviour), and also the views of both the community of professional translator trainers and interpreters” (2008a: 47). To this end,

Pinto Molina and Sales Salvador collected their research data via an expert panel (carried out by e-mail) consisting of eight teachers in translation and interpreting, which was used to design a first questionnaire completed by 193 translation students and a second questionnaire completed by 35 academic staff in translation and interpreting across several Spanish universities. White, Matteson, and Abels' study, finally, is based on focus group interview sessions with a total of 19 professional translators.

There is little doubt that all these studies make a highly significant contribution to the identification of translators' information behaviors. Nevertheless, as Massey and Ehrensberger-Dow (forthcoming) admit, "any survey of self-reported practices leaves a number of questions unanswered ... We can only properly understand what is being done in the workplace by employing additional methods ... to monitor what is actually being used, how and why." For the in-depth study of Web search behaviors embedded in translation, and as Chapter 5 shows, this project uses grounded theory as its main research approach and multiple-case study as its main research method, combining various qualitative and quantitative sub-methods, data-collection tools, and data sources for triangulation purposes. In particular, the study employs direct observation via screen recording and survey research using two types of questionnaires (a background questionnaire and an online search report) as well as semi-structured interviewing. The data sources include the completed background questionnaires, the translated texts obtained from two tasks dealing with the translation (from Spanish into English) of two popular science texts, the online search reports completed for each translation task, the corresponding screen recordings, and the one-to-one interviews conducted with the student participants. Qualitative analyses supported by descriptive statistics are used to process the data and provide a multi-faceted overview of the participants' Web search behaviors.

The selection of the research methods and data collection tools for this study is based on the overview of the previous work in translation process research provided in Chapters 2, 3, and 4. In these chapters, I pay particular attention to methodological issues involved in researching translation processes using both introspection and observation—i.e. the two main research methods available to study cognitive aspects of translation. As I will show, all the methods available have their own strengths and weaknesses; hence the need for triangulation. Furthermore, the choice of methods for any translation process-oriented research is necessarily constrained by a number of

factors, including the type of research questions asked as well as the availability of research participants, equipment, funding opportunities, etc. The ontological and epistemological positioning of the researcher should, of course, also be considered. To this respect, and as Chapter 5 explains in detail, the essentially exploratory and qualitative nature of this study is informed by previous Web searching studies that follow a contextual approach to the study of information search behavior on the Web. As White and Iivonen state,

[m]uch that is known about Web users' behavior in looking for information is derived from qualitative studies that have followed searchers throughout the process on a few questions ... or from studies that analyze [transaction] logs containing the strategies without the actual questions or the reasons underlying the strategies ... In the first case, in using a holistic approach researchers have been able to identify relevant search factors, common practices, and styles of searching on the Web. In the second case, researchers understand specific search steps and errors in query formulations, but the detail lacks contextual information about questions or users that would make the analyses more useful (2001: 722).

It should be noted at this point that Web searching (or Web-based information search) is a notion that can be presented under different headings such as information behavior (IB); information seeking (IS) or information-seeking behavior (ISB); information search behavior (ISchB); information retrieval (IR); and interactive information retrieval (IIR) (cf. Wilson 1999: 263 and Aula 2005: 5; see 5.1 for an overview of these concepts). Most importantly, it is a notion typically restricted to the use of IR systems such as search engines. In this study, however, the notion of Web searching is not limited to search engine use only. Rather, it refers to all kinds of search behaviors and online actions conducted on the Web to seek and retrieve information using multiple resources as well as types of searches (e.g. direct address searches, browse searches, subject directory searches, and search engine queries). Hence, the notion of Web search behaviors is used interchangeably with other IB-related notions, such as online information/search behaviors, information seeking and retrieval, etc.

From the perspective of information behavior, the theoretical framework for this Web searching study (see Chapter 5) draws on previous information-seeking models that adopt a problem-solving approach to the understanding of IB (e.g. Kuhlthau 1991, 2005; Wilson 1999, 2005; Dervin 1996). From the perspective of translation studies, it also draws on the cognitive approach to translation, conceptualizing it as a problem-solving activity. Thus, given that the need to seek, retrieve, use, and generate translation

information depends on the type of users and the translation tasks performed, the study examines the participants' online search behaviors in connection with a number of translation task attributes (text type and translation brief) as well as user attributes (translation expertise, Web search expertise, and domain knowledge). Both sets of attributes are analyzed in Chapter 6 (as well as in Chapter 7) along with the findings of the participants' working styles, conceptualized here in terms of time usage and task progression. In Chapter 7, the participants' Web search behaviors are then modeled based on my notion of "Web search task." This notion involves four information-seeking (IS) stages within the context of translation problem solving, namely (a) the formulation of a search need, (b) the specification of a search goal, (c) the implementation of a search process, and (d) the selection of a search outcome.

The data analysis in Chapters 6 and 7 follows an iterative process that moves from the research questions to the research data and then, in line with the principles of grounded theory, from the emerging patterns to the literature, back to the research data, and so forth (cf. White, Matteson, and Abels 2008: 580). This iterative research process leads to the summary of findings presented in Chapter 8, where implications for the teaching and learning of information skills are drawn as well. Here, a plea is made for integrating these skills in specialized translation courses so as to expand and consolidate the information skills acquired in other translation-related courses. I also make several methodological observations and discuss possible avenues for future research, in particular concerning the study of translators working with languages of limited diffusion that are less well represented on the Web.

2. Research into Translation Processes

2.1 Towards the Empirical Study of Translation

2.1.1 From Product to Process-oriented Translation

In past years, translation theory was mainly concerned with the study of translation as a product resulting from a translation process. This concern was primarily driven by an understanding of translation from the perspective of contrastive linguistics, where comparative analyses of the original text and its translation were carried out to hypothesize about the equivalence relation between the two texts (House 2000: 149-150). Translation product-oriented studies have nevertheless also “led to more ambitious hypotheses about what happened ‘in between’ the two texts so to speak, i.e. what the translational process was like that linked source text and target text, and many different models of translation were set up,” often reflecting a translator’s competence (ibid: 150). A similar observation is made by Lörcher, who argues that prior to the 1980s

translation theory was primarily concerned with two phenomena ...: with translation as a *product* and with translation *competence*. Translation as a product that is a written text in a target-language (TL), which represents the result of a translation process, had been described and analysed by a comparison with the respective source-language (SL) text. The relation between the SL text and the TL text had been the object of the numerous and highly abstract models of equivalence (Koller 1978; 1983: 95; Lörcher 1981: 393). In most cases, these models were prescriptive in nature and of very limited use for the practical translator. Translation theory was mainly competence-oriented and concentrated on the internalized knowledge of the professional translator (Lörcher 2005: 597, emphasis in the original).

While some product-oriented models of translation have attempted “to delineate the sequence (or parallel occurrence) of operations through which a translation ‘emerges’ from an original text, these models have traditionally not been based on empirical investigations into the ‘black box’, the translators mind” (House 2000: 150). Furthermore, the study of translation from a purely product-oriented perspective was considered to provide “a very incomplete and often misleading way into the translation process, hiding both successful strategies and problems” (Bernardini 1999: 179). As a consequence, translation studies shifted its “interest away from prescriptive and rather anecdotal attitudes, towards more descriptive, scientific positions,” leading to an

increase in the empirical study of translation as a process (ibid.). This shift of interest in the discipline is also acknowledged by House, who asserts that

[s]tarting with Sandrock's (1982) pioneering study, which was followed by the simultaneous but separate attempts on the parts of several researchers who developed the idea of analysing the translation process by means of 'think-aloud data' (cf. the contributions in House and Blum-Kulka 1986; Færch and Kasper 1987 and see Tirkkonen-Condit 1991), the translator's mind has in the past fifteen years become increasingly an object not so much of speculative theoretical concern but of empirical inquiry focusing on 'what goes in the translators' mind when they are translating' (Krings 1986) – a development which clearly mirrors the paradigmatic changes in the field of applied linguistics away from contrastive analyses of (parts of) the language systems and of such observable facts as errors and mistakes onto the psychological construct of an 'interlanguage'" (2000: 150).

Likewise, Lörscher (2005: 597, drawing on Toury 1980: 41) describes early translation models as "theoretical and speculative rather than empirical," often based on idealized conceptions rather than on actual data. Lörscher further explains that limiting the object and the scope of research into translation as a product was recognized as a "deficit." In an attempt to overcome this deficit, "a new, process-oriented, performance-analytical discipline" developed in translation studies (ibid.), and from the 1980s onwards, the study of translation was no longer "bound to linguistic models" (Shreve and Danks 1997: viii). Rather, alternative models and concepts from other disciplines, "especially psychology and its subdisciplines," were deemed necessary for a complete and meaningful understanding of translation. In particular, cognitive science and cognitive psychology became "sources of inspiration for those translation scholars building empirical models of the translation process" (ibid.).

2.1.2 Defining Features of Translation Processes

In studying translation processes, researchers attempt to understand what goes on in the translator's head (as opposed to what scholars claim might go on) between the comprehension of the source text and the production of the target text. As it is impossible to observe the human mind directly (see 2.2.1 for details), a number of research methods have been developed to indirectly gain access to the translator's mind. One such method, known as "introspection," has been originally developed within the field of psychology,

where the validity of introspective reports as empirical instruments to uncover subjects' thought processes had been fiercely debated ever since its introduction into German experimental psychology by Winhelm Wundt in the late nineteenth century. While such a mentalist procedure as

introspection was taboo in behaviourism, researchers who followed the paradigmatic shift to cognitive psychology felt licensed to use this method anew (House 2000: 150).

The data elicitation tool most often employed in introspective research into translation processes is known as “thinking aloud,” which involves asking translators to verbalize “their mental processes in real time while carrying out a translation task” (Bernardini 1999: 179). It should be clarified though that “thinking aloud is a means of collecting data for research, i.e. it is not a research method in the sense of a method of analysis” (Jääskeläinen 2002: 108). The main goal of thinking aloud is to

elicit a spontaneous, unedited, undirected, stream-of-consciousness type of account from the subject. To accomplish this, subjects need to be familiarised with the method by warm-up tasks prior to the experiment proper. The resulting data are messy, but it is the researcher’s task to make sense of the mess; the translating subjects are *not* expected to analyse their performance or justify their actions, i.e. thinking aloud as a research tool is not, strictly speaking, a ‘mode of reflection’. The subject’s task performance is recorded (on audio- or videotape) and the tapes are later transcribed into *think-aloud protocols*” (ibid., emphasis in the original).

Nowadays, research into the process of translation aims primarily at improving the understanding of how a translation comes into being. When referring to the term “process of translation,” we should not forget, and as House points out, that “we are dealing here not just with an isolable process but rather with a set of processes, a complex series of problem-solving and decision-making processes” that are constrained by a number of semantic, pragmatic, and situation-specific factors (2000: 150). House further states that “[w]e can thus look upon ‘the process of translation’ as any number of operations undertaken by a translator when ... converting (part of) a source text into a translation text” (ibid.). For Malmkjær, the term “translation process”

may be used to designate a variety of phenomena, from the cognitive processes activated during translation, both conscious and unconscious, to the more ‘physical’ process which begins when a client contacts a translation bureau and ends when that person declares satisfaction with the product produced as the final result of the initial inquiry (2000: 163).

In a similar fashion, Séguinot argues that the term “process” has at least two meanings: “The first refers to the progressive, physical production of a translated text ... [and the second] to the conscious and unconscious mental operations that go on during translation” (1989a: iii). In addition, Jääskeläinen points out that “for some researchers [the translation process] begins when a client/commissioner contacts a translator” (2002: 108). In a research setting, she proposes that, for practical reasons, “the process

begins when the researcher gives a source text, preferably together with a translation brief, to the subject. The process ends, when the translator hands in his or her translation – to the client or to the researcher” (ibid.). For Zabalbeascoa, the term “process” may be used in a *broad sense* to refer to

the stages of designing a translation project, selecting the source text (ST), hiring/selecting translator(s), getting the ST to the translator, getting the target text (TT/translation) back from the translator, editing of the text and all the other stages of publishing (or broadcasting, etc.) and distributing a TT and getting it to its target users (2000: 118).

Zabalbeascoa further explains that process can also be used “to refer to the linguistic and/or mental operations within the ‘narrow context’ of a translator who is faced with a ST and a commission to translate” (ibid.). The translation process in this case begins with the analysis of the ST and continues until the finding of “satisfactory renderings for individual aspects and items of a ST in the TT and for the text as whole” (ibid.). He goes on to argue that “narrow context” studies provide the “context for psycholinguistic studies and cognitive notions of *process*” (ibid., emphasis in the original). Indeed, the majority of the studies on cognitive translation processes discussed in this thesis, including my study, use the term *process* in such a narrow sense. This is not to say, however, that the psycholinguistic and/or cognitive view “[nurtures] the belief that translation is fundamentally an individual activity, ignoring the possibility of a task carried out by more than one translator” (ibid.). Furthermore, as Malmkjær (2000) points out, translation should be viewed not only as a process, or a series of complex processes, but also as a product. Given that translations are produced by people

they invariably bear marks of their creators; and people are affected by the circumstances in which they act. Therefore, it is not possible to separate absolutely the study of the translation product from the study of the translation process ... and a complete theory of translation ... must account for all three aspects of translation: (primarily physical) products, (primarily mental) processes, and those affective factors which arise from the settings and scenes ... in which translations are commissioned, made, distributed and used ... (ibid: 164).

Finally, one should keep in mind that in any study aiming to make inquiries into cognitive processes introspective methods such as thinking aloud (TA) do not give access to mental processes per se but to the *products* resulting from such processes. In other words, cognitive (translation) processes are not directly observable. Hence, like many other researchers in our field, I adopted a problem-solving approach to the study of translation in order to interpret my research data (see Chapter 3 and section 5.1.2 for

more details). I will return to methodological aspects of introspective research first in 2.2.1—to further discuss the (in-)direct accessibility to mental process—and then in 4.1.1—to outline the (dis-)advantages of using verbal reporting as a method for research into translation. In the following, however, I will first analyze other key features characterizing research into translation processes.

2.2 Key Characteristics of Translation Process Research

2.2.1 The Nature of Consciousness

One of the main assumptions behind all research into translation processes “is that the translator has at least partial control over what [he or] she is (mentally) doing, and that the mental activities involved in a translation are at least partially or potentially accessible,” i.e. open to conscious inspection and, hence, to verbalization (House 2000: 151). This assumption has its origins in the information processing theory of human cognition, where it is hypothesized “that a cognitive process can be seen as a sequence of internal states successively transformed by a series of information processes” (Ericsson and Simon 1984/1993: 11 and 1987: 25). According to Ericsson and Simon’s cognitive model of information processing, information is kept in several memories that have different storage and access capabilities. The different memories consist of “several sensory stores of very short duration, a short-term memory (STM) with limited capacity and/or intermediate duration, and a long-term memory (LTM) with very large capacity and relatively permanent storage ...” (ibid.). Ericsson and Simon’s model assumes that “information recently acquired (attended to or heeded) ... is kept in STM, and is directly accessible for further processing (e.g. producing verbal reports), whereas information from LTM must first be retrieved (transferred to STM) before it can be reported” (ibid.).

There are three main implications resulting from Ericsson and Simon’s model. First, only mental operations entering the short-term memory are available for direct access and hence for verbal reporting. Second, verbal reports can reflect mental processes without affecting them. Third, “practice and experience may affect the amount of processing carried out in STM, so that fewer mental states will be available for verbalization to subjects experienced in a task,” a phenomenon known as “automation” (Bernardini 2001: 243). In this section, I focus on the first implication of Ericsson and

Simon's model of information processing (access to mental processes). I will discuss the two remaining implications in section 4.1.1.

The main procedure to gain access to mental processes so far has been verbalization (of which thinking aloud is a type of data collection tool), "a technique where subjects report orally on the cognitive processes associated with a particular task" (Dragsted 2004: 24). The use of introspective data for investigating cognitive processes, however, has been widely criticized, for example in the field of cognitive science. Most criticism concerns the validity and reliability of such data for the purpose of examining the nature of conscious awareness and its limits. Likewise, issues revolving around the nature of consciousness have generated a controversial debate among translation process researchers.⁶ Kiraly (1995: 39-40) and House (2000: 150), for example, refer to Nisbett and Wilson's (1977) claim that conscious mental processes underlying choices, judgment, and behavior are inaccessible to conscious awareness (and, hence, to direct introspection), mainly because the latter is constrained by the *products* resulting from mental processes. House further argues that said claim "has never really been disproved, not least because the dichotomy between 'product' versus 'process' is far from being clear and unchallenged" (2000: 150).⁷ She also refers to Ericsson and Simon's (1984) inconclusive results as to whether some kind of conscious introspection can be trusted at all. It follows that "verbal reports about what goes on in one's mind can be used reliably to indicate the *outcome* of a decision ... but that such reports are less reliable about the processes leading to the decision" (ibid: 151-152, emphasis in the original). House is nevertheless critical of, and perhaps rightly so, "the simplistic assumption that all processes relevant for behaviour occupy short-term memory and are thus 'noticed', i.e., raised to consciousness, and verbalized" (ibid: 152). She posits that

processes that are not noticed may still have an influence on behaviour, and other processes while being noticed may not be consciously appreciated in their full significance but still influence our emotions, attitudes and plans without our being aware how we are being influenced. As Ledoux (1996: 307) points out 'Even if we holly accept the Ericsson and Simon view that some aspects of cognition can be characterized on the basis of introspective verbal reports, there remains for much of the cognitive mind to operate below the tip of the iceberg' (ibid.).

⁶ As Pavlović points out, the use of alternative terms to refer to *conscious* processes "such as 'automatic', 'routine', 'non-routine', 'intuitive', 'strategic', 'controlled' and 'uncontrolled' ... makes the situation even more complex" (2007: 26).

⁷ Lörcher (1991: 37) and Kiraly (1995: 40), drawing on White (1980: 105), also highlight the lack of satisfactory terminological definitions of product and process.

One way to bypass the debate over which mental processes are raised to conscious or unconscious awareness is to dissolve such a dichotomy. In discussing the role of intuition in translation—a phenomenon understood by Kiraly as involving the spontaneous association between terms and concepts in uncontrolled mental processes—Kiraly refers to Hönig (1990), who “conceptualizes cognitive-intuitive processing chains, where controlled processes alternate with intuitive ones in a manner that is neither predetermined nor completely desirable” (1995: 49). For Hönig, “[c]ognitive and intuitive factors alternate without any observable coordination and without evidence of a progression of mental processes” (1990: 9, cited in Kiraly 1995: 50). In other words, he views controlled and uncontrolled cognitive processes as being “interdependent” (1991: 80). Similarly, Chesterman (1993) also views conscious “actions” as alternating with unconscious “operations” in translation as well as Kiraly (1995), for whom controlled and uncontrolled translation processes are interdependent cognitive activities. Moreover, in his study of translation processes Kiraly did not find “sufficient evidence that processes are either completely controlled or completely automatic” and therefore distinguishes between “relatively controlled or automatic” processes (1995: 86) and “relatively uncontrolled (intuitive) processes” (ibid: 87).

2.2.2 *The Progression of Translation*

As it can be inferred from Hönig’s and Kiraly’s studies mentioned above, it appears that controlled and uncontrolled translation processes tend to mix in a rather unpredictable manner. According to Kiraly, Hönig’s study also suggests that “translation processing does not proceed in an orderly, step-by-step fashion” (1995: 50). This suggestion seems to be supported by other scholars who have examined the (non-)linear nature of translation. Séguinot, for example, found evidence in her study of management issues in translation that “the progress of the translation is much more complex than a linear progression or even a series of procedures for arriving at equivalences where the structures do not coincide” (2000a: 146, cf. Séguinot 1996). Séguinot goes on to argue that

translation can be *non-linear*, that it can be *iterative*, meaning that though a translation is arrived at the mind continues to look for alternatives and comes back to the same item or structure, and there is *parallel processing*, meaning that the translator can be working on more than one item, structure, etc. at a time (2000a: 146, emphasis in the original).

Two of Séguinot's findings are of particular significance, i.e. that translation processes are *iterative* and that they are conducted in *parallel*. First, as regards the iterative nature of translation, Dancette found several indicators of efficient translation strategies in her study of meaning and comprehension in translation and observed that "the best performers have a larger range of avoidance strategies that allow them to go on with the translation and to set the problem aside. They come back to it as they are working on other segments" (1997: 102). Likewise, Tirkkonen-Condit explains that previous research into translation processes, in particular Jääskeläinen (1990), Krings (1988), and Laukkanen (1997), "has shown that ambitious translators tend to work in a spiral kind of fashion: they do not try to solve all problems at once but leave problematic points open and come back to them over and over again until a feasible solution emerges" (Tirkkonen-Condit 1997: 79). In addition, Kiraly explains that Krings (1986a) "found evidence differentiating professional from non-professional translation ... [where] the professional proceeded in a more concentric fashion through the text, as opposed to the lineal progression of the nontranslator" (1995: 48). As regards the latter type of performance (non-professional), Kiraly argues that "the models proposed by Krings suggest that his subjects' translation procedures were applied linearly, moving in systematic progression from one strategy to the next" (ibid: 46). Similar results were obtained by Pöntinen and Romanov (1989), who compared the translation processes of a professional translator to those of a non-professional translator. While the latter proceeded in a linear fashion, the former shifted backward and forward through the text and concentrated on problematic items. This type of "retrospective-prospective" translation behavior was also detected by Lörcher (1986), albeit in relation to second-language students who produced oral translations of two written texts in their L2. Based on his data, Lörcher suggests that "the translation process is neither exclusively linear nor continuous" (ibid: 287). He goes on to explain that, within the framework of problem solving, the prospective element of translation entails progressing towards an intended goal. In reaching this goal, "subjects often use retrospective strategies such as monitoring and rephrasing (of SL and TL text segments)" (ibid.). Like Lörcher, Gerloff also observed that the translation process (like any writing process) "is neither exclusively linear nor continuous, but is, instead, a retrospective-prospective process characterized by numerous backtrackings which preclude a directly forward movement through the text" (1988: 127). In her study of the translation processes of three groups

of subjects (second-language students, translators, and bilinguals, respectively), she found evidence that

the translator and bilingual groups engaged in much more intensive processing than the students did. They evidenced higher volumes of processing, which were associated as well with more 'retrospective' skips backward in the text. Additionally, bilinguals and translators went through the text more times than the students did – a behavior which, again, has a strong 'retrospective' component to it; it, too, is a behavior which to an analyst would not at first appear to be optimally 'efficient' or economical ... Further support for Lörscher's suggestion that this sort of retrospective behavior may well be optimal and economical for the translator (even if it appears to the analyst to be inefficient) is provided by the fact that more retrospective processing, not less, seems to be associated with higher quality translations (Gerloff 1988: 130-131, building on Lörscher 1986).⁸

Second, concerning the notion of parallel processing (as per Séguinot's definition above) in translation, Danks and Griffin's psycholinguistic study of reading and translation suggests that translators work "on various possibilities for translation at the same time that she or he is comprehending the source text" (1997: 174).⁹ In other words, translators "do not first comprehend the source text fully and only then begin the process of translation." Rather, the authors believe that comprehension and production processes may take place simultaneously. They further explain that "claims for a highly interactive process of comprehension and translation are consistent with the research literature on reading and listening comprehension" (ibid.). Similarly, Séguinot asserts

⁸ The conceptualization of translators' iterative behavior in translation problem solving seems to hold some parallels with the notion "that human beings are optimisers or maximisers," as put forward by theories of decision making (Jääskeläinen 1996: 71, drawing on Howard 1983: 424-425). In decision-making processes, optimizers are believed to assess all the possible "alternative actions and outcomes [before they] eventually choose the best possible alternative, *i.e.* the one with the optimal cost-effect ratio" (ibid: 71-72). One could comment, however, that although the search for *best* alternatives might be "optimal" (for optimizers) or "ambitious" (for certain translators), it does not seem very economical and therefore, from a professional standpoint, not very realistic. This observation seems somewhat akin to that of Herbert A. Simon (1956, 1979, cited in Jääskeläinen 1996: 72), who considers human beings "satisficers" rather than optimizers. For Howard, the former are decision makers who "accept a choice that is good enough rather than continuing to search for one that is the best possible" (1983: 424, cited in Jääskeläinen 1996: 72). Yet, although the professional translator may be thought or expected to be someone who spends "little time and effort on translation tasks" due to time constraints, for example, this "does not apply to all situations or all translators" (Jääskeläinen 1996: 71). Other factors that may affect translation behavior include, among others, assignment-related features, translators' motivation, interest, aptitude, attitude, etc.

⁹ Danks and Griffin's suggestion that translators work "on various possibilities for translation at the same time" (1997: 174) is somewhat akin to Pym's minimalist concept of "translation competence," which "basically sees translating as a process of producing and selecting between hypotheses" (2003: 492). More specifically, Pym's minimalist approach to translation competence follows two sets of skills: (a) the "ability to generate a series of more than one target text (TT₁, TT₂ ... TT_n) for a pertinent source text (ST)" and (b) the "ability to select only one viable TT from this series, quickly and with justified confidence" (2002: n.p.).

that “[i]n cognitive psychology and in related language research the last two decades of research have led to the development of new, associative, non-linear models to explain the composing process and the comprehension and production of text and discourse” (1989b: 2). Yet, in translation studies other researchers found evidence to the contrary. Kiraly, for example, observed that all the subjects (both non-professional and professional translators) in his study

read through the entire source text before beginning to translate ... [and then] progressed through the text in a basically linear fashion, producing translation solutions for individual elements as they appeared sequentially in the text. There was very little backtracking to previous units in the source or target text (1995: 87).

Similarly, Jensen found out in her study of time pressure in translation that all her subjects (including professional and non-professional translators) “read the source text before beginning to translate ... [and then] progressed through the text in a basically linear fashion, producing translation solutions for individual elements as they appeared in the text” (1999: 111). All the studies mentioned above point to the fact that some subjects translate in a more or less linear fashion than others. The difference in performance is commonly attributed to the subjects’ level of translation professionalism,¹⁰ although it may of course also be a question of different translating and/or cognitive styles, among other factors. Nevertheless, as Pavlović points out, “[i]t remains to be seen whether future studies will confirm the link between a higher instance of non-linearity and a higher degree of translation competence” (2007: 29). I will discuss this and other research goals in the investigation of translation processes in the following section.

¹⁰ As with most of the TAP studies discussed in this chapter, the notion of “professionalism” is typically associated with other concepts such as “expertise” or “competence.” For reasons explained in sections 2.3.1 and 5.2.1, the association of translation professionalism with translation expertise is, however, not endorsed in this thesis. Building on Séguinot, I will use “professionals” to refer only to “translators who spend all day, day after day, translating” (1997: 109), i.e. who earn “a living by translating” (Jääskeläinen 1999: 8; cf. González Davies and Scott-Tennent 2005 for their notion of “full-time translators”). Furthermore, while professionalism is taken here to involve the ability of a translator to join and attain professional status within the community of full-fledged translators, expertise involves translation processes that result in good quality performance (see Kiraly 2000a: 13 for his distinction of “translator competence” vs. “translation competence”). Translation expertise, as Tirkkonen-Condit points out, “captures the idea that it is not professional status we are interested in but expert-level performance and the processes that account for it” (2005: 406).

2.3 Aims and Hypotheses in Think Aloud Protocol (TAP) Research

Empirical research on translation processes has been motivated by a wide range of research interests. These have, in turn, determined the choice of subjects in TAP studies (e.g. from second-language learners and translation students to professional translators and/or combinations of these); the languages involved (subject to the linguistic competence of the researchers and the setting of the studies); the objects of research (such as translation problem-solving strategies, decision-making criteria, units of attention, attitudinal and affective factors, translation tasks, etc.); and the data analysis methods (qualitative, quantitative, or both) (cf. Jääskeläinen 1996: 60). This section attempts to classify different TAP studies according to their object of research and their hypotheses. However, due to the large number of studies available and the wide spectrum of process features examined by process-oriented researchers, I will only focus on TAP studies that are most relevant for the purpose of this study.¹¹ These are studies that directly or indirectly address some of the research attributes that I selected for the purpose of this thesis, i.e. user-related attributes (translation expertise, Web search expertise, and domain knowledge) and translation task-related attributes (text type and translation brief) (see 5.2.1 and 5.2.2 for details). Except for aspects relating to Web search expertise, which I discuss in detail in Chapter 5, I will elaborate upon the remaining research attributes in the two following sections. More precisely, I will first discuss early, first-generation TAP studies, whose research aims are very general and tend to focus on features of *translation expertise*. I will then describe later, second-generation TAP research, which is more narrowly focused, and where I pay special attention to studies that explore translation task-related aspects, (including *source text type*, *source text domain*, and *translation brief*) as well as affective and/or attitudinal factors (such as self-image, personal involvement, and motivation).

2.3.1 First-generation Studies

The use of think aloud protocols (TAP) to study translation “dates back to 1986 and the publication of four articles reporting on TAP projects,” namely Dechert and Sandrock

¹¹ For attempts at systematically classifying the existing body of research into translation processes using think aloud protocols see, for example, Bernardini (2001) and (Jääskeläinen 2002). Additionally, the TransComp Research Group in Austria provides a comprehensive bibliographic database of process-oriented translation studies (see <http://itat2.uni-graz.at/pub/transpro/> for details) and the PETRA Research Group in Spain several resources on cognitive translation processes, among others (see <http://www.petraweb.org/home.htm> for details).

(1986), Gerloff (1986), Krings (1986a, 1986b), and Lörcher (1986) (Jääskeläinen 2002: 107). These studies followed the pioneering work of Ursula Sandrock, who conducted the very first TAP study into translation as part of her *Diplomarbeit*, which was “supervised by Hans Dechert at the University of Kassel (Germany) ... [and] completed in 1982” (ibid.). From the early 1980s onwards, thinking aloud became a popular data elicitation method used to explore a wide range of research foci in translation. In addition to improving our understanding of translation processes, these research projects pursued a pedagogical purpose (see, for example, most of the TAP studies included in House and Blum-Kulka 1986 as well as Færch and Kasper 1987). The motivation for “transferring research findings to translation pedagogy is,” according to Tirkkonen-Condit, not very surprising, “as the researchers were themselves teachers of translation in departments of foreign languages or in schools of translation studies, where they also had access to voluntary subjects for experiments” (2002: 5). Tirkkonen-Condit further explains that while

Pamela Gerloff, Hans-Peter Krings and Wolfgang Lörcher in their pioneering work were primarily focused on identifying the nature of process phenomena, most of the other researchers in the 1980's and early 1990's were already in the lookout for applications. Pedagogical relevance is clearly highlighted in the work of Donald Király, for example, who challenges the old-established didactic routines of a teacher-centred translation class and argues for a constructivist approach to learning and teaching (see Király 1990, 1995, 1997, 2001). Paul Kussmaul with his colleague Hans Hönl also used students' performance as a data base, and focused on identifying such strategies for solving translation problems that could be taught to novices in translation (see, e.g., Hönl 1988; Kussmaul 1989, 1995). Frank G. Königs is another scholar who deserves to be mentioned among those whose empirical findings from translation students' performance contributed to the theory of the translation process already in the 1980's (see, e.g., Königs 1986, 1987, 1991) (ibid: 5-6).

Kiraly also refers to the researchers mentioned by Tirkkonen-Condit above to state that, like himself, these researchers “have been gathering introspective data from subjects involved in translation activities, not only to look into the translator's back box but also with the aim of improving translation skills instruction” (1997: 138). This pedagogical aim in early TAP research had been, as shown above, preceded by a general interest in the nature of translation processes. More specifically, early attempts at gaining access to cognitive translation processes set out to “decompose” said processes “into different operations, procedures, or strategies” (House 2000: 152). House elaborates on this point by stating that

[w]hile the ‘first generation’ of investigations into translation processes can ... be characterized by a concern with typology and classification of certain specifiable ‘units’ (strategies and procedures) making up these processes, the second generation of studies can be regarded as being more concerned with questions that have a bearing on the outcome achieved through the operation of certain (hypothesized) processes ... – an important objective from a pedagogical standpoint” (ibid: 153).

Kussmaul and Tirkkonen-Condit take this argument one step further and explain that analyses of think aloud protocols “have at least two pedagogical purposes in mind” (1995: 178). First, if translation experts are used as subjects, the strategies identified in the TAPs “may serve as models for successful training” (ibid.). Second, if translation students are the subjects, then the analyses of their TAPs may be used to identify their translation problems. In both cases, the results of the analyses can ... form a basis for translation pedagogy” (ibid.). In this regard, my study on Web searching for translation purposes shares some of the features that characterize early TAP research. For instance, this study (a) is pedagogically motivated in that it aims at exploring translation problems encountered by students and at drawing implications for translator training; and it (b) focuses, among others, on *strategies*, albeit not so much on translation strategies in general, but on specific *behaviors* for seeking translation-related information on the Web.¹² This narrower focus of my study is thus a feature also shared by later TAP studies investigating particular aspects of translation processes (see 2.3.2 for details)—in my case, aspects of Web searching.

House’s study on the strategic use of aids for translation, for example, also belongs to the “pedagogically motivated line of studies that spring from an interest in improving the quality of translations, through research which links alleged procedures or strategies with products” (2000: 153). In these studies, a model that identifies “correlations between translation problems encountered, translation strategies implemented to solve those problems, and translation products yielded by the strategies could be developed” (Kiraly 1995: 50, building on Wilss 1988 regarding his suggestion that the translator only resorts to intuition when controlled processing fails to produce acceptable solutions

¹² Although translation strategies are one of the major concerns in early TAP research, I will discuss these in a section of their own (see 3.2). The main reason for doing so is that subjects’ research behavior, of significant importance here, is typically discussed within the realm of general translation strategies. For a detailed discussion of the notions of “strategy” and “behavior,” see 3.2.1.

to perceived problems).¹³ Kiraly argues that such a model “could encourage the development of rule-based translation instruction, in which strategies could be memorized for controlled application to corresponding translation problems” (ibid.). Like Kiraly’s study, however, this thesis does not aim at developing a model that could lead to the development of rule-based translation instruction. Rather, it aims at exploring, among others, the relationship (if any) between translation quality and Web search behaviors. The results obtained could in turn be used to enhance translator training practices.

House’s study is particularly relevant here as it specifically “deals with the practice of using dictionaries and other translational aids in the process of translating” (ibid.), albeit involving language learners as opposed to translation students, who are the participants of this study—I shall return to House’s and other similar studies in 3.3.2. The choice of language students (i.e. neither professional translators nor translation students) for research into translation processes is another feature shared by early TAP studies. For example, some researchers have collected verbal reports from second-language learners (Gerloff 1986; Krings 1986a, 1986b; and Lörcher 1991), from philology students (Dechert and Sandrock 1986; Königs 1987) or from secondary school teachers completing their teaching degrees (Lörcher 1986; Krings 1986a). As acknowledged by Jääskeläinen, “[t]ranslation as a form of language use has frequently been involved in [these studies], either as the object of study or as the means of eliciting data” (1989: 87).

Lörcher, for instance, studied the translations produced by non-professional translators “because of the hypothesis that every individual with a command of two or more languages also possesses a rudimentary ability to mediate between these languages” (1991: 3). However, choosing language students as subjects in TAP studies “meant limitations on the generalisability of the findings. It also raised justified objections among translation scholars” (Jääskeläinen 2002: 109). Kiraly states that “professional translation is not a simple transcoding process and that translator competence is not coextensive with second-language competence” (1995: 47). Hence, “the validity of extrapolating from the results of data gathered from nontranslators” is questionable

¹³ Yet, as González Davies and Scott-Tennent point out, “translator intuition” may involve “declarative knowledge that has become automatized” (2005: 161). That is, “[w]hat may seem automatic behaviour may well be the result of previous controlled learning” (ibid.).

(*ibid.*).¹⁴ Similarly, Kussmaul and Tirkkonen-Condit state that foreign language learners, who were the subjects of early TAP experiments, tend to translate literally to show their linguistic ability in a foreign language and that in language teaching contexts “the notion of a well functioning target text is normally non-existent or irrelevant” (1995: 179). Furthermore, selected texts in early TAP experiments were expected to pose a large number of difficulties, translation assignments were not provided, and real-life translation situations were not taken into consideration. Obviously, these experimental conditions “were completely different from those of professional translator training” (*ibid.*). Consequently, translation students (e.g. Jääskeläinen 1989; Tirkkonen-Condit 1989/1990; Dancette 1994), professional translators (Laukkanen 1993, 1997; Fraser 1994, 1996, 2000; Séguinot 1989c, 2000a; Tirkkonen-Condit 2000), or combinations of both (Krings 1988; Englund Dimitrova 1993; Jääskeläinen 1990; Kiraly 1995) were soon after used as subjects in experiments of translation processes.

So far we have seen that one of the major concerns of early TAP studies was to explore the nature of translation processes, most prominently through the identification and analysis of translation strategies. In addition, early TAP research was primarily conducted with second-language learners and/or translation students, “mainly due to the availability of subjects and to the pedagogic concerns of the experimenters” (Bernardini 2001: 244). However, these subjects were also selected for experiments of translation processes for another reason. It was hypothesized “that the verbalisations produced by professionals would be less informative than those produced by non-professionals, due to their [the professionals] more ‘automatised’ processing style” (*ibid.*: 244-245). Similarly, Jääskeläinen posits that “[o]ne of the most frequent hypotheses” in first-generation TAP research—known as the “automaticity hypothesis”—was that

many thought processes would be automatised in professional translators’ translation processes (see Börsch 1986; Krings 1986). Consequently, as automatised thought processes are inaccessible for verbalization (see Ericsson and Simon 1984), it was assumed that professional translators would verbalize little, if anything, of their thought processes. In addition, the highly automatised process would be fast and unproblematic. To make an extreme interpretation of the automaticity hypothesis, it could be argued that it was assumed that we need to acquire data from inexperienced

¹⁴ This is not to say, however, that translation competence and second-language competence are unrelated. Quite to the contrary, multicompetence studies in second-language research (see, for example, Cook 1991, 1992, 2008) have drawn a firm link between the two types of competence.

translators such as language learners and translation students, to be able to know what is missing from the professional translators' automatised, hence silent, processes (1996: 62-63).

In other words, one of the main reasons “for investigating language students was that it was assumed that professional translators' processing might be largely automated, which would have prevented them from producing verbalisations” (Jääskeläinen 2002: 109). The idea that problem-solving and decision-making processes from novices would become automated for experts and therefore would not be verbalized in the experts' thinking aloud “unless explicitly prompted” seemed to be supported at first (Tirkkonen-Condit 2002: 6).

Inssofar as automaticity of processing is believed to result from experience and proficiency in a task (Ericsson and Simon 1993 (1984); Toury 1988), it is not surprising that researchers have tried to determine whether the performance of professionals is recognizably more automatic than that of non-professionals. To do so, they have analysed the amount of marked processing in professionals' and non-professionals' TAPs (Bernardini 2001: 249).

The automaticity hypothesis was verified in Séguinot's case study, for example, in which a professional translator working for the “English Section of the Translation Bureau of the Department of the Secretary of State in Ottawa” (1989c: 22) was videotaped while translating a source text considered to be “typical of the translations done by the Section” (ibid: 23). The professional translator¹⁵ seemed to verbalize little and therefore translation processing phenomena had to be inferred from sources of information other than verbalizations, such as pauses and hesitations in typing (ibid: 31-32). In addition to producing few verbalizations, the professional translator worked in a fast and unproblematic fashion. Yet, other studies such as Krings (1988), Gerloff (1988), and Jääskeläinen (1990) found evidence to the contrary, in particular: (a) that professional translators do not necessarily verbalize less than non-professionals, and that (b) translation quality appears to be related to the amount of time and effort invested in translation processing. More specifically,

in Hans-Peter Krings' study (1988) with a professional translator as a subject, the professional engaged in considerably more processing than the foreign language learners who had translated the same text earlier (Krings 1986). For example, he problematised more source text items and used

¹⁵ The size of samples in translation process research has been rather limited, with the number of subjects in experiments usually ranging from one to five, and rarely exceeding ten. As Jääskeläinen explains, “the painstaking methods of data collection and analysis involved in process-oriented research ... [and] the search for the identification of relevant parameters” are two main reasons for keeping samples relatively small (1996: 61).

reference material more often than most of the language learners in the earlier experiments. Similar results were obtained by Gerloff (1988) and Jääskeläinen (1990). It was found that professional translators did not necessarily spend less time and effort on the experimental translation tasks than less professional subjects (Jääskeläinen 1996: 63).

Likewise, the more professional subject in Tirkkonen-Condit's study (1989: 82) made more decisions in a shorter period of time than both the semi-professional subject and the non-professional subject. Furthermore, Gerloff (1988) found out that professional translators do not necessarily perform better than non-professionals, i.e. that particular translation strategies do not always correlate with a certain level of expertise. Rather, as briefly indicated above, quality performance seems to be related to the amount of time and effort invested in a given translation task. She refers to this phenomenon as "Translation Does Not Get Easier" with increased professional experience (ibid: 54). This phenomenon is, according to Gerloff, "evident, first and very simply, in the total number of problem solving activities engaged in during ... translation, and in the amount of time subjects [spend] doing the translation" (ibid: 55). In her study, the group of professional translators engaged in more problem-solving activities than either the group of college students learning French as a second language or the group of bilinguals (speakers of French and English), "taking less time to do so than the bilinguals, but more time than the students" (ibid: 59). In other words, the professional translators were more efficient problem solvers than the bilinguals but less than the second-language learners.¹⁶ Jääskeläinen (1996), for example, set out to explore the translation-does-not-get-easier phenomenon by comparing the results of the study she conducted in 1990 with the results of Gerloff's (1988) study. The purpose of the comparison was to test two hypotheses: "(1) that not all the translation processes are carried out more quickly and more easily as professional experience increases, and (2) that the time and effort invested in the process is likely to be reflected in the quality of the product (irrespective of how experienced the translator is)" (Jääskeläinen 1996: 63).

¹⁶ For Gerloff, efficiency, a term she borrows from Tirkkonen-Condit (1986), is the "average number of problem-solving activities engaged in per minute ... Thus, greater amounts of problem solving activity performed during the same or shorter period of time would indicate higher levels of efficiency in processing" (1988: 59). Notwithstanding the importance of Gerloff's results described above, it should be pointed out that one of the main differences between non-experienced and experienced translators "is the ability of the latter to *spot a problem* and to apply adequate *strategies* and *procedures* to solve it *efficiently* and as *quickly* as possible" (González Davies and Scott-Tennent 2005: 162, emphasis in the original). In this regard, and as González Davies further pointed out to me, "problem-spotting is more cognitively challenging than solving in the sense that you cannot solve what you have not spotted" (personal communication).

The results obtained led Jääskeläinen to conclude that both her study and Gerloff's indicate that "official professional status does not seem to be an automatic guarantee of success, at least not in all kinds of translation tasks" (ibid: 64). These results were "dramatic enough" for both Gerloff and Jääskeläinen "to reformulate [their] basic research question and look at features of successful processing instead of features of professional processing" (ibid.).

In light of the above findings, i.e. that "the relationship between expertise and professional status is not as straightforward as it would seem at first" (Séguinot 1997: 108), the early automaticity hypotheses in translation along with the notion of professionalism had to be refined (Jääskeläinen 2002: 110). As a result, new hypotheses were formulated in later TAP studies to investigate mainly the relationship between translation ability and specific features of translation processes.

2.3.2 Second-generation Studies

The realization that professional status is not necessarily related to expert-level performance had important consequences for later protocol studies aimed at investigating translation expertise. While the main object of research in early TAP studies was the identification of features that characterize expertise by looking at differences between novice and expert performance, new hypotheses developed in later studies aiming at investigating the process of acquiring translation expertise, or competence (see below). In second-generation TAP research, differences between experts and non-experts are also examined, albeit in relation to a number of specific features (see below) believed to affect translation processes and their products. As mentioned before, in this section I will only focus on process features that involve task-related aspects (text type, text domain, and translation brief) as well as affective and/or attitudinal factors (such as self-image, personal involvement, and motivation).

One of the features thought to influence translation processes concerns the type of translation task used in process-related experiments, in particular as regards the use of routine vs. non-routine tasks. In Séguinot's (1989c) case study, for example, the professional translator tackled a routine task, i.e. a typical translation task in terms of text type, style, topic, etc. In contrast, Gerloff (1988), Krings (1988), Tirkkonen-Condit (1989), and Jääskeläinen (1990) used non-routine tasks in their experiments, which required translators to deal with non-habitual source texts. Their studies report opposing findings to those of Séguinot concerning the amount of verbalization that both

professionals and non-professionals produce in routine vs. non-routine tasks. Bernardini summarizes these findings by stating that, “[i]n the former [routine tasks], professionals do tend to verbalise less than non-professionals, whereas in the latter [non-routine tasks] the amount of verbalisation is not necessarily smaller” (2001: 249). Jääskeläinen thus points out that “it seems highly likely that professional translators will behave differently depending on whether they are carrying out a routine task or a non-routine task” (1996: 67). On this basis, she puts forward a number of hypotheses about the various “developmental stages” involved in the acquisition of translation expertise (ibid.). She first hypothesizes that novice translators “problematise relatively little. As a result, they translate quickly and effortlessly (and perhaps wrongly, depending on the difficulty of the task), i.e. novices are blissfully unaware of their ignorance” (ibid.). Jääskeläinen then states that “semi-professional translators, such as translation students” are more aware of their ignorance as well as of potential problems, which translates into “very arduous and time-consuming processing” (ibid.). Finally, she hypothesizes about the relation between professional processing and translation tasks stating:

When professional translators encounter routine tasks, their processing is likely to be highly automatised hence the process is relatively fast and effortless and little is verbalized. When professional translators encounter a non-routine task, they need to resort to conscious, non-automatised processing which consumes lots of time and energy (ibid., cf. Jääskeläinen 1990: 55-56).

Similar observations are made by Bernardini, who argues that, in addition to the amount of verbalizations that different subjects produce in routine vs. non-routine tasks, the nature of such verbalizations also tend to differ.

The explanation offered is that ‘while some processes become automated, other processes are evoked into consciousness, i.e. the translator becomes sensitised to new kinds of problems’ (Jääskeläinen and Tirkkonen-Condit 1991: 105). This conclusion is supported by the finding that semi-professionals (translator trainees) show more extensive processing than both professionals and non-professionals (Jääskeläinen [1999]). This may be because they are aware of the problems involved but have not yet automatised the necessary problem-solving strategies. Equally, professionals are assumed to be better at recognising the need to resort to non-automatic, controlled processes (i.e. problem recognition) than non-professionals. Automatic processes ... are typically very efficient but not very flexible, so that there is the danger (pointed out by Wilss 1994: 144) ‘of problems being forced into a certain structure, because it is believed to offer a solution’. A typical example of this danger would be, for instance, the difficulty experienced by non-professionals in overruling automatic lexical associations (Ivanova 1998: 102), or ‘false-friends’, a process requiring high control (Bernardini 2001: 249-250).

The developmental hypotheses presented above, although not directly comparable, can perhaps be best illustrated by González Davies' "pedagogical reflection based on cognitive psychology" concerning the different stages involved in competence development (2004: 40, building on Honey and Mumford 1986, 1995; González Davies 1994; González Davies and Cotoner 1999). According to González Davies,

[i]n a first stage, the students are not aware of the intricacies of the discipline they have chosen (how to translate, in our case): this is the *unconscious incompetence* stage. Everything is easy from the outside, which is precisely what the average person thinks translating is all about ... Once they have become acquainted with the first challenges and problems, however, they become aware of the fact that there is much to be learnt about the subject: this is the *conscious incompetence* stage. Now they know when they are doing well and why ... Decisions are made, and problem spotting and solving skills are developed with a global idea of the task and its possible outcomes ... Finally, we arrive at the *unconscious competence* stage, that is, they do well but sometimes cannot explain why: most of the skills have been internalized along with the knowledge and strategies necessary for a top performance which is produced with the greatest ease. This stage corresponds to the expert level (2004: 40, emphasis in the original).

The hypothesis that expert translation processes in routine tasks are faster than in non-routine tasks is supported by Laukkanen's (1993) case study. In this study, which compares the performance of one professional translator in a routine task to that of the same translator in a non-routine task, Laukkanen found evidence that the translator's processing was faster in the former (i.e. the routine task). As acknowledged by Jääskeläinen, however, this and other developmental hypotheses like the ones described above still need "empirical testing — preferably in a longitudinal study, which would follow the development of the same individuals from the beginning of a translator training programme to the workplace — and preferably also at the workplace" (2002: 111) (see 5.2.1 for references of developmental studies that aim to improve our understanding of the acquisition of translation competence).

The potential influence that translation tasks may have on translation processes and products is a feature that I also examine in this thesis, albeit by looking at the text types used and the participants' level of text domain knowledge (see 5.2.2 and 5.2.1, respectively). Another task-related factor that I also examine here involves the translation assignment, or brief. As Séguinot points out, both translation students and professional translators

know that different text types require different approaches, and that different people can translate the same text in different ways. It is also clear that different levels of competence, familiarity with

the material to be translated, as well as different interpretations of the nature of the assignment will lead to differences in processes and results (1997: 104-105).

As far as the translation assignment is concerned, Jääskeläinen (1987, 1989a, 1990) is one of the few process-oriented researchers who has specifically looked at the reactions of different subjects to the translation assignment. Using experimental data collected from 1985 to 1986, Jääskeläinen explores the different processes of two first-year students and two fifth-year students of translation “as regards their sensitivity to the requirements of the translation assignment, as well as their use of dictionaries and other reference material” (1989a: 88; see Jääskeläinen 1987 for a detailed report of the results obtained). Regarding the subjects’ reactions to the translation assignment, Jääskeläinen hypothesized in her study that the two fifth-year students (considered professionals due to their good grades in translation courses) “would take the assignment into account throughout the entire translation process,” while the two first-year students (considered non-professionals due to their lack of experience in translation theory and practice) would “approach the assignment less systematically or ignore it altogether” (1989a: 90). The results obtained support Jääskeläinen’s original hypothesis, as far as the fifth-year students are concerned. While these students displayed different behaviors in relation to the translation assignment, they would both frequently use it “as a decision-making criterion” for omitting elements from the source text as well as for choosing the overall text style they would follow (*ibid.*). With regard to the first-year students, Jääskeläinen states that “they showed a far greater degree of awareness of the possible implications” of the translation assignment than she initially expected (*ibid.*: 92). Although one of these students did not seem to “pay any attention to the translation assignment” at first, she actually did so whenever she encountered problems that could only be solved on the basis of the assignment (*ibid.*). In contrast, the other student “seemed to be aware of the possible implications of an instance in which the function of the translation differed from that of the source text, but for some reason she failed to notice the translation assignment at hand” (*ibid.*: 93).

On the basis of her data as well as that of Tirkkonen-Condit (1987), Jääskeläinen concludes that “professional translators’ decisions concerning the translation assignment are in the majority of cases automatised and therefore not observable in the protocols” (*ibid.*: 95). This seems particularly true with regard to the choosing of a text style as, once a decision is made, the “professional translator creates a set of rules which

he or she then follows throughout the translation process” (ibid.). Furthermore, Jääskeläinen states that the results of her study as well as those of Tirkkonen-Condit (1989) suggest that “even non-professional translators start asking questions about the intended audience of the translation once they encounter problems which can only be solved on that basis” (ibid: 96).

Translation task-related aspects have not only been examined in relation to subjects’ degree of translation ability but also in connection with other features, in particular with translators’ attitudes and affective factors. Studies that have specifically observed affective and attitudinal features in relation with translation tasks and translation quality include, most notably, Laukkanen (1993, 1997). As briefly mentioned earlier, Laukkanen (1993; cf. Laukkanen 1996) conducted a case study (as part of her *pro gradu* thesis) that involved one professional translator dealing with two tasks, a routine one and a non-routine one. In general, Laukkanen hypothesized that the evaluative utterances expressed by the translator “would to some extent reveal self-confidence and a sense of security in the routine process and insecurity and lack of confidence in the non-routine process” (1996: 263). She also hypothesized that self-confidence and trust are related to successful performance whereas uncertainty is associated with less successful results (ibid.). The results of Laukkanen’s study seem to support both hypotheses. She found evidence that the processes involved in both tasks (routine and non-routine) differed not only in terms of difficulty and speed but *primarily* with regard to the translator’s attitudes and self-image. These appeared to be more positive in the routine task, which, in turn, seemed to contribute to a higher degree of translation quality. The most striking difference between the processes involved in the two tasks concerned the translator’s critical attitude towards the source text in the routine translation task (ibid: 265). Laukkanen attributes this critical attitude to the translator’s previous knowledge on similar text types as well as her previous translation experience. These two factors seemed to help her “free herself from the text and edit the translation more than in the non-routine process, [during which the translator] tried to stick as closely as possible to the non-routine ST and did not even consider leaving anything out” (ibid: 266). Laukkanen also found that the translator produced far more tentative translation variants (i.e. tentative solutions to certain problems) in the non-routine task than in the routine one. In addition, the translator’s evaluative utterances revealed that her evaluations were more positive in the non-routine task, “as if to encourage herself

because she was not sure about her solutions” (ibid: 267). Perhaps, not so surprisingly, the translator appeared to rely more on the use of reference material in the non-routine task than in the routine one. Finally, she made considerably more changes to the translation (through editions and revisions) produced in the latter (ibid.).

The above research results are also supported by Tirkkonen-Condit and Laukkanen’s (1996) detailed examination of the subjective evaluations produced by the professional translator in Laukkanen’s (1993) case study. According to the authors, the professional translator “was more self-confident and secure in the routine process ... [and adopted] a more critical attitude towards the routine source text [a travel brochure on eastern Finland], whereas she did not feel ‘entitled’ to criticize the non-routine source text [a chewing gum advertisement]. Thus there were more negative evaluations of the non-routine text” (1996: 48). They also found that the translator’s critical attitude towards the routine task manifested in terms of translation editions and improvements, which were more frequent than those in the non-routine task. This, in turn, contributed to a higher degree of quality in the routine translation text, which was found to be publishable as opposed to the non-routine translation text, which needed editing before it could be published (ibid.). Similar results were obtained in Laukkanen’s (1997) *licentiate* thesis, which supports the hypothesis that there are affective and attitudinal differences between routine and non-routine tasks, and that these differences, in turn, influence the quality of translation products. More precisely, the results obtained in Laukkanen’s 1997 study, in which three professional translators carried out routine as well as non-routine tasks, suggest that a positive attitude is related to a desire to produce and maintain translation quality, while a negative attitude leads to a lesser degree of perseverance for achieving said quality (cf. Jääskeläinen 2002: 126).

Yet, as Jääskeläinen points out, some affective factors may also act as “a double-edge sword” (1996: 70). For example, in Laukkanen’s (1993) study, the translator’s reliance on her professional routines seemed to be an obstacle for translating the non-routine source text. In Tirkkonen-Condit and Laukkanen’s own words, the translator’s performance in the non-routine task “would probably have been better, if she had dared to liberate herself from the boundaries of the source text and to orient herself afresh to the preferences of the international readers, instead of copying her routines of brochure translation” (1996: 56). Furthermore, high personal involvement with translation tasks has been found to negatively affect translation processes. As an example of this,

Jääskeläinen refers to Tirkkonen-Condit's (1992) study, in which a non-professional subject dealing with a source text within her field of expertise "was at times so taken up with her emotional reactions to the contents of the source text that she ended up distorting what it said" (Jääskeläinen 1996: 70). However, Gerloff (1986, 1988) found evidence to the contrary, i.e. that personal involvement plays a relevant role in translation. For example, in her study of the translation TAPs produced by five intermediate-level university students of French as a second language, the successful problem solving of one of the subjects was thought to be "related to his high level of personal involvement with the text" as well as his strong reliance on world knowledge, high volume of processing, and text comprehension efforts (1986: 258). In contrast, the low volume of processing of another subject, "her low level of involvement with the text, and her reliance on a few standard strategies resulted in a less coherent translation" (ibid.). Other studies have established similar positive correlations, albeit with different affective and attitudinal factors such as creativity, success and/or positive encouragement (e.g. Kussmaul 1991; Tirkkonen-Condit 1992); and experience, emotion, and decision making (Hansen 2005), among others.

Although this thesis does not examine any of the affective/ attitudinal factors mentioned so far, other similar aspects do play a secondary role. These relate to the participants' perceptions of success, satisfaction, and difficulty with regard to their Web search tasks performed for translation problem solving (see 5.1.1 for details on the affective dimension of information-seeking processes). There are, in addition, many TAP studies that have looked at process features different to the ones discussed above. Although there is neither time nor need to survey them all here, it should be pointed out that other commonly researched features of translation processes include the role of writing and/or revising processes (see, for example, Breedveld 2002a; Immonen 2006; Shih 2006a, 2006b); time pressure (e.g. Jensen 1999; Jensen and Jakobsen 2000; Breedveld 2002b); segmentation (Dragsted 2004, 2005); and external aids in translation (e.g. Jääskeläinen 1989b; Luukkainen 1996; House 2000; Sánchez Ramos 2004; Hirci 2007; Livberg and Mees 1999, 2002, 2003), to name just a few.¹⁷

The diversity of interests in process-oriented research can be "an advantage: different studies shed light on different aspects of different kinds of translation processes thus

¹⁷ Given the research focus of this study, the use of translational aids will be specifically addressed in a section of its own (see 3.3 for details).

increasing our understanding of the mechanisms underlying translation. Yet the multiplicity of interests is not totally unproblematic” (Jääskeläinen 1996: 61). For example, comparing the results of process studies that have different research foci or that have been carried out under different experimental conditions may be particularly challenging.¹⁸ In addition, as Jääskeläinen (*ibid.*) and Tirkkonen-Condit (2005: 406) point out, generalizations made on the basis of the results obtained in small-scale studies should be interpreted with caution. I will return to these and other related methodological aspects in Chapter 4. First, however, let us examine some of the tentative results obtained by early TAP studies sharing a concern with the understanding and classification of specifiable “units” and “strategies” found in translation processes. Translation strategies are, as mentioned earlier, of particular interest here, given that subjects’ research behavior is usually studied in relation to said strategies.¹⁹ Furthermore, both translation units and strategies represent the two main categories of analysis in the investigation of translation as problem solving, an approach that I also take in this study.

¹⁸ A number of shared features and general trends have nevertheless been identified in translation process research. For an excellent summary of these features and trends, see Tirkkonen-Condit (2005) as well as Göpferich and Jääskeläinen (2009: 174-175).

¹⁹ I should clarify at this point that, to avoid dichotomies such as strategic vs. non-strategic or conscious vs. unconscious processing typically associated with the notion of “strategy,” I will adopt the more flexible notion of “behavior” in my study of Web searching for translation. As further discussed in 3.2.1, this notion is taken here to involve an action or a series of actions that may be carried out in a more or less strategic or conscious fashion.

3. Translation Phenomena as Problem-solving Activities in TAP Research

Given that translation processes are not directly observable, process-oriented researchers have primarily “adopted the methodology of problem-solving studies in cognitive psychology to produce interpretable data” (Séguinot 1989a: iii). As Bernardini points out, “[v]iewing translation mainly as a problem-solving process, some TS scholars have put forward the suggestion that it should be possible to study it by means of TAPs, and have set up experiments to test this hypothesis” (2001: 244). In fact, most of the TAP studies discussed in 2.3.1 conceive of translation processes as problem-solving activities. These, in turn, have been monitored through two major categories or units of analysis: (a) the source text elements that translators work with; and (b) the strategies they employ to translate said elements into the target language. The ST elements studied are commonly referred to as “translation units,” “SL text segments,” and/or “units of attention,” among others. Although, as further explained below, these labels are used with different meanings in the literature, my own conception of the notion of *translation unit(s)* is best illustrated by what Jääskeläinen refers to as “those instances in the translation process in which the translator’s unmarked processing is interrupted by shifting the focus of attention onto particular task-relevant aspects” (1990: 170).²⁰

Translation units can vary in size and nature. For example, they can range from single words to whole texts, and pose more or less problems for translators. Translation strategies, then, are typically conceptualized as the steps taken to translate more or less problematic units (see below). Given that this thesis also adopts a problem-solving approach to the study of translation-embedded Web searches (see 5.1.1 and 5.1.2), the following two sections will discuss in detail the notions of translation units (3.1) and translation strategies (3.2), respectively. Furthermore, their associated processing

²⁰ For Jääskeläinen, unmarked processing refers to “effortless or uncontrolled processing, such as reading aloud the source text or producing a fluent, uninterrupted translation of a source text item or passage” (1993: 102). In contrast, marked or conscious processing involves dealing with both problematic and unproblematic units of attention (ibid: 101). This view seems to differ from traditional conceptions of marked processing as involving translation problems only. For example, Bernardini also views unmarked processing as involving “unproblematic sections of the protocols in which a subject verbalises fluently while reading or writing” (2001: 249, building on Jääskeläinen 1990: 173). However, for Bernardini marked processing “begins with a problem indicator and ends with a solution to the problem or an indication that the problem is temporarily abandoned” (ibid.). In this regard, Séguinot argues that “labelling all points at which the translation seems non-automatic in the same way has the disadvantage of investing the source text with difficulty” (2000a: 144).

indicators will be described whenever applicable. Processing indicators elicited by means of thinking aloud are, as Kiraly explains, “verbal report data that can be used to infer a cognitive process or the progression of cognitive processes” (1995: 76). Similarly, Lörscher views processing indicators as representing “a subgroup of signs” and referring to “non-observable phenomena” (1991: 59-60, building on Sager 1981).

3.1 Translation Units

The concept of the translation unit (TU) is, as Dragsted acknowledges, “far from being a well-defined” notion, despite it being an object of discussion “as old as the debate over translation equivalence and free versus literal translation” (2004: 11). Over the years, the discipline has witnessed the development of theoretical considerations about the size and nature of the TUs translators *should* work with in order to produce good quality translations. These considerations, aimed at determining the “ideal” translation unit, stem primarily from a linguistic and prescriptive point of view.²¹ Empirical studies of translation processes have, however, looked at the different TUs translators actually *do* work with when translating, i.e. they have examined “actual” translation units from an empirical and descriptive point of view (ibid: 23-24). A similar observation is made by Lörscher, for whom

[t]he concept of ‘translation problem’ which manifests itself empirically has hardly been paid any attention by translation theory. The reason for this may be the fact that translation theory has had a strong theoretical, speculative, and thus non-empirical orientation ... Although taxonomies or typologies of translation difficulties are sometimes given in the relevant literature ..., they are theoretical constructs which are based on single, individual, and largely unsystematic observations or, what is more likely, are hypothetically derived from a comparison of source- and target-language phenomena in a contrastive-linguistic way. Only very recently, with the development of a new empirical and process-oriented paradigm within translation studies ..., has the concept of ‘translation problem’ – and with it, that of ‘translation strategy’ – gained crucial importance (1991: 92).

In the following, I will discuss translation units as identified in selected empirical TAP studies that do explicitly address said units (and translation strategies) within a problem-

²¹ For a discussion of translation units from a linguistic perspective, see Dragsted (2004: 11-23).

solving approach to translation.²² As Mondahl remarks, “[t]here are only a few investigations of this type – one of the foremost and one of the main sources of inspiration for [other studies] being that conducted by Krings [1986] on German learners of French” (1995: 184). Mondahl goes on to argue that research into translation strategies (and, by extension, into translation units)

has been sparse, partly because access to processing is and to some extent remains problematic. We do have methods of research such as think-aloud and retrospection, which are well-known psychological testing methods, but we are still left with the question: Did we get it all and did we really get access to the [subjects’] processing? (ibid: 186).

There are, however, a few other TAP studies explicitly dealing with translation units and strategies in addition to Krings’ (1986) study, including Dechert and Sandrock (1984), Gerloff (1986, 1987, 1988), Lörcher (1986, 1991, 1996), Jääskeläinen (1987, 1990, 1993), Séguinot (1989c), Kiraly (1995), Mondahl (1995), Mondahl and Jensen (1996), and Jensen (1999), among others. I will discuss these studies in the following two sections. In particular, in section 3.1.1 I will describe studies that address the size (i.e. number of words processed in each unit), level of analysis (i.e. the grammatical nature or linguistic rank of the units), and the number of translation units processed by different subjects (e.g. professional translators, non-translators, second-language learners, and bilinguals). In section 3.1.2, I will focus on studies discussing the nature of translation units within a continuum of problem and non-problem units.

3.1.1 Size, Level of Analysis, and Amount of Processing

Dechert and Sandrock (1984) are, as mentioned earlier, among the first researchers to conduct a TAP experiment in which translation was used as a data elicitation method. In their study, the verbalizations produced by a philology student were taped and his/her time spent talking about each translation unit recorded (cited in Kiraly 1995: 42-43). According to Kiraly, the results obtained by Dechert and Sandrock indicate that (a) the basic translation unit was the sentence; (b) the subject tended to keep his/her initial solution for the translation of each source text unit; (c) the syntactic structure of the source text was retained “despite deviations from the norms of usage of the target language;” and (d) the subject primarily translated “at the lowest (word) level” and only

²² It should be noted that the studies reported in this section used TAPs and/or interviews as the only research tools to elicit data. For empirical studies that deal with translation units and strategies explored by means of additional introspective and/or retrospective methods (see section 4.1 below).

moved to the next level “when the initial attempt failed” (ibid: 43). It seems, then, that the subject in Dechert and Sandrock’s study operated mainly within two basic levels of analysis: the lowest (word) level and the sentence level. In this regard, Dragsted points out that it “does not appear (at least not from the summary provided in Kiraly 1995) how these different levels differ from or relate to each other” (2004: 25).

More ambitious and elaborate studies aiming at identifying different linguistic levels of source text analysis were carried out by Gerloff (1986, 1987, 1988). In her study of the protocols produced by five foreign language learners of French, Gerloff developed an inductive coding system that identifies “five levels of analysis: morpheme, word, group, clause, and sentence” (1986: 246).²³ Interestingly, none of her subjects seemed to work with translation units larger than the sentence. In addition to the specific translation units that the subjects worked with, Gerloff identified their changes in and “direction of movement from one level of analysis to the other” as well as the amount and percentage of processing done in each language, and at each level of analysis (ibid: 247).²⁴ Although she only analyzes the data from two out of five subjects in her 1986 article, it is clear that these two subjects differed primarily with regard to the amount of translation units processed during the translation task (a French magazine article to be translated into English).²⁵ While one of the subjects processed a total of 39 translation units, the other processed 210 TUs. Gerloff attributes this quantitative difference to the latter subject having processed the same material at different levels of analysis, beginning “with moderate sized groups, breaking sentences down into smaller units and varying both unit size and level,” and gradually building up “to the larger sentence unit” (ibid: 249). This seems to support Bernardini’s suggestion “that attention units are better defined in hierarchical rather than sequential terms, with smaller units being processed within larger units” (2001: 249). For instance, “[t]he search for a term or collocation

²³ Gerloff later expanded her 1986 coding system from five to seven units of analysis in a pilot study that she conducted in 1987. The two new levels of analysis include the phrase level, or “group of words constituting a grammatical phrase” (for example, noun phrase, verb phrase, adjectival phrase, etc.), and the discourse level, which involves “processing two or more sentences together” (1987: 141 and 1988: 37-38).

²⁴ Gerloff also identified the different strategies that the subjects of her study used for translation problem solving. In fact, the concept of translation strategy is generally linked to that of the translation unit. Furthermore, indicators of both units and strategies may be sometimes hard to distinguish from each other in a neat, unambiguous, and intersubjective way (Lörcher 1991). For heuristic reasons, however, translation strategies will be discussed under a separate section (see 3.2 below) to that of translation units in this Chapter.

²⁵ All the subjects in Gerloff’s 1986, 1987, and 1988 studies were given the same French magazine article and asked to think aloud as they translated it into English.

may be embedded in the processing of a whole sentence, without implying a ‘word unit’ or ‘phrase unit’ analysis” (ibid.). Séguinot goes one step further to claim that

there is little evidence in [her study], apart from the importance of the sentence as a unit, that the translation process progresses in terms of units in administrative translation. Rather than proceeding by units, what seems to happen is that the translator switches strategies depending on the interplay between memory constraints and the difficulties encountered in the source text. There is also evidence of a critical awareness or monitoring of the translation task being performed (1989c: 33-34).

Nevertheless, Séguinot states that the professional translator in her TAP study, while also working at the level of sentences and paragraphs, she concentrated mainly on the level of words (ibid: 33). In contrast, Gerloff’s subjects processed translation units mainly at the group unit level, which involves working with clusters of words that constitute neither a complete nor a coherent syntactic unit (1986: 248). In other words, the foreign language learners in Gerloff’s (1986) study tended to process shorter units than the professional translator in Séguinot’s (1989c) study.²⁶ In addition to these findings, Gerloff tentatively concludes that a large amount of text processing is one factor that, among others (such as personal involvement with the task, previous knowledge and problem-solving strategies), seems to be related to the communicative success of a given translation product. Conversely, a small amount of text processing appears to contribute to the production of less successful translations (1986: 258).

Jääskeläinen (1987) makes a similar observation based on the analysis of the TAPs produced by a total of four translation students: two first-year students (referred to as “non-professional translators”) and two fifth-year students (referred to as “professional translators”). The results of this study seem to support the hypothesis that “[p]rofessional translators need less time for the translation process than non-professionals, and in that time they do more processing than non-professionals, i.e. they are more efficient than non-professionals” (ibid: 54). In Jensen’s (1999) study of the effects of time pressure on the translation performance of three groups of subjects (non-translators, semi-professional translators, and expert translators), it was found that the problem-solving activities of all three groups increased when the translation timeframe was changed from 15 to 30 minutes. When comparing the results from the individual

²⁶ It should be emphasized though that the professional translator in Séguinot’s study performed a routine task involving the translation of an administrative text, while the foreign language students in Gerloff’s study translated a non-routine text (a magazine article).

groups, Jensen observed that the expert translators “had relatively fewer problem-solving activities than the two other groups, about 30% less than the group of” semi-professionals (ibid: 113). Furthermore, “the expert translators felt that 30 minutes was too much time since they typically only needed 20 minutes” (ibid.).

In a study of the protocols produced by twelve subjects (two first-year and two fifth-year students of translation, four professional translators, and four “educated laymen”),²⁷ Jääskeläinen found evidence that “in the least successful translators’ protocols fewer attention units [could] be identified than in the good or satisfactory processes” (1990: 196). She nevertheless clarifies that

the total number of attention units should be examined in relation to the amount of time spent on the process ... The density of attention units (number of attention units per minute) should then be compared to the subjects’ fluency of verbalising (pages of text produced per minute), to see whether in the more talkative subjects’ processes a higher density of attention units can be observed (ibid.).

In Jääskeläinen’s study, “a positive correlation between the density of attention units and the degree of talkativeness” was in fact established (ibid: 197). Notwithstanding the importance of this correlation, the amount of units processed—as well as their size and level of analysis—have been found to affect translation processes as Gerloff’s (1986) and Jääskeläinen’s (1987, 1990) findings above seem to suggest. These findings appear to be supported by Gerloff’s (1987) pilot study of the protocols produced by five foreign language students and one bilingual speaker. Although Gerloff only analyzes the data obtained from three of these subjects (two foreign language students and one bilingual) in her 1987 article, the results obtained indicate that all three subjects strongly preferred to work with naturally occurring syntactic units or “sentence constituents” at the clause, phrase, and word unit levels (ibid: 147). Also of interest is the “relative frequency of analysis which occurred at the group unit level” (ibid.), with group units ranging from two to 15 words (ibid: 140). And perhaps of a slightly higher interest is the finding that the bilingual subject who produced the “best overall translation” among all participants did more text processing at the sentence and discourse levels than any of the foreign language students. Among these, the student who produced the “least good” translation did, however, rely highly “on much smaller, morphemic and syllabic

²⁷ Jääskeläinen uses the term “educated laymen” to refer to subjects who are highly proficient in English, but have no experience in translation (1990, 1993).

analysis” (ibid: 138 and 147). Nevertheless, all three subjects “used several levels of analysis, sometimes even at the same time” (ibid: 152).

The results of Gerloff’s pilot study suggest “that clearly identifiable differences may exist between good and poor translators, as well as among less competent speakers and learners, in such areas as preferred language of analysis, size of units dealt with, editing styles, and characteristic patterns of movement through the text” (ibid: 153). Gerloff’s (1988) doctoral thesis in fact aimed at identifying such performance-related differences in connection with (a) the size of the translation units worked with and (b) the problem-solving strategies, and behaviors, of a total of twelve subjects: four second-language learners, four bilingual speakers, and four professional translators (ibid: ix). As far as the size of the translation units is concerned, all twelve subjects worked primarily with naturally occurring syntactic units. More specifically, they worked mostly at the word, phrase, and clause levels. However, the group of bilinguals and the group of translators “also worked in larger discourse chunks, demonstrating greater range and flexibility in their processing style” (ibid.). While the sentence unit was rarely used (except by one bilingual who mostly progressed through the text by translating complete sentences), units larger than the sentence were most frequently used, first, by the bilinguals; second, by the translators; and third, by the foreign language students. This last group of participants thus problematized the least at the level of the discourse unit. Moreover, the highest proportion of text processing at the discourse level seemed to be “associated with less non-syntactic group unit activity” (ibid: 124). Although Gerloff’s doctoral study does not provide any conclusive evidence supporting the relationship of text processing behaviors and translation quality, it appears that the subjects who produced the “best” translations, in this case all four translators and one of the bilingual subjects, “were moderately high to very high volume processors” (ibid: 138). They also “showed moderate to high amounts of combined discourse- and sentence-level processing” (ibid.). In other words, they processed more and larger translation units than their fellow participants. Conversely, the subjects who produced the “weakest” translations, namely two foreign language students, “exhibited low to moderate amounts of processing [as

well as] low to medium levels of combined discourse- and sentence-level processing” (ibid: 139).²⁸

Similar results to those of Gerloff were obtained by Lörcher in his 1986, 1991, and 1996 studies. While the subjects in the first two studies were foreign language students, the subjects of the latter study consisted of both professional translators and foreign language students. Interestingly, in all three studies the foreign language students showed a stronger preference towards considerably smaller units than the professional translators. More specifically, the language students in the 1986 study seemed to favor the group unit, which, according to Dragsted, “ranged from 2 to 6 words” (2004: 27, building on Lörcher 1986: 284ff). Similarly, the language learners in Lörcher’s 1991 study problematized either at the lexical, syntactic, or lexico-syntactic level of analysis (ibid: 202).²⁹ All subjects were faced with a total of 206 translation problems of which a “considerable amount ... [were] supraindividual in nature, which means that one and the same problem [occurred] with several subjects” (ibid: 206). On this basis, Lörcher states that it is not surprising that “the subjects were faced with the 206 translation problems 394 times” (ibid: 207). Of the 394 occurrences of translation problems, 247 were purely lexical, 88 lexico-syntactic, and 32 purely syntactic problems. That is, about 70% of all problem instances referred to “lexical items for which the subjects [had] either no or only inadequate TL items available. Approximately 22% of all the instances of problems [had] both a lexical and a syntactic component, and only 8% [were] of a purely syntactic kind” (ibid.).³⁰ In contrast, the translation units processed by the subjects in Lörcher’s 1996 study were significantly “larger among professional translators than among foreign language students” (1996: 30). According to Lörcher,

the processing system of professionals can obviously handle larger units than that of non-professionals. The former mainly choose phrases, clauses or sentences as units of translation

²⁸ The remaining foreign language student and three bilinguals “produced either ‘good’ or ‘very good’ translations” (Gerloff 1988: 138). These participants showed the least within-group consistency in their processing behaviors by exhibiting great variability (from low to high) in their range of activities. This naturally prevented Gerloff from establishing general patterns for these participants (ibid: 139).

²⁹ In this study, a total of 48 language students produced 52 oral translations of written texts into their L2. In an earlier study, Lörcher explains that the choice for investigating oral translations of written texts is based on the assumption that having subjects produce oral translations would reveal “more aspects of the language production process, and thus the translation process, than would written translations” (1986: 277). This decision is, according to Kiraly, justifiably criticized by Krings (1986) on the basis that the “production of a sight translation changes the parameters of a translation task considerably because the translator cannot backtrack and review interim translation products” (1995: 44).

³⁰ The numbers and percentages provided above represent the mean values for 45 subjects and seven texts used (Lörcher 1991: 207).

whereas the latter concentrate on syntagmas and especially on single words. As a consequence, professional translators often realize problems *while* they are rendering a unit of translation into the TL. The foreign language students, however, mostly realize translation problems before they start translating because the units they extract from the SL text are much smaller and thus problems can be located more easily and more quickly (ibid: emphasis in the original).

Opposing findings to those of Lörcher (1996) and Gerloff (1988) were, however, obtained by Kiraly in his study of nine novice students of translation enrolled in the second semester of a “university-level translator training program and nine graduates of the same program” (1995: 72). All 18 subjects were asked to think aloud while translating a tourist brochure into their L2. Based on the explicit references made by these subjects, Kiraly identified “the particular segment of the source text that was the focus of attention at any given moment during the production of the translations” (ibid: 85). The analysis of the protocol data shows that most of the units translated by both groups of subjects occurred at the word and word string levels. It also appears that there were very few references to the suprasentential level of analysis, i.e. the subjects rarely considered links between sentences. Likewise, references to the text level, i.e. those involving “the author’s communicative intentions, the intended function of the translation, or the reader’s expectations,” were scarce (ibid: 86). Only very minor differences were found in the number of units processed at the word level, which was slightly lower in the group of professionals. This group also processed a slightly higher number of units at the word string, suprasentential, and text levels (ibid: 89). Kiraly therefore concludes that there were no major differences in the type of units processed by the novices and professionals of his study. More specifically, he states that

the similarity of these two groups is striking with respect to all the variables that emerged during translation, including the number of elements translated; the number of problem and nonproblem elements encountered, the length of the elements translated, the number of acceptably translated elements, and the global quality of the translation (ibid: 90).

Notwithstanding the different correlations established above between unit size and/or level of analysis on the one hand, and subjects’ levels of translation expertise on the other hand, it is important to note “that some research suggests that the verbalization process of TAP studies has a shortening effect on translation units” (Malmkjær 2006: 93). Jakobsen (2003), for example, conducted an empirical study to determine the potential effects that thinking aloud may have on translation speed, revision, and segmentation. To do so, he carried out an experiment in which four MA translation

students and five expert translators translated a total of four texts (two in their L1 and two in their L2) under two different experimental conditions. “In each language direction, one task was performed while thinking aloud and one without thinking aloud” (ibid: 69). The results of the study suggests, perhaps not surprisingly, that thinking aloud had significant effects on translation speed in both groups of subjects. More specifically, the think aloud condition delayed translation by approximately 25% (ibid: 69). It also appears that “[n]o significant effects on revision were found. However, contrary to expectation, significant effects on segmentation were discovered. The think-aloud condition forced both groups of translators to process text in smaller segments” (ibid.).

Although, as noted earlier, it is not easy (or even desirable) to compare the results of several studies carried out under different experimental conditions,³¹ some of the studies discussed above report similar results with regard to the length, level of analysis, and amount of units processed during translation. As regards the length and level of analysis, there seems to be a general preference towards the translation of shorter units at the clause, phrase, word, and group levels among both translators and non-translators, especially among the latter (Dechert and Sandrock 1984; Gerloff 1986, 1987; Lörcher 1986, 1991; Kiraly 1995). It also appears that different subjects can work with units at several levels of analysis at the same time (Dechert and Sandrock 1984; Gerloff 1986). Although the tendency among different subjects is to translate at the levels mentioned above, some professional translators have been found to work with larger units (mainly at the discourse and sentence levels) than those of non-translators (Gerloff 1988; Séguinot 1989c; Lörcher 1996; Lorenzo 1999a). In this regard, Malmkjær claims that

[s]tudies that have compared translation and source text pairs produced by novice translators with pairs produced by experienced translators show that the units formed in novice-translator pairs are smaller in extent and generally are of a lower linguistic rank (word, phrase) than are those (clause, sentence) formed in pairs produced by experienced translators (2006: 92).

Kiraly (1995), however, did not observe major differences in either the size or the level of analysis of the units processed by the subjects of his study (novice and professional

³¹ All the studies reported here differ in terms of subjects (language learners, bilinguals, student translators, professional translators or combinations of these), languages involved (German, French, and English), translation directionality (L2-L1 translation and vice versa), type of texts (e.g. an administrative text, a magazine article, and a tourist brochure), type of text production (written vs. oral), and availability of translational aids (with or without access to them).

translators). As far as the amount of units processed is concerned, it appears that professional translators tend to process more units than non-translators (Gerloff 1988; Jääskeläinen 1987) and that high volume processing, in turn, contributes to the production of more successful translations among different subjects (Gerloff 1986, 1987, 1988; Jääskeläinen 1990).

To sum up, with the exception of Kiraly's (1995) study, the research results reported in this section appear to suggest that professional translators do not only process more and larger units than non-translators but also that both unit volume and unit length seem to correlate with translation quality. Yet, the effects that different research methods may have on text segmentation also need to be taken into account. As mentioned earlier, Jakobsen (2003) found evidence suggesting that thinking aloud forces subjects to work on smaller text segments.

3.1.2 Types of (Non-)problematic Units

In addition to size, level of analysis, and number of units processed, translation units can also be compared in terms of their more or less problematic nature. Krings, for example, identified "two basic features of the translation process" in his study of the TAPs produced by eight second-language learners, namely "the presence of translation problems and a variety of strategies for solving these problems" (1986b: 266). With regard to the former, he also found an important distinction between problematic and non-problematic SL text segments (Dragsted 2004: 28, building on Krings 1986a: 118). According to Dragsted, problematic text segments in Krings' study appeared to trigger the application of one or more translation strategies. Problematic text segments were also marked by problem indicators (see below) "either in the form of a verbalization or in the form of some effect on the translation process" (2004: 28). In contrast, non-problematic text segments were marked by the absence of translation problems and translation strategies, "i.e. if the translator encountered no translation problem, the SL item would be transferred directly and automatically into a TL item" (ibid.). Dragsted goes on to argue that

[w]hen relating the findings of Krings' study to the issue of the TU, it may be inferred that a distinction should be made between problematic and non-problematic TUs. When the translator encounters a problematic TU, this will be marked in the translation process by a problem indicator, for instance, a long hesitation in the translation process. As long as the translator encounters no translation problems, translation will be performed more or less automatically until the next problem occurs, with no or only short pauses (ibid.).

Like Krings, Lörcher (1991) also noted the distinction between problematic and non-problematic phases—both referring to segments of the SL text—in his own data corpus (cf. Lörcher 1986). With regard to the former (i.e. problematic phases), the subjects in Lörcher’s study appeared to face “barriers which prevent or delay, or which only partially or inadequately allow the transformation of SL text segments into TL” (1991: 204). Thus, problematic phases required “a strategic, i.e. problem-solving approach” to be applied by the subjects (ibid.). In contrast, non-problematic phases were “characterized by the subjects’ performing their task in an automatised or partly automatised way without being faced with barriers during the transformation of SL text segments into TL” (ibid.). For Kiraly (1995), non-problematic units are also dealt with in an automatic or partially automatic way. In his study, problem units involved “translation units that appeared to pose problems for the translator and are marked by the application of translation strategies” (ibid: 75). Non-problem units, however, were “translation units solved by the subjects with no processing-related verbalization” (ibid.). Furthermore, while problem units “required cognitive attention and the application of conscious or potentially conscious translation strategies ... [non-problem units] came from intuition and spontaneous association, apparently without the intervention of problem-solving strategies” (ibid: 86). A similar perspective is adopted by Mondahl and Jensen, who argue that information processing in translation falls into two main categories:

spontaneous sequences and *problem sequences*. The spontaneous sequences are characterized by the absence of stops/interruptions and by no overt signs of problems. During these sequences, the translator applies her automatised, skill-based knowledge (know-when) and the most automatised elements of her experience-based knowledge. In thinking-aloud protocols, these sequences are characterized by the absence of verbalisation or by verbalisation that does not contain any signs of a problem-solving approach to the element in question. Problem sequences are – in contrast to spontaneous sequences – characterized by stops/interruptions in the translation process. The translator’s automatised skill- and experience-based knowledge are no longer sufficient and she has to change to more controlled type of processing which draws on analysed knowledge i.e. controlled experience-based or knowledge-based knowledge (1996: 102, emphasis in the original).

For these researchers, then, two main aspects seem to characterize non-problematic units. First, they are dealt with in an automatized or semi-automatized way. Second, they require no apparent strategic behavior. Concerning the first characteristic (and as briefly mentioned earlier), Jääskeläinen views automatic processing from quite a different perspective. For her, automatic processing involves taking conscious decisions

on both problematic and non-problematic attention units (1993: 101).³² She explains that one of the main reasons for “trying to encompass both problematic and unproblematic processing under one analytical category was the nature of [her] data” (ibid.). That is, “the process features that seemed to illustrate the most significant interindividual differences were not necessarily related to translation **problems** in the traditional sense” (ibid: 102, emphasis in the original). Like Jääskeläinen, I too think that problems and non-problems in translation may be equally interesting from a researcher’s point of view. Or, as Jakobsen puts it, “[s]omething that is not a translation problem is as interesting or uninteresting as something that is” (1999: 15). Yet, given the pedagogical motivation of this study, my main interest is in problems in the traditional sense, i.e. as requiring more or less problematic processing. In this regard, Mondahl remarks that from a

researcher’s and teacher’s point of view the problem sequences are the most interesting ones since this is where the translator feels that translation is problematic, where the need to introduce controlled processing is felt and hence the need for particular strategies for retrieval and evaluation that can be introduced once the problem has been identified (1995: 187).

Concerning the second characteristic (i.e. strategic behavior in translation), most of the researchers mentioned above view strategic behavior as only taking place when dealing with translation problems. Similarly, for Lorenzo (1999a: 128) as well as Sirén and Hakkarainen (2002: 76) translation problems require translators to engage in a process of deliberation where several translation alternatives are considered (cf. Pym 1993: 29). This seems to be closely related to Séguinot’s view that problems are characterized by the negotiation of meaning in “those instances where translation does not occur automatically” (2000a: 144), or to Sirén and Hakkarainen’s understanding that problems are characterized by non-routine purposeful activities (2002: 77, building on Bereiter and Scardamalia 1993: 83). Yet, for Sirén and Hakkarainen problems “do not necessarily refer to something serious or difficult” (ibid.). Their view is somewhat akin to that of Jääskeläinen, for whom strategic and deliberative behavior does not only take place when dealing with problems but also “when no problems in the traditional sense exist, for example, when the translator makes unproblematic decisions” (1993: 106).

³² Jääskeläinen clarifies that the notion of “attention unit” (defined at the beginning of this Chapter) needs to be refined as per Séguinot’s suggestion, according to which the term “unit” typically refers to something “measurable” and with “delimiters, such as eye movements” (1993: 117). Séguinot therefore suggests using the term “attention locus” or “marked processing” instead (ibid.).

Furthermore, Séguinot points out that it “has become clear in both translation and interpretation (Gile 1997) [that] not all translators and interpreters find the same items difficult” (2000a: 145). That is, the perception of problems and their degree of difficulty seem to vary across subjects, a view that is also adopted a priori in this study (see 5.1.2 for more details on the notion of “translation problem”).

Notwithstanding the apparent unproblematic nature of certain translation decisions, the reality is that the majority of the TAP studies adopting a problem-solving approach to translation have primarily focused on the analysis of problems in the traditional sense, i.e. as “laden with negative connotations” (Pavlović 2007: 30) or as involving difficult processing. Translation problems, in turn, have been the object of several typologies or categorizations. Krings (1986a, 1986b), for example, conducted one of the most extensive TAP studies focusing on translation problems. He inductively identified a total of eleven problem indicators from his protocol data: The subjects’ explicit statement of problems; the use of reference books; the underlining of source-language text passages; the semantic analysis of source-language text items; hesitation phenomena in the search for potential equivalents; competing potential equivalents; the monitoring of potential equivalents; specific translation principles; the modification of written target-language texts; the assessment of the quality of the chosen translation; and paralinguistic or non-linguistic features (1986b: 267). Krings further (1986a: 121) divides these indicators into primary and secondary problem indicators, a distinction closely resembling that of Færch and Kasper’s (1984) explicit strategy markers vs. implicit strategy markers. Concerning this distinction, Lörcher explains that processing indicators can have different degrees of vagueness, may be more or less reliable depending on the availability of several pieces of information, and are always subject to an interpreter, i.e. a data analyst (1991: 60-61, building on Sager 1981: 351-353). It is in relation with the degree of vagueness that Lörcher also distinguishes between explicit and implicit problem indicators. For example, “a pause in the production of the target-language text can be interpreted as being an implicit indicator, whereas the verbalization of a translational problem by the subject is to be interpreted as an explicit indicator. Thus, implicit indicators are obviously more vague than explicit ones” (ibid: 61). The degree of reliability of the former (i.e. implicit indicators) is thus higher when several sources of information are considered for purposes of data analysis. For instance,

[a] pause in the target-language text production may indicate a translation problem, but also a momentary distraction, lack of concentration, etc. If, however, the pause occurs at a point in the text which the analyst interprets to be difficult to translate, and if further signs such as *handicap-signals* – e.g. “I don’t know.” (cf. Færch 1984: 60) – phatic utterances such as “hm” or “oh” with a fall-rise intonation contour, drawls, repetitions, and/or self-corrections can be found in the environment of that point, all the signals in their entirety are most likely to indicate a translational problem of a subject. But it is the analyst’s discretion to interpret the signals as an indicator or not (Lörscher 1991: 62, emphasis in the original).

As it can be seen, the process of data interpretation for Lörscher is not entirely unproblematic. Concerning Krings’ (1986) problem indicators, in particular, Lörscher argues that these “refer both to subjects’ realization of problems and to steps of problem solving” (1991: 65). Consequently, “they can be interpreted as being strategy or problem indicators by the analyst” during the process of interpretive reconstruction (*ibid.*). As a result of this ambiguity, Lörscher takes a critical stand towards “Krings’ view that the problem indicators can be *read* from the thinking-aloud protocols and hence allow a consistent and widely intersubjective identification of translation problems” (*ibid.*, emphasis in the original). Similarly, Livbjerg and Mees refer to Krings’ (1986a) findings to remark that they also find that “the interpretation of what constitutes a translation problem for a subject leaves us with a fuzzy problem/non-problem borderline” (2003: 133, quoted in Pavlović 2007: 32). Furthermore, Pavlović (2007: 84) found “instances in which it was difficult to tell whether a dilemma constituted a single or two problems” in her study of the collaborative TAPs produced by several graduate translators (see 4.1.1 for details on collaborative translation protocols).³³

Despite the difficulties associated with the identification of translation problems in TAP studies, Krings’ problem indicators have been typically considered relevant for purposes of data analysis (cf. Lörscher 1991). Moreover, they have often been used as a basis for the analysis of translation problem-solving activities in other TAP studies (see, for example, Jääskeläinen 1987, 1990). One of the main reasons why Krings’ list of

³³ In an effort to try and avoid ambiguities in the interpretation of my research data, the research participants were asked to explicitly identify and describe their translation problems in the online surveys that I administered throughout the course of my investigation. These online surveys, distributed in the form of “online search reports” (see 5.7.3 for details), were complemented with other data sources for triangulation purposes. These data sources include the participants’ screen-recorded translation processes, their translation products, and the one-to-one interviews that I conducted with each student participant (see 5.3 for details on the methodology I used in this study).

problem indicators may be useful for analyzing verbal protocol data is that “the number and variety of indicators ensures that problem identification does not depend exclusively on self-observation on the part of the subjects” (1986b: 267).³⁴ The problems identified by Krings (1986a: 112-171) himself include “translation problems,” “L2-competence problems,” and “translation-competence problems” (in Lörcher 1991: 93). According to Lörcher, Krings views translation problems as the most general category comprising all types of linguistic problems and as further divided into L2-competence problems, and translation-competence problems. Lörcher criticizes this distinction on the basis that Krings classifies any given problem as “a translation-competence problem as long as no clear evidence can be produced of it being an L2-competence problem” (ibid.). He goes on to argue that Krings’ types of problems are “characterized by a low degree of practicability and operability on the one hand, and by a high degree of speculation on the other hand” (ibid.).³⁵ In his own psycholinguistic studies of translation processes, Lörcher (1986, 1991, 1996) therefore prefers to speak only of “translation problems.” For him, translation problems are “all those (linguistic) problems which a subject is faced with when performing a translation” (1991: 94). He nevertheless adopts a further problem categorization put forward by Krings (1986a: 144-152), one that distinguishes among “*reception problems*, *production problems* and combined *reception-production problems*” (Lörcher 1991: 94, emphasis in the original) (cf. Hatim and Mason 1990: 21-22).

Reception problems occur when a subject has difficulties in receiving a source-language text segment, i.e. in the intake of information from an SL lexeme or combination of lexemes, and in the subsequent sense constitution ... *Production problems* occur when a subject has difficulties in finding a target-language text segment which s/he considers equivalent to the corresponding source-language text segment ... Combined *reception-production problems* occur when a subject has difficulties in both the reception of an SL text segment and in the production of an equivalent TL text segment (Lörcher 1991: 94, emphasis in the original).

Unlike Lörcher, Jääskeläinen (1987) decided to reject Krings’ categories of comprehension, production, and combined comprehension-production problems

³⁴ As shown earlier, some studies found evidence that novice translators tend to problematize relatively little and therefore may translate quickly, effortlessly and/or wrongly, depending on the difficulty of the task at hand (Jääskeläinen 1996: 67). Krings’ problem indicators could therefore be particularly useful for identifying problems that novice translators are “blissfully unaware of” (ibid.).

³⁵ As Pavlović points out, “the distinction between language learners’ problems and other types of problems may [indeed] not be as straightforward” as it appears at first (2007: 31, building on Séguinot 2000a: 144, for whom translation problems exclude language competence problems).

altogether in her study of the protocols produced by four translation students. She did so on the grounds that “a problem’s nature changes so considerably when a comprehension problem turns out to be a production problem as well, that there are really two separate problems connected with the same item in the source text, rather than one combined problem” (ibid: 36).³⁶ Instead, Jääskeläinen distinguishes among comprehension problems, monitoring problems (i.e. searching for appropriate translation alternatives), editing problems (i.e. changing the translated text), and planning problems, or “ponderings about the style of the target text or the requirement set by the translation assignment” (ibid., building on Tirkkonen-Condit 1986: 7). Like Jääskeläinen, Lörcher claims that “a clear, intersubjective valid distinction between *reception problems*, *production problems*, and especially combined *reception-production problems* can often neither be made from the translations nor from the protocols of thinking-aloud” (1991: 95-96, emphasis in the original). He nevertheless considers that translation problems may be assigned in most cases “to either *reception-* or *production problems*” (ibid: 96, emphasis in the original). So does Mondahl, who also argues that problems can be both receptive and productive (1995: 187; cf. Mondahl and Jensen 1996). Gerloff too distinguishes between comprehension and production problems, thus remarking that all the strategies identified in her study of the protocols produced by five language students “are potentially applicable to either comprehension or production goals” (1986: 252). She goes on to claim that this distinction is an important one as the foreign language learners in her study “seemed to work almost exclusively with comprehension goals in mind, whereas preliminary data from competent translators suggest that they place much more emphasis on production goals” (ibid.).

A similar observation to that of Gerloff above is made by Jääskeläinen, who claims that the two advanced translation students of her 1987 study were primarily faced with production problems (in the form of monitoring) as opposed to the two novice students, for whom comprehension problems were the largest group of translation problems (ibid: 47-50). She thus obtained similar results in her 1990 study, in which she analyzes the attention units identified in the protocols of twelve subjects, including translators and non-translators. According to Jääskeläinen, the majority of the attention units identified were TT production-related as opposed to ST processing-related (ibid: 217). It seems,

³⁶ This seems to be akin to Pavlović’s (2007: 84) remark above concerning the difficulty of telling whether a given translation unit constitutes one or two problems.

however, that the distribution of source text processing units into further sub-categories of analysis support the hypothesis that successful translation requires “deep levels” of ST comprehension processes. In other words, “the more successful translators seem to pay more attention to the content features of the ST than the less successful translators, who approach the ST mainly at the language system level (i.e. focus on code features)” (ibid.). Furthermore, Jääskeläinen found evidence that “in the successful processes a larger share of attention units” involved the production of a refined translation product through several adjustments. For her, this finding “implies that the more successful translators worked with higher level production goals than the less successful translators” (ibid.). Similarly, Lörcher found evidence that non-translators are faced with “problems of a local kind, especially lexical transfer problems arising from lack of competence in SL or TL” (1996: 30-31). In contrast, competent translators “are primarily concerned with global, formulating problems, with the optimal expression of sense according to the TL norms of text production” (ibid: 31).

Hansen (1999a), however, reports opposing findings to those of Gerloff (1986), Jääskeläinen (1987, 1990), and Lörcher (1991) in a study of the translation processes of five advanced translation students. According to Hansen, these students were primarily faced with reception problems as opposed to production problems (1999a: 57). A possible explanation for the increased reception side focus might be found in the nature of the source text selected by Hansen, in this case a marketing brochure containing a high degree of chemical terminology.³⁷ Another plausible explanation could be related to variability in expertise across different subjects. Yet, Lörcher (1996) does not elaborate on the level of expertise concerning the group of translators he refers to as “professional translators.” Neither does Gerloff (1986) comment on the “competent translators” who appeared to be more concerned with production goals than with reception ones. Hansen nevertheless distinguishes, like Lörcher, between *global* vs. *local* problems in translation, which may be resolved on the basis of macrostrategies

³⁷ It should also be pointed out that Hansen used Translog (Jakobsen 1999), a computer program that times and logs every keystroke during the translation process, along with retrospective interviews as opposed to thinking aloud. One could therefore argue that differences in results may also be attributed to the various tools used for data collection purposes.

and microstrategies, respectively (1999a: 44).³⁸ For her, problems are goal-oriented and hence involve “givens,” “goals,” and “obstacles” (1999: 44, drawing on Mayer 1991: 5).

In Übereinstimmung damit wird der Übersetzungsprozess hier als zielgerichtete Lösung eines komplexen globalen Problems betrachtet, das eine Menge lokaler Einzelprobleme enthalten kann. Zum Übersetzen sind sowohl globale Strategien, Makrostrategien, nötig, mit denen der Übersetzer versucht, den Übersetzungsauftrag zu erfüllen und einen in der Kommunikationssituation zweckentsprechenden ZT zu produzieren, und Mikrostrategien, mit denen er lokale Probleme in Übereinstimmung mit dem Gesamtziel löst (ibid: 44-45).

Although other problem classifications are of course possible and indeed available in the relevant literature, of particular interest here is the fact that several researchers seem to agree on the distinction between problem and non-problem units in translation (Krings 1986a, 1986b; Lörscher 1986, 1991; Kiraly 1995; Mondahl 1995; Mondahl and Jensen 1996; Séguinot 2000a). While for these scholars only problem units seem to interrupt the automatic processing of translation, for Jääskeläinen both problematic and non-problematic, yet conscious, decisions interrupt said automatic processing (1993: 101). The distinction between problems and non-problems is, as mentioned above, also made by Jakobsen, for whom both types of units may be equally interesting or uninteresting (1999: 15). In addition, the more or less problematic nature of translation units is recognized by Sirén and Hakkarainen (2002: 77), for whom problems do not necessarily involve serious or difficult processing. Furthermore, it seems that different subjects conceive of problems and their difficulty in rather different ways (Séguinot 2000a: 145, building on Gile 1997). In this regard, Séguinot (2000a, 2000b), Krings (1987) as well as Livbjerg and Mees (2003) conceptualize problems as self-constructed entities.

In addition to the more or less problematic nature of units, there seems to be certain agreement that problems may be of a ST comprehension, a TT production nature, or both (Krings 1986a, 1986b; Gerloff 1986; Lörscher 1991; Mondahl 1995; Mondahl and Jensen 1996; Hansen 1999a). This is naturally not very surprising given the dialectic nature of translation, which always involves mediating between two texts (cf. Lorenzo 1999b: 25). Of slightly higher interest may be the fact that translators seem to focus more on production-related problems (or goals) than non-translators, who seem to face

³⁸ From a theoretical rather than an empirical point of view, Wilss (1990: 26-27) also distinguishes between macro-contextual problems (involving the establishment of context) and micro-contextual problems (dealing with textual aspects).

mainly comprehension problems (Gerloff 1987; Jääskeläinen 1987, 1990; Lörcher 1991). Hansen (1999a), however, obtained different findings regarding the advanced translation students of her study, who were primarily faced with reception problems. Finally, problems have been found to be of either global or local nature (Gerloff 1987; Lörcher 1991), thus requiring the application of macrostrategies and microstrategies for their solving (Hansen 1999a). These represent just one of the many types of strategies identified by process-oriented researchers adopting a problem-solving approach to translation. Said strategies are, accordingly, the object of discussion in 3.2.2. Let us first, however, discuss the very notion of “translation strategy.”

3.2 Translation Strategies

3.2.1 Definitional Criteria

Just as the concept of the translation unit is far from being a well-defined one, so is the term strategy the object of ongoing terminological discussion in translation. In addition, the use of alternative terms such as *plans*, *methods*, *procedures*, *behaviors*, *shifts*, *techniques*, and *operations*, and *actions* (the latter used in this study) only adds to the confusion arising from the lack of terminological homogeneity. The notion of strategy, as referring to the steps taken to solve a translation problem, is perhaps most frequently found in cognitive studies of translation.³⁹ Yet, as Lörcher points out, the term strategy “denotes highly different phenomena, and very rarely is it defined precisely” (1991: 68). Bernardini, for example, claims that the researchers whose TAP studies she surveys in her 2001 article—Lörcher (1986, 1991, 1996), Krings (1986), Gerloff (1986), Mondahl and Jensen (1996), Séguinot (1991, 1996), and Jääskeläinen (1993)—“have either avoided a terminological discussion of the term strategy (for which alternative definitions abound in linguistics) and used the term in a rather undefined, everyday sense, or endorsed the definition provided by Lörcher (who, in turn, adapts Færch and Kasper’s (1983) definition)” (Bernardini 2001: 245). Others have adopted Lörcher’s notion of translation strategy as a starting point to develop their own definition of the concept. This is, for example, the case with Jääskeläinen, who considers Lörcher’s

³⁹ Zabalbeascoa, for example, argues that “[s]trategies of this kind cannot be discovered by descriptive studies of the texts alone since the underlying principle is that a given result might be reached by different paths” (2000: 120).

study “the most extensive investigation of translation strategies published to date” (1993: 104-105).

Nevertheless, for reasons explained below Jääskeläinen’s concept of strategy differs considerably from that of Lörcher, who views a translation strategy as “a potentially conscious procedure for the solution of a problem which an individual is faced with when translating a text segment from one language into another” (1991: 76). Lörcher’s definition is, as mentioned above, based on Færch and Kasper’s notion of communication strategy, according to which “a strategy is a potentially conscious plan for solving what to the individual presents itself as a problem in reaching a particular goal” (1980: 60). Lörcher adapts Færch and Kasper’s (1980) definition on the basis that it involves two key criteria: “problem-orientedness” and “potential consciousness” (1991: 74). From the perspective of psycholinguistics, problem-oriented strategies are those “which a second language learner uses for solving a communication problem” (Lörcher 1991: 74). Problems thus occur when knowledge and skills are insufficient to achieve a specific goal, in which case the learner can make use of two types of strategies. These are “achievement strategies” and “reduction strategies” (Færch and Kasper 1980, quoted in Lörcher 1991: 74). Lörcher elaborates on the nature of these strategies by stating that achievement strategies

are used when the communicative goal is retained and an alternative plan for reaching it is developed. Learners thus creatively expand the linguistic resources available to them. The latter (reduction strategies) are used when a problem is evaded by altering (parts of) the goal and by setting a (partially) new goal which, the learner assumes, can be reached by means of the linguistic resources available to him or her (1991: 74).

As acknowledged by Lörcher (1991: 74) and documented by some translation scholars (see, for example, Krings 1986b; Mondahl 1995; and Mondahl and Jensen 1996 below), Færch and Kasper’s two main types of problem-solving strategies can also be found in translation processes. With regard to potential consciousness, Lörcher states that Færch and Kasper (1980) consider this criterion “to be a secondary one, subordinate to that of problem-orientedness. It does not necessarily apply to the strategies themselves but rather to the situation in which strategies are used, i.e. to the realization of problems” (1991: 74). In other words, Færch and Kasper do not necessarily take consciousness to be a defining feature of strategies but of problem realization. So does Krings, who found that the criterion of consciousness, when applied to his own TAP data, “proved in

fact to be inadequate for a clear-cut distinction between strategic and non-strategic features of the subjects' translational procedure" (1986b: 268). In contrast, potential consciousness for Lörscher "applies to the problem *and* the procedure employed for its solution" (1991: 77, emphasis in the original).⁴⁰ For Dancette, consciousness also seems to be a key feature of translation strategies, which she defines as

a series of ordered behaviors, *consciously* called upon to solve a problem. For example, a systematic or purposeful exploration of the text to seek a second occurrence of a given term implies a strategy, whereas behaviors leading to *a serendipitous result* that the subject was not actively seeking is [sic] not a strategy (1997: 89, my emphasis).

For Jääskeläinen, neither potential consciousness nor problem-orientedness constitutes useful criteria for defining translation strategies (1993: 106). As far as problem-orientedness is concerned, she points out that Lörscher limits his notion of translation strategies to those used for solving problems in the traditional sense. In Jääskeläinen's words, "Lörscher's concept of translation strategy is ... clearly designed to describe **problem-solving** strategies, not unproblematic processing of the task which Lörscher (e.g. 1991: 119) describes as non-strategic behaviour" (ibid., emphasis in the original). As mentioned above, however, Jääskeläinen views translation as encompassing "both problematic and unproblematic processing" (ibid.). Moreover, strategic behavior for her also occurs "when the translator makes unproblematic decisions" (ibid.). With regard to potential consciousness, she argues that the use of this criterion as a defining feature of strategy involves a number of practical problems (ibid: 108). First, as seen in 2.2.1, consciousness-related issues have been widely questioned, among others, on the grounds that not all cognitive processes are available for direct access and hence for verbalization. Therefore, establishing "whether or not one is conscious of something can prove to be a very complex task" (ibid.). Second, Jääskeläinen criticizes Lörscher's

⁴⁰ This is also the case for Scott-Tennent, González Davies, and Rodríguez Torras, who view translation strategies as "the steps selected from a consciously known range of potential procedures, taken to solve a translation problem which has been consciously detected and resulting in a consciously applied solution" (2000: 108). Their notion of strategy therefore excludes "(a) solutions found without considering a range of potential solutions, and (b) solutions found without any conscious reasoning at all, i.e. 'intuitively'" (ibid., cf. Dancette 1997: 89 above). It should be noted, however, that Scott-Tennent, González Davies, and Rodríguez Torras' study of translation strategies is based on student data elicited by means of written protocols (see 4.1.3 for details) as opposed to verbal ones. In completing the former, the participants of their study had to explicitly identify translation problems and explain the strategies applied to solve said problems. Consequently, the distinction between conscious and unconscious processing becomes more feasible, or less complex, with written protocols than with verbal ones where the subjects do not necessarily verbalize all their thought processes.

view that plans which are always used unconsciously do not represent strategies (ibid.). As Lörcher puts it, unconscious plans “cannot function as strategies. They are not open to empirical investigation” (1991: 75). Jääskeläinen, however, argues that unconscious processes can be investigated by observing behavior (1993: 109). As a case in point, Jääskeläinen refers to Séguinot’s (1989c) study, in which the translation processes of a professional translator were highly automatised (very little was verbalised) and hence “her processing patterns had to be inferred by observing her behaviour, such as pauses and hesitations in typing, etc.” (ibid: 110).

While Jääskeläinen rejects Lörcher’s notions of problem-orientedness and potential consciousness as definitional criteria of translation strategies, she does adopt a third criterion put forward by Lörcher. This is the criterion of “goal-orientedness,” which Lörcher considers “of a general kind and applies not only to processes of language use but to human behaviour in general” (1991: 77). Goal-orientedness for Jääskeläinen is interpreted in terms of van Dijk and Kintsch’s (1983: 64-65) notion of “optimality,” according to which strategies in general are the means for achieving a goal in the most effective way (1993: 111). Jääskeläinen explains that van Dijk and Kintsch’s notion of optimality is to be understood as being subjective, i.e. as involving the actions taken by an individual to best achieve a certain goal. When applied to translation,

subjective optimality seems to be an important element of strategy, partly because it emphasizes the translator’s central role as the decision-maker: translation strategies are the means which **the translator**, within the confines of his or her existing knowledge, considers to be best [or acceptable] in order to reach the goals set by the translation task (ibid., emphasis in the original).

As Pavlović (2007: 35) points out, Chesterman (1998: 141) also views strategies as often involving an element of optimality. For him as well, strategies represent the most efficient or appropriate ways of solving problems. Similarly, Zabalbeascoa conceives of strategies as “any conscious action(s) intended to enhance a translator’s performance for a given task, especially in terms of efficiency and effectiveness” (2000: 120). For Lörcher, translation problem solving “is largely controlled by an expectation structure” that involves “separating SL forms from their meaning” on the one hand and “ideas about an ‘optimal’ TL text” on the other (1986: 286). However, as Pavlović explains, for others “the ‘optimal’ way of resolving a problem might be to abandon the aim of achieving an ‘optimal’ translation, such as in the case of ‘playing-it-safe’ strategies (e.g. Lorenzo 1999[a])” (2007: 35). In this regard, she also refers to Tirkkonen-Condit, who

argues that, in translation, “tolerance of ambiguity and uncertainty is needed ... for reconciling the optimal with what is feasible” (Tirkkonen-Condit 2000: 213, quoted in Pavlović 2007: 35). On this basis, Pavlović justifiably concludes that the concept of optimality means “slightly different things to these authors - the best, or having the best cost-benefit ratio” (ibid.), a distinction closely resembling that of “optimizers” vs. “satisfiers” discussed in 2.2.2 above.

So far we have seen that, due to their focus on problem-solving strategies, Færch and Kasper (1980), Lørscher (1991), and Krings (1986), among others, adopt problem-orientedness as a defining criterion of the term strategy. In contrast, Jääskeläinen (1993) rejects this criterion on the grounds that it does not account for “unproblematic” translation decisions. Given the pedagogical focus of this study, I do also take an interest in problem-orientedness in the traditional sense. I nevertheless join Jääskeläinen as well as Færch and Kasper, and Krings, among others, in moving away from viewing strategies as being potentially conscious. Instead, potential consciousness is taken here to apply to the realization of problems from the perspective of the subject. That is, while in this thesis consciousness applies to the problems identified by the research participants, it does not necessarily apply to their problem-solving strategies.⁴¹ This seems to contrast with Lørscher’s (1991) view described above that potential consciousness applies to both problems *and* strategies. Furthermore, Lørscher (1991), like Dancette (1997), but in contrast to Jääskeläinen (1993), characterizes problems as requiring strategic processing. Krings (1986b), however, found it impossible to clearly distinguish between strategic and non-strategic features of translation processes. As Pavlović points out, “teasing apart strategic vs. non-strategic behavior will present the

⁴¹ The research participants of this study were not explicitly asked to explain/justify the strategies applied to solve certain translation problems. They were only asked to explain their rationale for their perceived problems and selected solutions. The main reason for obtaining student data on types of problems and solutions is, once again, pedagogically motivated. This is in line with Zabalbeascoa’s perspective, according to which “[t]he purpose of grouping solutions into solution-types is to provide meaningful samples of options for the trainee and illustrations of translator behaviour” (2000: 126). Zabalbeascoa further states that future translators will eventually face situations that have not been dealt with in the classroom or in the relevant literature. Strategies and solutions are therefore “to be presented as mind-openers, not as a closed set of categories that act as blinkers in the search for optimal solutions and fully satisfactory translations” (ibid.). In this regard, Pavlović’s findings on the study of collaborative translation processes suggest that, in a pedagogical context, “having more solutions to choose from, and being more ‘selective’ when it comes to those solutions correlates with higher quality of the output” (2007: 192, building on Pym 1992: 175). As previously indicated, one might think that assessing too many solutions “spells inefficiency, especially in the professional world” (ibid.). Yet, as Pavlović points out, “in the learning environment having a lot of ideas and thinking (aloud) critically about them can only be an asset. Speed and confidence should follow suit” (ibid.).

researcher with a practical as much as a conceptual problem” (2007: 38). As a result, Pavlović proposes “to take a step backwards and leave ‘strategies’ aside” to adopt Strauss and Corbin’s (1998) notion of “actions/interactions” instead (*ibid.*). According to these authors, actions/interactions are “a series of evolving sequences ... that occur over time and space, changing or sometimes remaining the same in response to the situation or context” (Strauss and Corbin 1998: 165, cited in Pavlović 2007: 38). In addition, actions/interactions can be either “strategic” or “quite routine” as well as “orderly” or “interrupted.” It is their “evolving nature and [their] varying forms, rhythms, and pacing all related to some purpose” that best describe the nature of actions/interactions (*ibid.*). In a similar fashion, I will avoid dichotomies like strategic vs. non-strategic or conscious vs. unconscious processing.⁴² I will instead adopt the more flexible notion of “behaviors” in my Web searching study.

As defined by Dancette, the term behavior is taken here to involve “an action or a series of actions carried out by the subject, whether or not they lead to a result” (1997: 89). Thus, one would expect that “there is always a result, whether nothing, positive, or negative” (*ibid.*). Unlike Dancette, however, behaviors in this study do not necessarily involve actions consciously applied to solve certain translation problems (*ibid.*).⁴³ Consequently, both serendipitous and non-serendipitous solutions that may have resulted from certain Web search actions are investigated in this thesis. Similar to what Strauss and Corbin suggest above, what matters is that Web search behaviors involve the seeking of information in relation to a goal. Furthermore, as discussed in 5.1.1, the initial state of the information-seeking process is taken to relate to a “problematic situation” (Wersig 1971) or “anomalous state of knowledge” (Belkin 1980, 2005). Conversely, the goal state involves either the resolution of the problem in a more or less successful manner, or its non-resolution (cf. Spink, Park and Cole 2006; Dancette 1997: 89; Lörcher 1991: 96). It is on this basis that the criteria of problem-orientedness and

⁴² As Færch and Kasper point out, consciousness (and, for that matter, strategic processing) “is not a matter of ‘either or’, but of ‘more or less’” (1980: 60).

⁴³ As Zabalbeascoa suggests, “[i]t seems useful to distinguish ‘behavioural’ strategies from ‘mental’ activity, where the former would include actions that could be observed directly by the researcher and recorded on video as the translating job is carried out” (such as performing a dictionary search or drafting a translation version) (2000: 120). The latter, i.e. mental activities, refer to “the thought processes that can only be detected indirectly by noticing indicators or symptoms (hesitations, mumbblings), or otherwise by means of interviews and think-aloud protocols, or by special equipment that can track neural activity” (*ibid.*).

goal-orientedness are initially taken to characterize Web search behaviors embedded in translation.

3.2.2 Categories of Analysis

Translation strategies, like translation units, have also been the object of different classifications in process-oriented research. In addition, most of the researchers mentioned above—most notably, Krings, Gerloff, and Lörcher—have linked the concept of translation strategy to that of translation problem. Others, like Jääskeläinen (1990, 1993), have related the former to both problematic and unproblematic translation processing. In this section, I take an interest mainly in translation strategies that subjects have been found to resort to in translation problem solving. I will nevertheless also take a brief look at strategies that have been linked to unproblematic processing in translation.

As far as problem-solving strategies are concerned, Krings, for example, classifies these into five main categories (1986b: 268). These are strategies of comprehension (further divided into inferencing and use of reference works), equivalent retrieval (via interlingual/intra-lingual word associations, paradigmatic and semantic recourse to related items, and dictionaries), equivalent monitoring (by means of L2-intuitions, grammatical rules, comparisons between SL and TL items, and reference books), decision making (i.e. choosing among competing equivalents), and reduction (e.g. ignoring the markedness or metaphorical nature of certain ST items) (ibid: 268-273).

Gerloff (1986) developed a similar, albeit perhaps more extensive classification of translation strategies. She refers to these as “text processing strategies,” which involve “any metalinguistic or metacognitive comments made or, specific problem-solving behaviors effected, during the decoding and rendering of the translation text” (ibid: 252). Gerloff’s text processing coding system therefore aims at highlighting “those strategies which subjects use when they encounter problems with the text” (ibid.). This coding system includes eight categories (and their subcategories) of text processing strategies. These are strategies of problem identification (including a sub-problem and/or an error, possible error, or source of error), linguistic analysis (analogies to linguistic units as well as syntactic, grammatical, and lexical analyses), storage and retrieval (memory searches and dictionary searches), general search and selection (e.g. by repeating the pronunciation of linguistic units, generating synonyms, stating tentative or general meanings, skipping unknown items or using filler words, and comparing SL and TL

systems), inferencing and reasoning (using world knowledge or personal experience knowledge, referring to author's intent or particular use of a term, constructing context, and using text structure), text contextualization (using previous text information as well as sentence context, paragraph context, and larger context), and language use and task monitoring (correcting or altering meaning choices, assessing congruity, checking punctuation, assessing TT quality, and making changes to the TT) (ibid: 253-254).

Like Gerloff, Lörcher (1986, 1991) also views the realization of translation problems (which can be verbalized or not) as one of the several translation strategies making up his categories of analysis. Translation strategies for him "have their starting-point in the realization of a problem by a subject, and their termination in a (possibly preliminary) solution to the problem or in the subject's realization of the insolubility of the problem at the given point in time" (1991: 96). Lörcher goes on to argue that between the initial and final states of this problem-solving process there are various "mental activities ... which can be interpreted as being strategy steps or elements of translation strategies" (ibid.). It is these steps or elements that yield Lörcher's 22 categories of strategic analysis. Some of these categories "refer to entities which exclusively occur within strategic phases of the translation process" (ibid: 100). These categories range from realizing and/or verbalizing a problem to adopting a solution (whether a preliminary, positive, or negative one) to a problem, postponing it (i.e. leaving it aside), or not solving it altogether. Other categories "refer to entities which frequently, but not exclusively, occur within strategic phases of the translation process" (ibid.). These include monitoring ST or TT segments, rephrasing ST or TT segments, checking a (preliminary) solution to a problem (e.g. by comparing SL and TL segments, or using context), commenting on a ST segment, and making transpositions. Yet other categories refer to "entities which can, but generally do not, occur within strategic phases of the translation process" (ibid.). Examples for this category include the mental organization of TT segments, the reception of ST segments, non-strategic translation, and the organization of translational discourse (ibid.).

Mondahl, in her study of lexical search strategies in translation, distinguishes between retrieval strategies and evaluation strategies applied to the solution of text production

problems (1995: 187, drawing on Krings 1986b).⁴⁴ She further divides retrieval strategies into achievement strategies (characterized by spontaneous associations, experience-based or situational associations, reformulations, and problem analysis) and reduction strategies (e.g. the simplification of form or content due to the translator's inability to find a "satisfactory" translation equivalent, or the non-translation of a ST element) (ibid: 188). Evaluation strategies involve choosing among possible solutions for a translation problem and "may range from the spontaneous evaluation: 'this sounds best' to the less intuitive strategy of identifying differences between the source element and a potential translation" (ibid.). Furthermore, given that for Mondahl evaluation strategies involve testing for acceptability and adequacy, she argues that said strategies are closely related to "the translator's general approach to the task, i.e., her translation maxims" (ibid.). These maxims involve reading the ST before translating, taking notes (either mentally or on paper) on problematic items, considering different audiences, translating word-by-word, progressing in a linear or circular fashion, and focusing on content or formal aspects (ibid: 186-187, cf. Mondahl and Jensen 1996). Given that Mondahl adapts her theoretical framework from Krings' (1986b) lexical search model, one would be tempted to say that her translation maxims closely resemble Krings' translation principles. Krings in fact views these principles as specific types of decision-making strategies used to choose among translation equivalents. However, for him these principles are "independent of individual problems and limited to cases where [the] monitoring" of potential equivalents does not lead to a decision (1986b: 273). Krings thus reduces his translation principles "to imperatives such as ...: 'If all competing potential equivalents turn out to be equally appropriate or inappropriate, take the most literal one!' or alternatively: 'Take the shortest one!'" (ibid.).⁴⁵

It should be noted at this point that the subjects of the studies discussed so far are all foreign language learners except for Mondhal (1995), whose subjects were recruited from two higher education institutions (the Copenhagen Business School and the Danish Civil Defense Corps Officers' Academy). Furthermore, as Bernardini points out, none of these studies have attempted to "systematically compare strategies across two groups of subjects" (2001: 247). This is also the case with non-comparative studies that

⁴⁴ Mondahl excludes from her study the investigation of "receptive problems" that require the application of comprehension strategies (1995: 187).

⁴⁵ Krings identifies other translation principles that are related to the use of reference material. I will refer to these principles in section 3.3.1, which deals with processes of resource consultation.

have used professional translators as subjects. Séguinot, for example, found that the professional translator in her (1989c) study applied a number of “global strategies” while translating an administrative routine text. These global strategies involve a “tendency to translate without interruption as long as possible, a tendency to correct [language] surface errors immediately and leave errors involving meaning until a natural break, and a tendency to leave the monitoring for qualitative errors in the text to the re-reading stages” (ibid: 36). According to Séguinot, these strategies are likely to be “all related to a principle of least effort,” which suggests that “it may be easier to correct errors once they come into conscious awareness than to remember them” (ibid.). It also appears that “the correction of superficial errors would not disrupt the translation, [while] critically evaluating the translation as it is being produced would” (ibid.).

Séguinot also detected a further global strategy, referring to it as “the desire to stay as close to [the original] text as possible” (ibid.). One could argue, however, that this particular strategy may be subject to the type and nature of the text to be translated. This observation is in fact made by Séguinot (1996) herself in another protocol study involving two professional translators working on the same translation task. Séguinot naturally argues that not all translators display the same regularities in their use of translation strategies. She goes on to claim that this is particularly true with regard to the “*global* way of approaching a text [which] can be expected to vary depending on the type of text, familiarity with the text type and the vocabulary, even personal preference” (ibid: 78-79, emphasis in the original). Like the professional translator mentioned above, the two professional translators also “stayed close to the English syntax, privileged the search for exact terms, and then reformulated the translation to conform to French syntax and stylistic norms” (ibid: 79). These two translators thus employed a number of strategies at the local level (what Séguinot calls “translation-in-progress”). Here, she detected four main types of translation strategies, “based on function” (ibid.). These are interpersonal strategies (which involve the phatic, corrective, and brainstorming functions), search strategies—further divided into external searches (reference materials such as dictionaries, glossaries, etc.) and internal searches (based on internal knowledge and recourse to paradigmatic and syntagmatic terms)—inferencing strategies (rereading ST and TT, and consulting), and monitoring strategies (rereading ST and TT, consulting, and comparing texts) (ibid: 79-80).

While, as indicated previously, none of the studies described above compare strategies across different groups of subjects, “finding out what is that distinguishes professional from non-professional (student or lay person) behaviour has always been a major concern of researchers in process-oriented translation studies” (Bernardini 2001: 247). Comparative studies of this type include, for example, that of Gerloff (1988), who coded the problem-solving strategies and behaviors of three different groups of subjects (foreign language students, bilingual speakers, and professional translators). In this study, she found evidence that the bilingual speakers and the translators produced “more possible translation variants, did more editing and continuous monitoring, ... worked through the text a greater number of times” and spent more time on their translations than the foreign language students did (ibid: x). That is, the bilingual speakers and the translators were “more ‘intensive’ processors” than the foreign language students (ibid: 147).⁴⁶ Yet, “only the translators were considered to be more ‘efficient’ processors than the students, exhibiting more problem-solving behavior per unit of time than either the students or the bilinguals” (ibid.). Furthermore, the best translation performers appeared to use dictionaries more frequently than the weakest performers, who used dictionaries moderately (ibid: 138-139).

Jääskeläinen (1987, 1990) also found similar differences among the global behaviors of two groups of subjects, namely two fifth-year translation students (considered professional translators) and two first-year translation students (considered non-professional translators). Like in Gerloff’s study, the professional translators in Jääskeläinen’s did more text processing in less time than the latter, i.e. they appeared to be more efficient processors than the non-professionals. In addition, the non-professionals tended to “use the bilingual dictionary as the primary means for solving comprehension problems,” while the professionals favored the translation assignment in their problem-solving activities (1987: 54). In contrast, the non-professionals tended to “ignore the assignment or be unaware of its implications” (ibid.). On the basis of these results, Jääskeläinen tentatively concluded that “intensive processing” leads to better translation quality (ibid.). She reached the same conclusion when she compared the

⁴⁶ The higher volumes of text processed by the bilingual speakers and the translators were in turn associated with large amounts of retrospective processing, or frequent “skips backward in the text” (Gerloff 1988: 147). Gerloff therefore claims that her findings “strongly support Lörcher’s [1986] characterization of the nature the translation process as a retrospective-prospective process which proceeds in a non-linear, non-continuous fashion towards the final goal” (ibid.).

results of her 1990 study to those obtained by Gerloff (1988). In both studies, “those subjects who spent considerable time and effort on the experimental tasks were the ones who produced the best translations, irrespective of their relative translation competence or level of language proficiency” (Jääskeläinen 1996: 66).

With regard to strategies of source text comprehension, Dancette (1997) compared the protocols produced by three graduate students of translation; the first with no professional experience, the second with over two years of experience in business translation, and the third with two years of professional experience in interpreting. In this study, she observed nine main types of translation behaviors (and sub-behaviors), including reading the ST, alternating between the ST and the TT, repeating intra-linguistic items either in the ST or the TT, paraphrasing either in the ST or the TT, translating, consulting a dictionary, monitoring proposed translations, and making either extra-linguistic or linguistic comments (*ibid*: 90-91). She classified the comprehension processes of all three subjects according to the textual, linguistic, and notional levels of analysis (*ibid*: 94). Furthermore, when comparing the translation performance of her subjects, Dancette detected three main types of “efficient strategies” (*ibid*: 102). These involve the ability to neutralize problems, express logical links between prepositions, and propose a number of translation variants. Concerning the strategy of neutralization, Dancette found, as indicated previously, that the “best performers” are able to postpone problems (or set them aside) and come back to them as they work on other segments. With regard to the establishment of logical links between items, the two subjects with professional experience displayed a tendency to “reinforce causal links in their translations” (*ibid.*). These two subjects also produced protocols that were “much richer in synonyms, candidate equivalents, and phrases than [those of the subject with no professional experience], who [did] not resort to paraphrasing” (*ibid*: 103). These results led Dancette to arrive at two main conclusions:

First, the failure of one of the respondents to fully resort to the notional level explains, to a certain degree, the inappropriate renderings in her translation. Second, with the other two respondents, the construction of elaborate conceptual networks, based on linguistic and nonlinguistic elements, leads to translations with textual features usually considered to be assets, such as the reinforcement of logical connectors between clauses. In-depth comprehension seems to be linked to the ability to formulate various translation variations with more expressiveness and increased creativity (*ibid.*).

Like Dancette, Kiraly also found a number of processing indicators characterizing the translation behaviors of 18 subjects (nine novice students and nine graduates of

translation). These processing indicators include rephrasing ST segments, searching dictionaries (monolingual and/or bilingual), employing mnemonic aids, back-translating, abandoning strategies that produce unexpected results, identifying problems, monitoring TL accuracy, reducing meaning, making extra-linguistic judgments, re-contextualizing, referring to a translation expectation structure, making intuitive acceptability judgments, attempting syntactic reconstructions, and accepting interim solutions (1995: 77-78). Unlike the authors above, however, Kiraly found no “major differences between the way translations were processed or in the quality of the translations produced by” the two groups of subjects in his study. In contrast, Jensen (1999) found a number of differences regarding the translation strategies and “coping tactics” of three groups of subjects (non-translators, semi-professional translators, and expert translators).⁴⁷ Drawing on Bell (1991), Jensen distinguishes among the strategies of borrowing, literal translation, paraphrasing, adaptation, and reduction (ibid: 109-110). As far as coping tactics are concerned, she uses a modified version of the list of tactics provided by Gile (1995: 207), including instant naturalization, transcoding, contextual reconstruction, generalization, and omission (ibid: 110). When comparing the pattern and frequency of both strategies and coping tactics used by the three different groups of subjects, Jensen observed that, in line with some of the findings reported so far, the group of “non-translators seemed to favour a word-for-word translation or literal translation” (ibid: 116). This group of subjects also appeared to use transcoding and omission of textual elements as their main coping tactics. In contrast, the main strategy used by both groups of professional translators (i.e. semi-professionals and experts) was paraphrasing. The use of this strategy thus appeared to “increase with experience. Conversely, the frequency of coping tactics decreased” (ibid.). Finally, Jensen observed that the main coping tactics used by both groups of professionals “seemed to be reconstruction based on context, and generalisation” (ibid.).

Like Jensen, Lörcher (1996) found a number of differences regarding the translation strategies employed by two groups of subjects (professional translators and foreign language students). In particular, he found that “the mental processes of the two kinds

⁴⁷ Although Jensen does not explicitly define the notion of “coping tactic,” she builds on Gile (1995: 191) to argue that the coping tactics that interpreters use “because of processing capacity limitations and gaps in their knowledge base, ... also apply in modified form to written translation” (1999: 106). She goes on to state that said “coping tactics are consciously used by translators in order to become operational, which means that they are used strategic” (ibid.). She finds this claim to be supported by van Dijk and Kintsch’s (1983: 64-65) concept of strategy and its associated notion of optimality (ibid., cf. Jääskeläinen 1993).

of translators did not reveal significant differences” as far as the detected strategies are concerned (ibid: 30). Differences were found, however, concerning “the distribution and frequency in the types of strategy, i.e. in the quantitative aspects of the translation strategies” (ibid.). The translation strategies identified refer to the approach taken to translate the ST (the language students favored a form-oriented approach to translation as opposed to the professionals, who employed a sense-oriented approach); the size of the SL text segments (which were larger among the professionals than among the language students); the amount of checks concerning TT output (the professionals tended to continuously check their translations, while the language students exhibited the opposite behavior, i.e. they tended not to check the utterances they produced in the TL); and the amount of checks with regard to style and text-type adequacy (the professional translators tended to check their stylistic and textual adequacy, while the language students only checked their solutions to problems at the level of “lexical equivalence and, to a lesser extent, to their syntactic correctness”) (ibid: 30-31). As mentioned earlier, Lörcher also found evidence that the foreign language students were faced “mainly with problems of a local kind” (especially of a lexical nature), while the professionals were “primarily concerned with global, formulating problems [affecting] the optimal expression of sense” in the target language (ibid: 31).

The distinction between strategies of a global vs. local kind is also discussed by Jääskeläinen (1993). Here, she analyzes the problematic and unproblematic translation processes of twelve subjects, all students who participated in the study for her 1990 *licentiate thesis* (four translation students, four professional translators, and four “educated laymen”). Based on the analysis of the protocols obtained, Jääskeläinen identified two types of strategies in the high quality translations produced by some of the subjects. These are “*global strategies*, which ... refer to the translator’s general principles and preferred modes of action” [e.g. deciding about the style to be adopted for the translation and about the needs of the target readers], and *local strategies*, which ... refer to specific activities in relation to the translator’s problem-solving and decision-making” (1993: 116, emphasis in the original). Jääskeläinen refers to Hönig and Kussmaul (1982) as well as Jääskeläinen and Tirkkonen-Condit (1991) to claim that

these strategies or “patterns of behavior are frequent in the protocols of professional translators and advanced students of translation” (Jääskeläinen 1993: 116).⁴⁸

As the discussion above shows, any attempt at establishing a typology or categories of translation strategies very much depends on the perspective adopted by the researcher. The most obvious classification distinguishes between global and local translation strategies (e.g. Séguinot 1989c, 1996; Lörscher 1996; Jääskeläinen 1993). The former (also referred to as “macrostrategies”) are typically taken to affect the processing of a whole text, while the latter (also known as “microstrategies”) generally apply to the tackling of individual text segments (cf. Zabalbeascoa 2000; Muñoz Martín 2000: 130). Some researchers focus on global strategies only, sometimes referring to these as translation maxims (Mondahl 1995; Mondahl and Jensen 1996), translation principles (Krings 1986b), and global behaviors (Gerloff 1988; Jääskeläinen 1987, 1990). Other researchers focus particularly on local strategies, i.e. those at the level of text segments (Krings 1986a, 1986b; Gerloff 1986; Lörscher 1986, 1991; Mondahl 1995; Mondahl and Jensen 1996; Séguinot 1996). And yet others link both global and local strategies to translation processing (Kiraly 1995) and translation behaviors (Dancette 1997). Furthermore, it appears that global strategies are not necessarily associated with problematic translation processing, while local strategies are. For Jääskeläinen (1993), however, both global and local strategies may be employed in problematic as well as unproblematic translation situations. What seems to be more important for her is the fact that, while some translation processes may be quite unproblematic, they are nevertheless strategic. Lörscher’s (1991) categories of strategic analysis, however, refer to entities that occur within more or less problematic phases of the translation process.

Notwithstanding the more or less problematic/strategic nature of translation, one observation that is particularly relevant for the purpose of this study involves the distinction between strategies that draw on internal resources and strategies that draw on external ones. For the majority of the researchers above (e.g. Krings 1986a, 1986b; Gerloff 1986, 1988; Jääskeläinen 1987, 1990; Kiraly 1995; Séguinot 1996; Dancette

⁴⁸ Zabalbeascoa also proposes the distinction of global vs. local strategies, albeit from the (theoretical) perspective of problem solving only. He proposes this distinction on the grounds that, if translation is considered a problem-solving process, as it usually is, “then it makes sense to view the target text as the ‘global’ solution to the problem posed by the ST together with the criteria for its translation” (2000: 121). In contrast, local solutions would involve “the renderings of identifiable segments or features of the ST” (ibid.).

1997; Pavlović 2007), the former resources relate to one's existing knowledge and past experiences, while the latter refer to dictionaries and other reference material. Given the focus of this study, the use of external resources for translation is the object of discussion in the following section.

3.3 External Resources for Translation

While the existing body of TAP research into the translation process is considerable, it appears that “very little attention, if any, is [usually] given to the sources of reference used by the translator during a translation task, despite the fact that much of the time and effort spent in translation work consists of consulting such sources” (Varantola 1998: 179). There are nevertheless a number of TAP studies, which I report on in this section, that have examined to a greater or lesser extent the use of reference material in translation. As these studies were carried out in the 1980s and 1990s, their focus is on the use of printed dictionaries and other reference material as opposed to electronic and/or Web resources, despite the fact that the latter have been available to translators since the early 1990s.⁴⁹ Furthermore, as I have shown above, the general trend in TAP

⁴⁹ A similar observation is made by Ronowicz et al., who, while also examining the use of printed dictionaries in their TAP study, state that “[t]o our knowledge, all TAP and Translog studies of the use of dictionaries in translation done until the time of writing this paper have investigated work with paper-based dictionaries, even though in reality translators nowadays also use web-based databases, dictionaries and corpora” (2005: 593). Most likely, the fact that the use of electronic and/or online resources in translation is under-researched is related to the type of data collection tools available at the time in combination with TAPs, such as video cameras and/or retrospective interviews. These tools are still being used, for example, in an ongoing research project carried out by the National Research Council of Canada and the Université du Québec en Outaouais, in which video cameras and interviewing techniques have been employed to investigate professional translators' attitudes and work-related practices with regard to “collaboratively built linguistic resources” as well as “collaborative translation and crowdsourcing” (Désilets 2010: n.p.; see also Désilets, Barrière, and Quirion 2007). Nevertheless, even in the first decade of the 21st century, we find almost no process-oriented studies that combine more sophisticated methods and tools such as Internet logs, keystroke logs (as those obtained in Translog, for example), screen recordings and/or eye tracking. These methods would be more appropriate to examine the use of electronic and/or Web resources in translation. The few exceptions like Lauffer (2002), Asadi and Séguinot (2005), Pavlović (2007), as well as Massey and Ehrensberger-Dow (forthcoming), among others, will be discussed in Chapter 4. Furthermore, with the exception of Pinto Molina and Sales Salvador (2007), there are hardly any studies addressing the information behavior of translation trainees within the areas of documentation, user studies, and information literacy. This concern is echoed by Pinto Molina and Sales Salvador, who state that “we find a huge research gap, because almost no previous research has been done dealing with the field of translators, apart from Alanen [1996] and Palomares and Pinto [2000], both of which studies centre on the professional translation community” (2007: 536). While Alanen's study focuses on the “working habits of some Internet-literate translators” (1996: n.p.) who completed an online questionnaire, Palomares Perraut and Pinto Molina's (2000) study focuses on the information needs, habits, and uses of the professional translators who also completed an electronic survey. Similarly, White, Matteson, and Abels' (2008) focus-group study analyzes the information behaviors of professional

research has been to examine translation strategies that draw on both internal and external resources. In the following, I will therefore first discuss studies that explore the use of both types of resources. Given the focus of my research, however, I will particularly deal with the elements of those studies that concentrate on the use of external resources, i.e. reference material (3.3.1). Second, I will discuss studies that have made the use of reference material their sole object of research (3.3.2).

3.3.1 The Use of Reference Material as an Additional Object of Study

In many TAP experiments, especially in the early ones, concerns for the conditions of the research environment led researchers to make printed dictionaries and other reference material available to their subjects. That is, the use of external aids would frequently be allowed to increase the *naturalness* of the experiments and therefore avoid interferences with the research data. Tirkkonen-Condit, for example, points out that experimental conditions “can be made fairly natural by allowing access to dictionaries and other reference material and by allowing the subjects to make notes, to produce a written draft, and to change the manuscript whenever necessary” (1989: 73). Séguinot makes a similar observation and claims that there has been

a recognition on the part of some investigators that test situations should replicate as far as possible the natural environment of the translator. That means making dictionaries and other reference material available and, for studies of the pragmatic strategies of professional translators, taping translators in their offices working on their own texts on their own computers (1997: 106).

In the experiments carried out by Jääskeläinen in 1985-86, she considered it “necessary to allow the subjects to use dictionaries and other reference material because in real life dictionaries are a translator’s tools of trade, and therefore the skill to use them efficiently is central,” particularly when comparing professional with non-professional translators (1989b: 179). Although most of the researchers mentioned in the previous section have in fact allowed the subjects of their experiments to use dictionaries and other reference material, there are a few exceptions, most notably Gerloff (1986) and Lörcher (1986, 1991). In Gerloff’s study, for example, “no dictionary use was allowed,

translators. Pinto Molina and Sales Salvador’s research does, however, “not just focus on the professional community but also the teacher and student communities, with the last-named group constituting the object of [their] study” (2007: 537). Although their findings are not based on direct observation but on data collected from 193 translation and interpreting students at the Universitat Jaume I de Castellón (Spain) by means of a semi-structured questionnaire (which drew on the insights of an expert panel, the ideas put forward in ANECA 2004, the international INFOLIT norms, and Pinto Molina’s 2005 ALFINTRA proposal), the results of Pinto Molina and Sales Salvador’s (2007) study will be briefly discussed in Chapter 8.

as it was believed that the absence of working aids would elicit more strategies for coding, thus enabling development of a more complete coding scheme” (1986: 245; cf. Gerloff 1987: 138). Jääskeläinen therefore states that Gerloff had “good reasons for not allowing the use of dictionaries, ... [as] one of the purposes was to examine foreign language learners’ text comprehension strategies (1989b: 179, drawing on Gerloff 1986: 245).

Similarly, Lörcher did not allow the subjects of his 1986 and 1991 experiments to use any reference material for translation problem solving. He did so hoping that the subjects would engage in more problem-solving activities, which, in turn, would be verbalized in their thinking aloud processes. In Lörcher’s own words, “[t]he use of aids of any kind, especially of monolingual and bilingual dictionaries, was not allowed to prevent problem-solving processes from being blocked or broken off too early by simply adopting ready-made solutions” (1991: 40). As Bernardini points out, however, “[t]he environmental validity of this decision seems dubious, the extra processes triggered by the absence of reference tools being an obvious result of the experimental condition, and arguably of little descriptive value” (2001: 260). More importantly, the strategies involved in the use of reference material “remain unaccounted for” (ibid.). Kiraly also remarks that the fact that subjects “were not permitted to use dictionaries” in Lörcher’s (1986) study represents a constraint criticized by Krings (1986) as well, as

the use of dictionaries and other reference sources is part of conscious translation strategy, and there is much to be learnt about the research aspect of translation. For instance, do translators uncritically accept translation equivalents proposed by bilingual dictionaries, or do they use collocations or connotation knowledge (if they have it) to evaluate the proposed equivalents? It might be interesting to determine whether professional translators and translator trainees use dictionaries in the same way and whether they have systematic strategies for retrieving translation equivalents with the help of dictionaries. How are such lexicographic retrieval strategies integrated with other translation strategies? (Kiraly 1995: 44-45).

Krings (1986a, 1986b), in particular, is one of the early TAP researchers who examined subjects’ strategies of dictionary use in his extensive psycholinguistic study of translation processes. Like many other process researchers, he did so because said strategies, among others, became apparent in his subjects’ (eight German students studying to become foreign language teachers of French) solving of translation problems. While four of these subjects were asked to translate a text into their L2, the

remaining four had to translate a different text in their L1.⁵⁰ To do so, all eight subjects were instructed to bring along “those reference books they were accustomed to use at home, such as monolingual dictionaries, bilingual dictionaries, grammars etc.” to avoid having unfamiliar reference material interfere with the experimental data (1986b: 265). This resulted in a poor selection of reference material with some subjects only bringing one bilingual dictionary. All subjects nevertheless had access to a monolingual dictionary in French that Krings had made available for them (ibid: 217). Krings found that the subjects of his study used dictionaries as one of the main strategies for (a) solving comprehension problems, (b) retrieving equivalents, (c) monitoring equivalents, and (d) making decisions. With regard to comprehension problems, most subjects used dictionaries as soon as they encountered lexical items they were not familiar with. In such cases, a very frequent strategy “consisted in looking up the unknown item in a bilingual dictionary and subsequently checking the appropriateness of the given equivalents in a monolingual dictionary” (ibid: 271). Whenever it was not possible to consult dictionaries or when these “turned out not to be helpful” for whatever reasons, subjects seemed to resort to a different strategy, that of inferencing. Inferencing strategies were particularly used for “filling gaps in the understanding of source-language text passages by relying on all types of interlingual, intralingual and extralingual knowledge” (ibid.). In addition, inferencing was, although not exclusively, most notably used in L1 translation (ibid.).

Concerning retrieval strategies of lexical items,⁵¹ Krings observed a number of procedures for searching equivalents in the target language (ibid: 270). The main strategy was “the recall of fixed interlingual associations [that took place] on the word level and [that] consisted of two directly linked items” (i.e. a one-to-one correspondence between two items in two different languages) (ibid: 271). Another typical strategy involved “recourse to semantically related items [in cases where] interlingual word

⁵⁰ The texts were a French article taken from a satirical journal dealing with the reorganization of the French cabinet and a German article extracted from a German newspaper describing the adventures of a “field-mouse ... in a German Intercity train” (Krings 1986b: 264). Krings considered both texts to be “fairly difficult” as they included “puns, metaphorical expressions and other instances of literary finesse” expected to pose a variety of translation problems. These problems, in turn, were *assumed* to affect the translation process (ibid.).

⁵¹ These strategies were observed in cases “where subjects had difficulties in recalling a specific lexical item, already learnt, mostly the term for a concrete object for which only the name existed in the foreign language, for example: ‘wagon-restaurant’ for ‘Speisewagen’ (restaurant car) or ‘passager clandestin’ for ‘blinder Passagier’ (stowaway)” (Krings 1986b: 270).

associations could [not] be recalled” (ibid.). In such cases, the subjects used “synonyms, paraphrases, superordinate terms, archilexems etc. to set up potential equivalents” (ibid.). Krings’ subjects searched for potential equivalents via dictionaries, via (other previously learnt) languages, or via other learning situations and/or sensory procedures (ibid.). Moreover, Krings found that strategies for retrieving equivalents alternated with monitoring strategies.⁵² That is, after a potential equivalent was retrieved the subjects tended to monitor said equivalent through comparisons of SL and TL items, recourse to grammar rules, L2 intuitions, or dictionary use. The latter, i.e. strategies of dictionary use, were also employed in decision-making processes involving a number of “translation principles” such as: “‘If one of the equivalents is to be found in the bilingual dictionary and the other is not, take the one from the dictionary!’ or: ‘If all equivalents concerned are in the dictionary, take the one that precedes the others!’” (ibid.: 273). Jääskeläinen argues that “using such arbitrary criteria in decision-making may be partly the result of the setting of [Krings’] experiment” (1989b: 181). As Krings’ subjects were asked to translate as they would normally do, Jääskeläinen believes that they might have considered “the translation task at hand as a language exercise,” in which case the production of a quality text may not have been the subjects’ priority (ibid.). She further points out that the aim in “at least some cases of ‘pedagogical’ translation” is to show (usually to a university teacher) that the meaning of the source text “has been roughly understood” (ibid.). This appears to be supported by the fact that Krings’ subjects mainly used bilingual dictionaries to solve comprehension problems, a type of behavior that for Jääskeläinen is not sufficient in professional translation (ibid.).

All in all, the results obtained by Krings seem to suggest that the subjects in his TAP experiment resorted to their own cognitive resources (such as previous knowledge and experiences) for solving comprehension problems only after a dictionary search had failed for whatever reasons. In contrast, for solving production-related problems recourse to internal cognitive resources seemed to precede dictionary searches. These findings would appear to have important consequences for translator training. However, it is important to realize that (a) Krings’ study is representative of advanced foreign language learners and (b) Krings does not differentiate between strategies found in L1

⁵² It appears that in very few cases would monitoring strategies be employed for checking the adequacy of an “L2-item as such independent of its appropriateness as an equivalent” (Krings 1986b: 272).

translation and those detected in L2 translation (there seems to be, however, more examples of the latter in Krings' 1986b article).

In an effort to compare the research performance of foreign language learners to that of translation students, Jääskeläinen (1989b; cf. Jääskeläinen 1987) analyzed Krings' research results together with the findings of her 1985-86 experiments. In these experiments, Jääskeläinen had asked her subjects (two first-year and two fifth-year students of translation) to translate a journalistic text (reporting scientific news) from English into Finnish according to the assignment they were given. Unlike in Krings' experiment, the text that Jääskeläinen chose for translation appeared to be relatively easy. It nevertheless contained "various difficulties, most of which [could] be solved with the help of reference material" (ibid: 182). Also in contrast to Krings' experiment, Jääskeläinen did not ask her subjects to bring the reference books they normally used. Instead, she provided the students with several dictionaries and other reference material, including "a bilingual dictionary (English-Finnish) ..., two monolingual dictionaries of English ..., two monolingual dictionaries of Finnish ..., and two volumes of a Finnish encyclopaedia" (ibid: 183). There were also two newspapers (in English and Finnish, respectively) available in the experiment room. Although the subjects were told that they could ask the researcher for any additional material they might need, none of them did. Yet, as Jääskeläinen points out, "it is likely that the first year students used dictionaries which they would not have used, had they not been available in the experiment room" (as one of the first-year students indeed confirmed) (ibid.). Jääskeläinen therefore argues that the results of her experiments "might have been slightly different if the subjects had been instructed to bring the dictionaries they normally use, as was done in Krings' study" (ibid: 184). She nevertheless assumes that "this distortion concerned mainly" the first-year students, who were not familiar with the reference material available as opposed to the fifth-year students, who were familiar with said material (ibid.). Furthermore, although the former students were not familiar with the resources available, they nevertheless used them for consultation purposes. In contrast, Krings' subjects did not use any reference material they were not familiar with (ibid.).

Notwithstanding the influence that Jääskeläinen's choice of reference material might have had on subjects' research behaviors, she obtained a number of interesting findings in relation to (a) the frequency and type of dictionary use, (b) the primary source of

reference, and (c) the purposes of dictionary use. With regard to the frequency and type of dictionary use, the difference in the number of items looked up in dictionaries was almost negligible between one of the first-year students and one of the fifth-year students. This difference was, however, rather extreme between the remaining two students. Both groups of students nevertheless used a variety of working aids as opposed to Krings' language learners, who (as indicated above) did not use any dictionaries they were not familiar with. Furthermore, the more experienced students in Jääskeläinen's study "showed a slight preference to use monolingual dictionaries" and other sources of reference such as encyclopedias and newspapers, while the less experienced students preferred to use bilingual dictionaries over other sources (ibid: 186). Jääskeläinen therefore states that "the professional subjects engaged more in research type of work in their translation process than the non-professionals" (ibid: 186-187).⁵³

Concerning the primary sources of reference, Jääskeläinen analyzed the subjects' consultations "wordwise", i.e. according to the individual items that were looked up in a dictionary etc.," and obtained two main findings (ibid: 187). First, the inexperienced students looked up items in dictionaries (as opposed to other reference material) much more frequently than the experienced students. The latter, however, conducted much more research and "looked up the same item in several dictionaries" (ibid: 188). Jääskeläinen associates this type of behavior with that of professional translators, who tend "not to trust just one source, but to check the given information in other sources, too" (ibid.). Second, the first-year students resorted to bilingual dictionaries as their primary source of consultation, while the fifth-year students "showed a reverse tendency and clearly preferred using a monolingual dictionary first (particularly when trying to solve comprehension problems)" (ibid.). This difference appeared to be "even greater when the two groups, monolingual dictionaries and other sources, are combined" (ibid.). While the experienced students "used other sources than the bilingual dictionary in more than two thirds of the cases," the inexperienced students only used such sources in "one third of the cases" (ibid.). On the basis of these results, Jääskeläinen claims that the first-year students of her study "resemble the subjects in Krings' study," who also

⁵³ While Jääskeläinen does not explicitly define what she means by research, it seems fair to assume that she refers to the consultation of sources other than monolingual and bilingual dictionaries, in this case, the encyclopedias and parallel texts available to the subjects of her study.

used bilingual dictionaries to solve comprehension problems (*ibid.*). In contrast, the fifth-year students in Jääskeläinen's study "never used a bilingual dictionary to solve a comprehension problem," but resorted to a monolingual dictionary instead (*ibid.*: 189). The first-year students, however, used monolingual dictionaries or other reference material "only where the bilingual dictionary had proved useless in problem solving" (*ibid.*: 189).

Another interesting feature of subjects' use of external resources is the purpose(s) for which each type of resource is used. While the experienced students in Jääskeläinen's study did not use the bilingual dictionary for solving comprehension problems (as opposed to Krings' subjects), they nevertheless used said dictionaries to solve production problems. Yet, they did so with "caution," i.e. they did not use the bilingual dictionary "as a resource of translation variants ... [but] as a source of inspiration, when they own 'inner dictionary' suffered from a momentary malfunction" (*ibid.*: 191). The rather critical attitude towards the bilingual dictionary was explicitly manifested by one of the experienced students. Although this student "had no alternative for the equivalents offered by the bilingual dictionary," she rejected said equivalents for reasons of contextual inadequacy (*ibid.*: 192). This type of selective behavior is, according to Jääskeläinen, highly typical of the fifth-year students of her study. These students would also use monolingual dictionaries in English as a source for solving production problems, while they would only look up items in a Finnish monolingual dictionary "to confirm their spontaneous tentative translation variants" (*ibid.*: 192-193).

Dancette (1997) obtained similar results to those of Krings and Jääskeläinen in a study of the text comprehension processes of three graduate students of translation (one with no professional experience and two with over two years of professional experience in translation and interpreting, respectively). In this study, Dancette detected two main types of strategies "that seem to be of paramount importance for solving comprehension difficulties, that is, the use of dictionaries and the use of extralinguistic knowledge" (*ibid.*: 101). Concerning the former, and from a quantitative perspective, Dancette found that "the number of consultations does not correlate with the quality of the translation" (*ibid.*). Gerloff, however, found that the best translation performers (both professional translators and bilingual speakers) of her study used dictionaries rather frequently compared to the weakest performers (foreign language learners), who only used dictionaries moderately (1988: 138-139).

Similarly, Jääskeläinen states that the results obtained in her 1990 study “indicate that success seems to be associated to the intensity of research activities in the form of dictionary consultations” (1996: 65). Jensen (1999), however, found that non-translators favored the use of dictionaries in her study of the effects of time pressure on translation quality. She also found that the use of dictionaries “decreased with increased experience, and when comparing the young professionals with the expert group we find that the experts had only half as many dictionary look-ups as the young professionals” (ibid: 113). In addition, she noted that *only* bilingual dictionaries were used by all the subjects, “except by one of the non-translators, who used [a monolingual dictionary] as a supplement to the bilingual ones” (ibid.). From a qualitative perspective, Dancette observed that, like Krings’ language learners, the inexperienced subject of her study (who produced the lowest translation quality) resorted to dictionaries “whenever she did not understand a term” (1997: 101). In contrast, the two subjects with professional experience (who produced better translations) used “dictionaries once a hypothesis on meaning [had] been formulated, to monitor a translation choice or an interpretation, or to find alternate equivalents or synonyms” (ibid: 101). As discussed earlier, Jääskeläinen (1989b) also detected this type of behavior in the more experienced students of her study, who used (bilingual) dictionaries as a source of inspiration for translation variants.

Like all the researchers above, Kiraly (1995) also observed that in his psycholinguistic study of translation the “relatively controlled processes” included subjects’ use of monolingual dictionaries to “gather information about either an interim translation unit (target language) or a word in the source text (source language)” (1975: 76). Said processes also appeared to include the

- (a) identification of a problem followed by a bilingual dictionary search, (b) retrieval of a single bilingual dictionary equivalent followed by acceptance of the equivalent as the solution to the translation problem, and (c) identification of a potential translation solution in a bilingual dictionary followed by a monolingual dictionary search (ibid: 86).

He found, however, no major differences among the research behaviors of the novice and professional translators of his study. Both groups of subjects thus appeared to consult monolingual and bilingual dictionaries for purposes similar to those identified so far, that is, to confirm a hypothesis on meaning, check or monitor the adequacy of a proposed translation variant, and find or inspire a new variant. Pavlović also detected

similar purposes of resource consultation in her study of the directionality features found in the collaborative translations produced by twelve “novice” students of translation who had recently “passed their final translation exam” at a Croatian university (2007: v). Unlike all the studies described so far, external resources in Pavlović’s TAP experiments included both printed and Web dictionaries as well as other reference material such as encyclopedias and parallel texts. Web resources also included the use of Google. The subjects in Pavlović’s study were allowed to use both printed and Web resources to collaboratively translate in groups of three one text in their L1 and another one in their L2.⁵⁴ One interesting observation is that Pavlović’s subjects, like the experienced subjects of the studies described above, also used reference material only after their own cognitive resources had failed to produce a translation solution (ibid: 189). Furthermore, Pavlović detected a number of differences regarding the research performance of her four groups (A, B, C, and D) of subjects. These differences relate to (a) “the number of problems in connection with which external resources were consulted,” (b) “the total number of consultations per task, comparing groups and directions,” (c) “the use of particular type [sic] of external resource by each group and in each direction,” and (d) “the total number of consultations to how often they resulted in finding the selected solution, or helped arrive at the selected solution – how “useful” or “helpful” a particular resource was” (ibid: 136-137).

Concerning the groups’ use of external resources in both directions of translation, Pavlović observed that “Groups B, C, and D consulted external resources in connection with more problems in L2 translation than they did in L1 translation” (ibid: 140). Group A, however, consulted external resources in relation to almost as many problems in L1 translation as in L2 translation. In addition, both Groups A and B “made (a few) more consultations in their L1 translation task” (ibid.). In contrast, Group C “consulted external resources twice as often in L2 translation,” while Group D almost twice as often (ibid.). With regard to the type of external resources used, Pavlović found that the bilingual dictionary and Google were the two primary sources of reference in both directions. It also appears that “[t]he collocations dictionary was more popular in L2

⁵⁴ These collaborative translation sessions were video-taped and audio-recorded. In addition, Internet histories were later retrieved to keep track of the Web resources used in each session.

translation” (ibid.).⁵⁵ Also in this direction, Group D appeared to refer to “printed parallel texts considerably more often than in the other direction ... [and in connection] with style and formatting” (ibid.). Finally, as regards the usefulness of the external resources consulted, Pavlović states that said resources “seem to have been more useful in L2 translation in terms of providing solutions that ended up being adopted as the selected solutions, or in inspiring spontaneous solutions that were used in the final product” (ibid: 141). More specifically, “most of the selected solutions [in L1 translation] were found in the bilingual dictionary, while in L2 translation the other resources also contributed” (ibid.). In light of these results, Pavlović justifiably argues that

it is very difficult to formulate anything but the most tentative of conclusions. The groups tended to rely more on external resources in L2 translation in the sense that they actually used the solutions found in those resources in their final product more often than they did in L1 translation. It also seems likely that resources other than bilingual dictionaries (especially the electronic resources) can provide more help in L2 translation, at least when the L2 in question is English. This can easily be explained by the abundance of materials in English on the Internet [sic], compared to the number of texts and tools available in a language of limited diffusion such as Croatian. When it comes to types of resources consulted, it seems that group profiles, or individual preferences for a certain type of resource, might play a more important role than does directionality (ibid.).

Despite differences found in the use of reference material in translation, there seems to be, not surprisingly, of course, undisputed agreement that subjects tend to draw on internal resources, external ones, or both. In addition, subjects who have been found to use external resources in translation appear to do so for similar purposes: to confirm a hypothesis on meaning, check or monitor the adequacy of an interim translation solution, and find, or inspire new solutions. Furthermore, some of the researchers mentioned above have linked these purposes to different research variables, including translation problems (comprehension problems, production problems, or both); sources of consultation (monolingual and bilingual dictionaries, encyclopedias, and parallel texts); subjects (foreign language students, translation students, professional translators, etc.); level of translation experience (experienced vs. inexperienced subjects), translation

⁵⁵ According to Pavlović, this was a predictable result as the collocations dictionary was in English “and such a resource does not exist for the Croatian language” (2007: 140).

quality (high quality products vs. low quality products), and translation performance (strong performers vs. weak performers); or any combination of the previous.

When comparing the results of the studies discussed above, a number of features seem to characterize the use of reference material in translation. From a qualitative perspective, it appears that subjects with little or no experience in translation tend to resort to dictionaries first as opposed to their own cognitive resources for solving translation problems. This seems to be particularly true in the case of comprehension problems, where bilingual dictionaries are usually preferred over monolingual ones. In contrast, subjects with experience in translation tend to rely more on their own cognitive resources and generally consult dictionaries only when the former fail to produce a solution. Moreover, experienced subjects seem to favor monolingual dictionaries over bilingual ones in the solving of comprehension problems. Bilingual dictionaries nevertheless appear to be popular for confirming a translation solution, retrieving and/or inspiring one. From a quantitative perspective, some researchers have suggested that the number of consultations does not correlate with translation quality. Others, however, have established a positive correlation between the frequency of dictionary use and the quality of the translations. In the following, I will compare these results to the ones obtained by researchers who have specifically addressed the use of external resources as an independent object of study, i.e. without necessarily looking at other categories of translation strategies.

3.3.2 The Use of Reference Material as a Sole Object of Study

As shown in the previous section, TAP experiments focusing on translation strategies often studied the use of reference material alongside a larger number of variables. In studies that primarily focus on resource consultation, the main variable selected has been the use vs. non-use of reference material in connection with translation quality. To control this variable (use/non-use of reference material), some TAP researchers have set up experiments in which subjects have been asked to translate under two different conditions, i.e. with or without access to reference material. These experiments, in turn, have typically involved different research scenarios in which (a) the same subjects translate two (comparable) texts, one under each condition (Luukkainen 1996); (b) the same subjects work on the same text under the two conditions (Livbjerg and Mees 1999); (c) the same subjects translate two different passages of the same text, one under each condition (House 2000); and (d) two groups of (comparable) subjects translate the

same text under one of the two conditions (Livbjerg and Mees 2002, 2003). In this section, I will discuss the TAP studies referred to in relation to each research scenario as well as how the different experimental conditions may have affected the results obtained in said studies.

Luukkainen (1996), for example, is one of the process researchers who aimed at comparing translation processes with and without the use of reference material. To do so, she conducted an experiment (building on Krings 1986 and Jääskeläinen 1990) with two first-year students of translation (considered novice translators) and two fourth-year students of translation (considered experienced translators) majoring in English at the Savonlinna School of Translation Studies in Finland. In this experiment, the subjects were asked to translate two texts reporting scientific news into their L1: one text was translated without access to printed reference material and another text with access to said material (three bilingual dictionaries, six monolingual dictionaries, two volumes of three different encyclopedias, and four parallel texts). The main hypothesis in Luukkainen's study was that "in addition to slowing down the translation process, dictionary use may have a certain restrictive effect on a translator's creativity and result in poor translation quality" (ibid: n.p.). To test this hypothesis, Luukkainen analyzed her experimental data in relation to "the subjects' general text processing and timing as well as their use of reference material," with special attention to the strategies employed for retrieving equivalents (ibid.).

Like Krings (1986) and Jääskeläinen (1990), it appears that Luukkainen also asked the translation students of her study to bring along their own reference material.⁵⁶ They were told, prior to the experiment, that the researcher would provide any additional resources they might need. A wide range of reference material was thus made available "to avoid influencing the subjects' choices too much" (ibid: 24). Yet, like Jääskeläinen (1989b, 1990), Luukkainen also points out that "the availability of various reference books may have influenced especially the first year students' choice of dictionaries" (ibid: 24).⁵⁷ Despite this influence, Luukkainen's research results suggest that the

⁵⁶ This is not entirely clear as Luukkainen does not make this information explicit.

⁵⁷ Luukkainen makes a number of suggestions to avoid experimental drawbacks of this type. She is critical, for example, of advising subjects to think beforehand which reference material they would like to be provided with during the experiments. She argues that translators tend to use a wide range of reference material and therefore it is often impossible to determine a priori which type of sources one might need for translation purposes. Furthermore, subjects may not ask for additional reference books they might need to avoid bothering the researchers (1996: 24 and 26). Luukkainen also remarks that "it would

translation processes of the more experienced students did not seem to differ from one translation task to the other (i.e. with and without access to reference material). In contrast, the translation processes of the less experienced students appeared to be affected by the use of reference material. More specifically, Luukkainen's findings "initially indicate that untrained translators rely more on dictionaries and omit preliminary processing and/or editing" stages in translation processes for which reference material is used (ibid: 71).

Furthermore, Luukkainen's original hypothesis that the use of reference material slows down translation processes and restricts translators' creativity seemed to be supported as far as the fourth-year students are concerned. In particular, "the time spent on the translation processes [was] influenced by dictionaries more in the fourth year students' processes, which were considerably longer than the first year students' processes" (ibid.). Luukkainen therefore suggests that emphasis on the use of external aids in translator training may restrict students' creativity due to their "mistrustful" attitude towards reference material and the "fair amount of time [spent in] checking and crosschecking" (ibid.). This, in turn, may lead to students' "increasing inability to trust [their] own intuition in the presence of a wide variety of reference material" (ibid.). Luukkainen, however, did not find any evidence supporting the correlation between the use of reference material and successful translation processes. Instead, sensitivity to context was found to play a more decisive role in the processes of both experienced and inexperienced translation students. In light of these findings, which suggest that reference material negatively influence the time spent on translation processes but not necessarily the quality of translation, Luukkainen arrived at the conclusion that "translator trainees might be able to develop a more effective translation process by relying more on creativity and the context rather than on reference material" (ibid.).

Luukkainen's research results are somewhat akin to those obtained by House (2000) in her TAP study of the use of translational aids. In this study, House carried out two sets

probably be better not to tell the subjects that the experimenter aims at observing the use of reference material in order to minimize the subjects' willingness to please the experimenter by choosing more 'sophisticated' reference books that they would normally choose" (ibid.: 26). Consequently, she suggests having experiments take place "in the library where students usually perform their translation tasks" (ibid.). For obvious reasons, however, libraries no longer represent the most typical working environment of translation students (or, for that matter, of professional translators). Rather, the classroom would seem to be a more appropriate working environment for students nowadays, thus lending itself to more natural research conditions that would appear to minimize some of the drawbacks resulting from experimental research (see this section for more details).

of experiments with a total of ten advanced language students of English, French, and German. The first experiment aimed at identifying the “subjects’ individual preferences for, or abstinence from resorting to translational aids” to determine which subjects were “habitual under- and habitual overusers of such aids” (ibid: 153).⁵⁸ The purpose of the second experiment was to have the subjects “engage in the opposite, non-routinized behavior, the hypothesis being that, given this treatment, subjects would be lifted up to higher levels of consciousness of the translational process in which they were engaged” (ibid.). To test this hypothesis, House asked the subjects to translate a journalistic text of a non-specialized nature within 30 minutes and according to the brief they were given in the first experiment. Unfortunately, the data collected in this experiment was not enough for House to distinguish between “underusers” and “overusers” of translation aids (all the subjects had used translational aids with almost the same frequency, an interesting result in itself) (ibid: 154). Consequently, House decided to change the nature of the second experiment and asked the subjects of her study “to engage in another translation-cum-think-aloud session, continuing in their translation of the same text,” but this time without access to reference works (ibid.).

The analysis of the data collected in both experiments (with and without access to reference material) yielded a number of significant results. First, although no two groups of underusers vs. overusers could be distinguished, two other groups emerged: “high-risk-takers” vs. “low-risk-takers” (ibid.). The former, “while appreciating the opportunity of using the dictionaries and the grammar,” were confident in their own translation capabilities in a way that they seemed to be able to tackle both translation situations, i.e. with and without access to reference material (ibid.). In contrast, low-risk-takers seemed to “intensely miss the ‘islands of reliability’ (Dechert 1983) provided by the possibility of using a dictionary or a grammar” (House 2000: 155). Second, while all the subjects (in particular, the low-risk-takers) seemed to “feel insecure” when translating without the help of external aids, they displayed more confidence in their own translation abilities “because they were free to creatively delve into their competence reservoir” (ibid.). House therefore suggests that “confidence” seems to play a more complex role in translation than it appears at first.

⁵⁸ The translational aids in House’s study consisted of “[m]onolingual and bilingual dictionaries and an English grammar” (2000: 154).

Other findings obtained by House relate to (a) the level of translation fluency, (b) the degree of editing and revising, (c) the choice of lexical items, (d) the level of creativity in the formation of words, (e) the frequency of contrastive linguistic analyses, and (f) the quality of the translations produced under both experimental conditions (i.e. with and without access to reference works). With regard to the level of translation fluency, the non-use of translation aids predictably led the subjects to translate more fluently by working on “larger units and operating in a ‘free association’ manner, making ample use of paradigmatic and syntagmatic variation, actively searching for synonyms and near-synonyms, as well as paraphrasing copiously” (ibid: 156). House, like Luukkainen, therefore hypothesizes that dictionary searches interrupt “the flow of thought” and prevent the more “creative-writing” or “re-writing” processes found in the experiment that prohibited the subjects’ use of reference material (ibid.). Under this experimental condition, subjects also seemed to carry out more editing through “cyclical re-translation and revising activities,” and, at a lexical level, use “more general, superordinate or generic” lexical items than precise and/or specific ones (ibid: 157). Subjects also seemed to generally use “more creative word-formation rules, drawing on analogy and generalization processes” (ibid.), and compare lexical and syntactic items of the L1 and L2 more frequently (ibid: 158). Concerning the quality of the translations produced, House found a number of differences with regard to (a) “accuracy and fluency,” and (b) “micro- and macro-perspectives of translation” (ibid.). While the quality of the translations produced “in the experimental condition allowing subjects to use translational aids [tended] to veer towards the accurate-and micro-end of the cline, the condition barring subjects from using translational aids [occupied] the fluent macro-end of the cline” (ibid.).

In light of the findings obtained by Luukkainen and House above, one might be tempted to conclude that the usefulness of consulting reference material for translation may be, at best, questionable. However, said findings are best to be interpreted with caution for reasons that I will explain below. The impression that reference material may be of limited help in translation is also gained, at least at first glance, in Livbjerg and Mees’ (1999) study of the influence of dictionary use on the quality of the L2 translations produced by five semi-professional translators (five of the researchers’ most competent postgraduate students of translation). The main purpose of this study “was to compare how five students’ translation process without dictionaries differed from their approach

when dictionaries were subsequently made available for correction” (ibid: 135). To do so, Livbjerg and Mees designed a TAP experiment consisting of two working sessions. In the first session (referred to as “experiment 1a” in the following), students were asked to translate a non-domain-specific text (taken from the politics section of a Danish newspaper) into their L2 (i.e. from Danish into English) without access to printed dictionaries or other reference material. In the second session (referred to as “experiment 1b”), students were given the possibility of correcting their translations with the help of reference material (these included a usage book, a monolingual dictionary in English and a bilingual dictionary from Danish into English), but they were not specifically asked to use said material (ibid: 136).

Both experimental sessions were audio-recorded (and the TAP data later transcribed) and the two translation versions resulting from these sessions saved in Translog.⁵⁹ In addition, the researchers took notes (from a different room that was separated from the students by a glass panel) whenever a reference works was used (ibid: 136). Livbjerg and Mees’s hypothesis was that “the possibility of consulting dictionaries would improve the product” (ibid: 137). To test this hypothesis, they designed an “error – correctness scale” (a) to evaluate and compare the students’ first spontaneous solutions with the ones opted for at the end of experiment 1a, and (b) to compare the translation solutions at the end of experiments 1a and 1b. There are thus three points of analysis. As the authors explain, [b]etween any two stages [i.e. between points 1 and 2 and points 2 and 3], an error could be kept, corrected or changed into another error and, similarly, a correct solution could be retained, turned into another correct solution or changed into an error” (ibid.). It should be noted that the correction scale was used to evaluate only those problem units that were identified by the students themselves, which amounted to a total of 74 (ibid: 139).

The results of Livbjerg and Mees’s study show that the students made very few changes to their translated texts after the introduction of dictionaries in experiment 1b. In fact, “in 55 of the 74 cases (74.3%), a solution chosen at the end of [experiment 1a] was retained. In a further nine cases (12.2%), a correct or erroneous solution was turned into another correct or erroneous solution, respectively” (ibid: 140). This means that the

⁵⁹ The translations were assessed by two experienced Danish translators. In addition, an English native speaker “was asked to assess the students’ translations as *texts* (rather than as *translations*)” (Livbjerg and Mees 1999: 136, emphasis in the original). Also, a “professional, bilingual English/Danish translator” was asked to provide the researchers with a “model translation” for comparison purposes (ibid.).

quality of the translations did not change in 86.5% of the cases. Furthermore, only in seven cases was an error corrected (one of them without the use of dictionaries) “and in three cases the possibility of consulting dictionaries led to a correct solution being turned into an error” (ibid.). That is, there was only a net improvement of three out of 74 units that could be attributed to the use of dictionaries. In contrast to the results obtained by Gerloff (1988) and Jääskeläinen (1987 and 1990), Livbjerg and Mees also found that “in the case of 56 (75.7%) of all the units commented on by students, all the time spent on interpreting the meaning of the text, choosing between different translation possibilities, and looking up items in a dictionary, did not lead to major changes in the quality of the product” (ibid: 142).⁶⁰ Nevertheless, the researchers observed that “the student whose final products were regarded by all evaluators as being the best was the one who took most time over the project and who had by far the highest number of dictionary consultations” (ibid: 146). This is indeed the type of quantitative correlation that Gerloff and Jääskeläinen established between translation quality and the amount of (a) resource consultations and (b) time spent on the translation.

From a qualitative point of view, Livbjerg and Mees found that dictionaries were particularly used “to solve gaps in the students’ vocabulary” (ibid: 143).⁶¹ The dictionaries were also used to monitor collocations or to (try to) avoid false friends. In addition, many dictionary look-ups were related to reception problems, a finding that, according to the authors, contradicts “what seems to be the general assumption for source texts in the mother tongue” (ibid: 144).⁶² Livbjerg and Mees therefore suggest that in translator training greater emphasis should be placed “on strategies for understanding texts when the source text is in the mother tongue” (ibid: 145). The results of their study also show that in addition to “looking for information that ... dictionaries cannot provide,” the students of their study spent a large amount of time “pondering over, or checking, problems for which they had a solution from the very beginning” (ibid: 145). This is not surprising as one of the purposes for using dictionaries or other reference material is, as shown in the previous section, to check or

⁶⁰ Livbjerg and Mees realize that the great deal of time spent checking problems for which students had solutions from the very beginning could be “an artefact of the experiment” (ibid: 145). While the authors do not elaborate on this point, it seems fair to assume that students might have felt the need to consult dictionaries simply because these were available to them for editing and revising purposes during the second part of the experiment.

⁶¹ Problems with spelling were excluded from the data analysis.

⁶² As seen above, Krings (1986b: 266) also found that the advanced language learners of his study were primarily faced with problems caused by items in either the L1 or L2 source text.

monitor interim solutions. Moreover, this particular use of reference material may become even more relevant in L2 translation where the level of insecurity is usually higher than in L1 translation. In fact, Livbjerg and Mees hypothesize that one of the reasons for spending a lot of time looking up items in dictionaries may be explained by the students' uncertainty "about their own level of linguistic competence" (ibid: 147).

In a further study conducted by Livbjerg and Mees (2002), the authors re-examined the data of experiments 1a and 1b described above and compared the results of the new analysis to those obtained in an additional experiment (referred to as "experiment 2") conducted with five different subjects. These new subjects were asked to translate the exact same text as the subjects of experiment 1 but had access to the same reference works as the students in experiment 1 right from the beginning of the translation process. According to Livbjerg and Mees, the subjects of the second experiment were "in every respect comparable students, who were given access to dictionaries from the outset of the experiment" (2002: 147).⁶³ The re-analysis of the data in experiments 1a and 1b led the authors to re-categorize the original 74 problematic units as 121, an increase explained by "the fact that spelling errors were now included, and that what had represented a single unit in the 1999 categorisation could now be subdivided into more, typically two (e.g. spelling/choice of word)" (2002: 149).⁶⁴ Another major difference between the two studies relates to the different points of analysis used to assess the students' solutions to their problems. While in the 1999 study, three points of analysis were selected, a fourth point was added in the 2002 study. Livbjerg and Mees' reason for including an additional point of analysis (what they call a "snapshot") can be explained by the fact that the first spontaneous solution (Point I)

would typically be directly succeeded by thoughts about the pros and cons of that solution, or by alternative suggestions before the student finally settled for a solution. [The researchers] therefore decided to introduce an extra snapshot (Point II). The solutions produced at Points I and II are inextricably connected: they represent the beginning and end of the first *uninterrupted verbalisation of a unit* (2002: 150, emphasis in the original).

⁶³ While in the study referred to here (Livbjerg and Mees 2002), the authors do not specify the profile of the students, in a later publication they describe them as belonging to their "most-competent post-graduate [translation] students of English (all with Danish as L1)" (Livbjerg and Mees 2003: 123).

⁶⁴ A translation unit for Livbjerg and Mees is "a segment of the source text independent of specific size or form to which, at a particular point in time, the translator's focus of attention is directed" (ibid., cf. Jääskeläinen 1990, 1993).

Furthermore, Livbjerg and Mees expanded their error-correctness scale to include “the notation ZS (= ‘Zero solution’) as a possibility in order to cover those cases where the students did not come up with any solution at all” (ibid: 152). In addition to these more methodological changes, Livbjerg and Mees’ (2002) study seems to focus more precisely than the previous one on the impact of dictionary usage. More specifically, they were interested, among others, in assessing the differences between translation solutions arrived at with and without the use of reference works, assessing the role that the moment of dictionary usage (after vs. during the actual translation process) plays in terms of the overall quality of the translation, and in the frequencies with which students in both experimental groups consulted the reference works available. The re-analysis also took into consideration whether students felt that the use of reference works was helpful or not (independent of whether the use was successful or unsuccessful). Based on the re-analysis of the data collected in experiment 1, Livbjerg and Mees found that “70 of the units were handled without dictionaries (58%), [while] 51 were looked up (42%)” (ibid: 158). Of these 51 units, “16 resulted in incorrect solutions (31%), and 35 in correct solutions (69%)” (ibid.). With regard to the helpfulness of the dictionaries, students considered them to be helpful in 30 cases (59%) and to be “ineffectual in 21 cases (41%)” (ibid.). Furthermore, “of the 30 units where the dictionary was felt to be of help, 21 resulted in successful solutions (70%). Of the units where the dictionary was felt to be ineffectual, 14 resulted in successful solutions (67%)” (ibid.).

When it comes to comparing groups 1 and 2, Livbjerg and Mees state that the results show striking similarities. As far as verbalization is concerned, for example, “[i]n the second group, 120 units were verbalised, which is practically identical to the number verbalised by Group 1 (ibid: 121)” (ibid: 166). The parallels also extend to the number of errors and correct solutions. With regard to the final solutions in experiments 1b and 2, the percentages of correct solutions were exactly the same, i.e. 76%. The authors further state that “not only is the percentage of successful and unsuccessful solutions virtually identical in both groups, the percentage of solutions which remain unchanged after each point studied in the process is also very similar” (ibid: 167). That is, the moment at which the dictionaries were used did not seem to have an impact on the overall number of correct and erroneous solutions. However, looking at the number of correct solutions at the end of experiments 1a and 1b (i.e. 69% vs. 76%, respectively), it seems apparent that the use of dictionaries did have an impact on the overall quality of

the product, as the number of errors in experiment 1 was reduced by seven percent through the use of dictionaries. Moreover, when considering the evaluation of the external assessors, “a comparison of the marks awarded for Group 1’s products (without dictionaries) with those of Group 2 shows that translations of Group 2 are slightly better,” an observation that leads Livbjerg and Mees to conclude that while “the value of dictionaries is rather limited, subjects still feel better with them than without” (ibid: 169). With regard to the differences in the marks given by the external assessors, the authors speculate that repeated “dictionary consultations in connection with units that are already correct” are indeed not a “waste of time,” but might actually result in the replacement of one correct solution by another, which might, in turn, “account for the marginally better results [i.e. marks] obtained in the experiments with dictionaries” (ibid: 171-172).

Notwithstanding the significance of the findings obtained by the studies described above, there are, in my mind, five major reasons (all closely interrelated) why it would seem advisable to interpret the results of these studies with caution. First, in all studies subjects were asked to translate a non-specialized text for which the use of reference material might be less relevant than for specialized texts. This seems to be particularly true with regard to subject-related searches for which reference works other than dictionaries could be very helpful indeed. I do realize, however, that having subjects translate a specialized text may constrain their research processes to the level of specialized terminology only. This may in fact be one of the reasons why some of the researchers mentioned above, in particular Livbjerg and Mees, decided against having domain-specific texts in their experiments of resource consultation. Nevertheless, one could argue that choosing a non-specialized text for examining the use of reference material might force subjects to focus on the language and grammar levels only, and exclude other relevant aspects involved in subject area research.⁶⁵ Second, except for Livbjerg and Mees’ subjects, all subjects were asked to translate into their L1, a direction in which the use of external resources may play a less significant role than in L2 translation. Pavlović, for example, found that the subjects of her study tended to

⁶⁵ In my study, one of the two texts analyzed, while dealing with a specific subject matter, is still accessible to the average reader. The second text, however, requires a certain amount of specialized subject knowledge and/or the ability to research that knowledge. The selection of texts with different degrees of specialization in my study stems from my believe that said degrees have an impact on subjects’ types of translation problems, which in turn may influence their research behaviors for problem solving.

“rely more on external resources in L2 translation than in L1 translation” (2007: 192).⁶⁶ This would seem to be one of the reasons why Livbjerg and Mees decided to study the role of dictionaries in L2 translation as opposed to L1 translation. Third, as acknowledged by Luukkainen and House above, the researcher’s choice of reference material may have influenced the subjects’ behaviors concerning their preference of certain resources over others. In Livbjerg and Mees’ (2002: 147) study, for example, the lack of a particular reference work (a collocations dictionary) was lamented by one of the subjects. Fourth, having different subjects translate the same text or having the same subjects translate two different texts may prove problematic as neither subjects nor texts can ever be directly comparable (neither quantitatively nor qualitatively). I am aware, however, that in experimental research this is ‘as good as it gets’ with regard to comparative studies. Fifth, and perhaps most importantly, all the subjects in the studies described above were asked to engage in non-habitual behavior, i.e. either to translate without access to translational aids (in Luukkainen’s and House’s experiments) or to make corrections with the use of reference material to a text translated without the use of said material (Livbjerg and Mees 1999). Having subjects engage in non-routine behavior is a concern also shared by House, who admits that she “gained the global impression that all subjects [in her study] were forced into a heightened degree of awareness of what they were doing while translating” without access to reference material (2000: 155). That is, this experimental condition appeared to force subjects to “become more aware of what they were doing, what they knew and did not know, [and therefore] they felt more active, more creative and more responsible for the decisions they were making” (ibid.).

In spite of what seems to be a number of experimental drawbacks, the studies mentioned above have various pedagogically valuable outcomes. House, for example, suggests exposing both foreign language learners and translation students to the use vs. non-use of external resources in different translation situations. This treatment would, on the one hand, contribute to increasing students’ awareness of their own translation capabilities and “limits of their linguistic-cultural knowledge and translation competence” (2000: 159). On the other hand, it would make students aware “of the rich and rewarding possibilities of using dictionaries for testing hypotheses of various kinds

⁶⁶ Pavlović further states that “[t]his finding confirms what teachers of translation intuitively know, and that is the importance of research and documentation skills in L2 translation” (2007: 192).

that go far beyond using these aids as mere crutches for quick and superficial checking” (ibid.). She goes on to claim that one the most “interesting and pedagogically useful consequences” of her study for translator training is as follows:

If the use of reference works is treated not as a substitute but as an enriching supplement for learners’ own autonomous search strategies, and if systematic consultations of reference works do not precede but follow one’s own creative translational strategies, the learners’ translational competence may be developed more solidly and efficiently (ibid: 159-160).

This seems to be in line with what some of the TAP studies discussed in the previous section have found out, i.e. that non-professional translators tend to use reference material (in particular, bilingual dictionaries) whenever they encounter a problem (which tends to be of a ST comprehension nature), while professional translators tend to draw on their own cognitive resources first and then use reference material (most notably, monolingual dictionaries and other sources of reference such as encyclopedias and parallel texts) for monitoring, checking, finding or inspiring translation solutions. These findings also seem to be supported by Ronowicz et al. (2005) in their TAP study of the frequent lexis store (FLS) and dictionary use of three groups of subjects: novice translators (five first-semester students of translation), paraprofessional translators (two completing students with very good results and two former students with less than three years of experience), and professional translators (four staff members and one “outsider” with between four and 18 years of experience). All three groups of subjects were asked to translate an article extracted from *The Economist* from English into their L1 (Chinese, Japanese, Korean, and Spanish).⁶⁷ For a variety of reasons, only nine TAPs out of 14 were “properly administered and analysed” (ibid: 587). Moreover, of these nine TAPs, “reliable data on the use of dictionaries [could only be obtained for] six subjects, three Japanese and three Korean” (ibid: 588). Each of these subjects had access to either nine (Japanese) or eight (Korean) “different types of dictionaries (smaller and larger dictionaries, monolingual dictionaries in both languages involved

⁶⁷ This is one the few studies discussed so far that used a specialized text for research into dictionary use. Prior to the translation task, the FLS of the subjects was measured by a vocabulary test which showed that, “as expected, two of the professionals with extensive experience (more than 15 years) had all or almost all the words in their FLS ready for use, even if some of the words required further checking in the context of the specific translation task” (Ronowicz et al. 2005: 587). The remaining, “less experienced translator ... had virtually the same level of content of the FLS as the three paraprofessionals” (ibid.). This was also the case for one of the novice students; the remaining two appeared to have relatively few words in their FLS ready for use.

and in English, and specialized dictionaries of economic and finance terminology)” (ibid.).

The results of Ronowicz et al.’s study show that the novice students “used dictionaries much more frequently than paraprofessionals and professionals” (ibid: 588). The authors also found that there was “a clear correlation between the content of FLS and number of dictionary consultations: the higher the content of FLS, the fewer dictionary consultations were needed (professionals)” (ibid.). Conversely, “the higher number of dictionary consultations by novices [was] directly related to the lower content of their FLS’s” (ibid: 589). The researchers also analyzed the primary sources of consultation, for which they obtained inconclusive results. They nevertheless found strong indications suggesting that “[n]one of the novices, who obviously had comprehension problems with the English source text consulted a monolingual English dictionary and they seldom checked more than one dictionary” (ibid: 590). In contrast, both the professionals and paraprofessionals “made use of monolingual and specialist dictionaries as they faced either comprehension or production problems” (ibid.). These subjects also appeared to be “very cautious about the accuracy and naturalness of word usage, [and] they did not always trust equivalents obtained from the dictionaries” (ibid.). Like other studies discussed above, the amount of text processing also appeared to positively influence the quality of the translations produced by the subjects. According to Ronowicz et al.,

[t]he target texts of the novice had very few crossings out in contrast to professionals and paraprofessionals, who have crossed out some equivalents, replaced them with others, sometimes two or three times. In other words, professionals and paraprofessionals tended to work and re-work their target text systematically until they were satisfied with the translation (2005: 190).

The results of Ronowicz et al.’s study would seem to support the main pedagogically useful outcome of House’s study for translator training described above. Livbjerg and Mees, like House, also “believe that by letting students translate texts under conditions similar to [their study], and then proceeding to discuss their translation behaviour and strategies with them, translation teachers can give advice to individual students, geared to their specific needs” (2003: 133). The authors further state that “students have insufficient confidence in their own linguistic abilities. They therefore overuse dictionaries for non-domain-specific translation tasks ... [and] focus too narrowly on lexical units at the expense of other important factors such as situational and textual

context” (ibid: 131). Here, Livbjerg and Mees see significant potential of the research tools used in their study (TAPs and Translog) as a means to raise students’ consciousness, stating that

[t]he outcome of our study is not that students should avoid using reference works, but that they should be taught to make better use of them. For instance, by making semi-professionals aware of their own processing, it is possible to show them how to distinguish between solutions that can be found in dictionaries and solutions that involve the use of other communication strategies such as paraphrasing or omission (2002: 146).

The pedagogical value of using research tools as a means to increase students’ awareness of their own processing styles is also shared by Alves (2005) with regard to Translog; Pym (2009) with regard to screen recording software; or Gile (2004), Hansen (2006), and Scott-Tennent, González Davies, and Rodríguez Torras (2001a, 2001b) with regard to problem-solving reports, to mention just a few. As I discuss in Chapter 5, I am also interested in this pedagogical aspect, particularly with regard to assessing the usefulness of screen recording and written protocols for awareness-raising in the translation classroom.

So far, and as indicated previously, I have only focused on studies that relied on TAPs either exclusively or in combination with other data collection tools, namely video recorders and/or Translog. In the following section, I will discuss more recent studies, i.e. from 2000 onwards, that have used other methods and tools (in particular, written protocols, keystroke logging, screen recording, and eye tracking) to research translation processes—often in combination with TAPs. In so doing, I will focus on both a general description of the research methods and tools per se, and an analysis of the findings of those studies that, at least to some extent, have dealt with the use of printed and/or electronic reference material.

4. Alternative Methods and Tools for Research into Translation Processes

As discussed in 2.3.2, the diversity of research methods and goals in process oriented studies may help improve our understanding of the various aspects characterizing the translation process. Yet, as Jääskeläinen remarks, the multiplicity of research approaches and interests is not entirely unproblematic (1996: 61). In her view, “the differences in the kinds of data collected, the kinds of analyses carried out, and particularly the overall goals of research have made it ... difficult to test the methods employed in different studies” (ibid.). She goes on to claim that, “[a]lthough the problem is to some extent understandable in a field that is still in its infancy, not enough attention has been paid to testing and refining the methodology” employed in empirical translation studies (ibid.). Over a decade later, Göpferich and Jääskeläinen made a similar observation stating that, although “methodological progress has been made in process studies ... systematic methodological studies into the validity and reliability of various data collection methods are still missing” (2009: 177). This is particularly true with regard to thinking aloud, an introspective method that, as shown above, has been used in translation studies since the mid-1980s. Yet, as Pavlović points out, with the exception of Jakobsen’s (2003) study discussed earlier, “[f]ew empirical studies have been conducted with the explicit aim of testing the think-aloud methodology and its effects on the translation process” (2007: 44).⁶⁸ This is not to say, however, that process oriented researchers have failed to critically assess the limitations involved in the use of thinking aloud (see 4.1 for more details). Most likely, it was the methodological shortcomings of thinking aloud that led translation process researchers to use other, more rigorous methods and tools that I will describe in this chapter.

In the following sections, I will briefly elaborate on the main advantages and disadvantages of the two main research methods available to study different aspects of the translation process, i.e. introspection (4.1) and direct observation (4.2). In so doing, I will also provide a general description of the tools that have been typically used for

⁶⁸ Other exceptions are the studies carried out by Jääskeläinen (2000) and Krings (2001), in which thinking aloud (TA) was found to interfere with the translation process in a number of ways. On the one hand, Jääskeläinen observed that her subjects’ lexical choices were influenced by the TA method. In particular, she found less “deviations from formal correspondence, such as omissions, additions and (optional) class-shifts” with the TA condition than with the non-TA condition (2000: 79-80; cf. Jääskeläinen 1999). On the other hand, Krings (2001) found that his subjects carried out more target text revisions with the TA condition than with the non-TA condition. Furthermore, subjects’ translation processes appeared to proceed in a more linear fashion with the former condition.

data elicitation purposes. These tools—alternative types of (non-)verbal protocols, key-logging software, video and screen recorders, and eye-tracking equipment—have been most frequently used in combination with each other and/or with TAPs from the mid-1990s onwards. Here, “a plea is made for triangulation, the combination of methodologies, as a means of improving translation research methodology” (Jakobsen 1999: 9).⁶⁹ As Jakobsen points out, “[t]riangulation has been claimed not only to validate [quantitative and qualitative] data but also to capture a more complete portrayal of the object or phenomenon under study” (ibid: 19). That is, triangulation—also known as “convergent methodology” or the “multiple method” approach—appears to enrich our understanding of the object of study.

4.1 Additional Types of (Non-)verbal Reporting

As we have seen above, introspection, usually in the form of thinking aloud (TA), has been one of the main methods for investigating thought processes in translation. As Börsch explains, introspection “played an important role in the establishment of experimental psychology and caused either extreme consent or rejection by different schools of psychology” (1986: 195). First introduced in the late nineteenth century by Wilhelm Wundt (considered to be the founder of experimental psychology and one of the main representatives of structuralism), classical introspection as “*a method for observing oneself* ... evoked strong opposition from representatives of successive psychological schools” for a long period of time (Börsch 1986: 196, my emphasis). This opposition was grounded in the different theoretical and methodological perspectives that the main proponents of said schools held towards the notion of consciousness.

For structuralists, consciousness consisted of a number of elements that could be reconstructed by studying their connections and regularities. In addition, structuralists like Wundt viewed sensation and stimulus as identical phenomena, thus regarding introspection as immediate experience. Higher mental activities like memory, thought or cognition were believed to be inaccessible for research into the human mind (Börsch 1986: 196). It was during the first decade of the twentieth century that the Würzburg School broadened the scope of introspection from mental processes that could not be

⁶⁹ Tirkkonen-Condit further explains that triangulation is “the adoption of multiple methods not only for data elicitation but also for data analysis” (2002: 13).

studied experimentally to “systematic experimental introspection.” That is, this psychological school believed that thought could be studied experimentally by making subjects think under controlled conditions and introspect upon their thought processes (Börsch 1986: 197, drawing on Boring 1953: 174).

Like the Würzburg School, Gestalt psychology also leveled criticism against classical introspection and consequently modified it to “phenomenological introspection,” where subjects were not only asked to describe what they could see, but also what they *believed* they could see. In other words, subjects were asked to think *and* describe their thought processes at the same time. As part of the development of Gestalt psychology, Duncker (1935) and Claparède (1932) invented the method of thinking aloud, making an important distinction between their method and classical introspection. With thinking aloud “subjects are only asked to tell the steps in the thought process thereby making observable what thinking *does*, not what it *is*” (Börsch 1986: 198, emphasis in the original; drawing on Claparède 1932: 110). This meant an important paradigmatic shift, one that no longer required subjects to carry out two tasks simultaneously, i.e. having to think and observe oneself thinking at the same time. Similarly, behaviorism shifted the role of observation from the subject to the researcher. For behaviorists, however, anything that was not observable and measurable could not be investigated, and so consciousness was regarded as inaccessible. Yet, as reducing research only to external variables of behavior proved to be difficult, behaviorists reluctantly resorted to introspection, but preferred to use the term “verbal report” instead. Nevertheless, behaviorists considered data collected by means of verbal reports to be unreliable (Börsch 1986: 199-200).

Despite much criticism of classical introspection throughout history, all successive schools of psychology resorted to thinking aloud or verbal reports for eliciting data on mental processes. Furthermore, cognitive psychologists and other contemporary researchers in areas like cognitive science, education, and second-language learning, revitalized the use of introspection during the 1980s and early 1990s (cf. Ericsson and Simon 1987: 24). Like these researchers, translation process scholars also borrowed the method of thinking aloud “from cognitive psychology where it has been used to study various problem-solving and decision-making processes” (Jääskeläinen 2000: 71). As shown in 2.2.1, “[t]he methodological groundwork for the application of thinking aloud as well as other verbal report procedures (introspection proper, retrospection) to study

human thought processes in contemporary psychology was laid by Ericsson and Simon (1984)” (ibid.).

The use of thinking aloud and other verbal data collection methods continues to be a controversial issue nowadays, mainly due to three methodological shortcomings. These relate to (a) the completeness of verbal reports, (b) their effects on the process of thinking, and (c) their ecological validity (see below). Given that these limitations have been intensely discussed in the literature (e.g. Börsch 1986; Kiraly 1995; Jääskeläinen 2000; House 2000; Bernardini 2001; Tirkkonen-Condit 2002; Hansen 2005; Pavlović 2007, 2009; Göpferich 2008; Göpferich and Jääskeläinen 2009), I will only comment on them briefly with a view to discussing two alternative verbalization methods known as “retrospection” and “joint translating.” The first method generates so-called “retrospective verbal protocols” and the second what Pavlović (2007) refers to as “collaborative translation protocols” (see 4.1.1 and 4.1.2, respectively). In sections 4.1.3 and 4.1.4, I will discuss written protocols and other similar tools used to collect written data as opposed to verbal one.

4.1.1 Retrospective Protocols and Interviews

As indicated previously, there are a number of limitations that continue to challenge the suitability of verbal reporting as a reliable and valid data elicitation method. The question of reliability typically concerns the completeness of verbal reports as well as their effects on cognitive processes, while aspects of ecological validity tend to relate to the extent to which translation situations are subjected to experimental control and hence to the artificiality that may be caused by experimental manipulation. Ericsson and Simon (1984/1993) extensively address these aspects in their discussion of the conditions under which the method of thinking aloud (TA) is believed to generate reliable and valid scientific data.

According to Ericsson and Simon’s model of human cognition, information is kept in several memories that have different access and storage characteristics. These are sensory memories of very short duration; a short-term memory (STM) of easy access and limited storage capacity; and a long-term memory (LTM) that is more difficult to access and has larger storage capacity (ibid: 11; cf. 2.2.1 above). It follows that information kept in the short-term memory is available for direct access and hence for verbal reporting, meaning that at least some mental processes are potentially open to conscious inspection. The question remains, however, which mental processes exactly

are directly accessible and verbalizable? Ericsson and Simon state that there are three main factors that affect the mental processes that are verbalizable and, by extension, the completeness of verbal reports.

First, as indicated above, only mental processes entering the short-term memory (i.e. information that is being “heeded” or actively processed by the subject) can be reported. According to Ericsson and Simon, verbal reports “will produce verbalization of at least a subset of thoughts heeded while completing a task ... Only the end products of perception ..., those that reach attention, are verbalized” (ibid: xxxv).

Second, the fact that subjects can only verbalize thoughts that are being processed in the short-term memory, i.e. thoughts that are to some extent conscious, “precludes reporting on processing which has become automatised due to extensive practice” (Jääskeläinen 2000: 75). Or, as Hansen puts it, “[c]ognitive processes are often subconscious, automatic processes are therefore not available to verbal reporting [...]. Many processes, especially processes of trained and experienced translators, are carried out automatically” (2005: 513; cf. Bernardini 2001: 243). That not all mental processes are conscious and therefore available for verbal reporting is an aspect that Ericson and Simon also take into account in their assessment of the thinking aloud method. They argue that “there is no fixed and stable boundary between automatic and focally attended processes,” and that with increased experience in a task, “the same process may move from cognitively controlled to automatic status, so that what is available for verbalization to the novice may be unavailable to the expert” (ibid: 90). For Pavlović, this is “particularly relevant for translation studies interested in the behavior of professionals or experts, whether for didactic purposes or in the interest of testing theoretical models” (2007: 41). Furthermore, although it is generally agreed that conscious processes can be verbalized, “[t]he problem is ... that not even all the information that is ‘heeded’ will surface in the reports” (ibid., emphasis in the original). According to Pavlović, one reason for this is that non-verbal thought can proceed much faster than speech (ibid., drawing on Ericsson and Simon 1984/1993: 247). To illustrate this point, she quotes one of Kiraly’s subjects asserting that “when I think something, I think it only for a second or so, but it might take fifteen seconds to say, and during that time I’ve kept thinking [...]. So there are many things that I didn’t say [...].” (Kiraly 1995: 94, cited in Pavlović 2007: 41).

A third factor that appears to affect the completeness of verbal reports “is high cognitive load, i.e. a very demanding (part of a) task tends to use up all the available processing resources and none are left for producing verbalizations” (Jääskeläinen 2000: 75; cf. Hansen 2005: 513). As Ericsson and Simon point out, “subjects tend to stop verbalizing or to verbalize incompletely in conditions in which they are giving indications of being under a high cognitive load” (1980: 237). The authors nevertheless stress that “[t]he failure of subjects to report some information does not demonstrate the uselessness of verbal protocols. Incompleteness of reports may make some information unavailable, but it does not invalidate the information that is present” (ibid: 243). In other words, when interpreting a subject’s verbal report, one should keep in mind that “a protocol is relatively reliable only for what it positively contains, but not for that which it omits” (Duncker 1945: 11, cited in Ericsson and Simon 1980: 243).

A further methodological shortcoming is that verbalization is believed to interfere with the thinking process itself. To assess the validity of this claim, we should first differentiate between two types of verbalization procedures, namely concurrent and retrospective verbalization. In concurrent verbal reports (also known as “talk aloud” or “think aloud” protocols), information is verbalized at the same time that the subject is attending to it. In contrast, retrospective verbalization requires the subject to report on his or her cognitive processes after a task has been completed (Ericsson and Simon 1984/1993: 16). Depending on the time delay between the completion of the task and the retrospective verbalization, the latter will be regarded as more or less complete: the greater the delay (as in “delayed retrospection”), the more challenging the recall of information, and hence the lower the likelihood of obtaining a complete retrospective report. Conversely, the shorter the time delay is (as in “immediate retrospection”), the less fallible the retrieval of information and the higher the likelihood of obtaining a more complete verbal report.⁷⁰ Memory, recognition, and retrieval of information are therefore key factors in retrospective verbalization.

Ericsson and Simon claim that both concurrent and retrospective verbal reports are the closest reflection of mental processes, but only concurrent, i.e. think aloud reports can claim not to modify cognitive processes. Yet, they emphasize that concurrent reports

⁷⁰ Immediate retrospection is generally resorted to after a TA experiment has been conducted (i.e. immediately afterwards), while delayed retrospection is carried out once the obtained protocols have been transcribed and analyzed.

have to be elicited under certain, closely interrelated conditions for the thinking process to remain unaffected. These conditions involve (a) the subject's verbal recoding of information and (b) the instructions provided to generate verbalizations (ibid.). Concerning the recoding of information, Ericsson and Simon distinguish among three levels of verbalization: L1 verbalization or the direct articulation of verbally encoded information (i.e. information stored in a verbal code and directly available to subjects); L2 verbalization or the verbal recoding of information that is stored in a non-verbal code; and Level 3 verbalization, which involves scanning, filtering, interference, or generative processes that modify the information available to subjects. According to the authors, only "with Level 1 and level 2 verbalization the sequence of heeded information remains intact and no additional information is heeded" (ibid: 18). That is, no mediating processes intervene between the moment information was heeded and the time a verbalization is produced. As a result, Level 1 and Level 2 verbalizations can be claimed not to modify cognitive processes. In contrast, "Level 3 verbalization requires attention to additional information and hence changes the sequence of heeded information" (ibid: 18-19). Moreover, this level of verbalization "requires the subject to explain his thought processes or thoughts," whereas the other levels do not "encompass such additional interpretative processes" (ibid: 79). On this basis, Ericsson and Simon conclude that

[w]hen subjects verbalize directly only the thoughts entering their attention as part of performing the task, the sequence of thoughts is not changed by the added instruction to think aloud. However, if subjects are also instructed to describe or explain their thoughts, additional thoughts and information have to be accessed to produce these auxiliary descriptions and explanations. As a result, the sequence of thoughts is changed, because the subjects must attend to information not normally needed to perform the task (ibid: xiii).

Given that the instruction to explain or describe thoughts is believed to change the structure of the thinking process, subjects are typically *instructed* to refrain from engaging in such interpretative processes. Ironically, as Pavlović points out, "the instructions that explicitly warn the subject against explanation and verbal description may themselves affect the process in ways that are impossible to predict or account for" (2007: 43). She refers to Hansen, who also points out that "even this process of 'having to leave out some kinds of thoughts' must have an impact on verbal reports" (2005: 517), and Séguinot, who believes that discouraging subjects from justifying their actions "may lead to self-censorship" (1996: 88). Moreover, even if, as Pavlović suggests,

“subjects *are* able to refrain from explanations and justifications of their choices ... [a]re we not interested in their explanations and the reasons behind their choices?” (2007: 43, emphasis in the original) (see below for a more detailed discussion on this point).

In addition to the effects that instructions may have on the subjects’ ability to produce Level 1, 2, or 3 verbalizations, Ericsson and Simon state that training subjects “to conform to TA instructions” or using reminders to encourage them to continue talking when they fall silent may also interfere with subjects’ thinking processes (1984/1993: 82). They claim that reminders, usually given after pauses of 15 seconds to one minute, such as “‘keep talking’ should have a very small, if any, effect on the subject’s processing. However, a reminder of the type, ‘what are you thinking about?’ is more likely to elicit a self-observation process or produce an other-oriented description” (ibid: 83). Yet, as Hansen writes,

[e]very time subjects are asked to continue talking, they are inevitably also reminded of the fact that they are participating in an experiment and that there is a researcher present who is in gaining some results. In short, the subject is made aware that it is a social situation of some kind in which they are participating. Such reminders must act as a thought-provoking impulse and their impact on the translation process cannot be evaluated and by no means controlled (2005: 517-518).

Some translation scholars have therefore suggested that the researcher’s intervention in TA experiments should be kept to a minimum in order to improve the ecological validity of said experiments. Bernardini, for example, stresses that

in order to make sure that the reports actually reflect mental states without distorting them, it is important that subjects do not feel they are taking part in social interaction: albeit obviously a much more natural situation, conversation involves reworking thoughts to make them conform to socially established norms, a process which might sensibly alter the information attended to. The interaction between subject and experimenter (or between subjects) should therefore be avoided or at least reduced to a minimum (2001: 243).

The concern for avoiding social interaction between subject and researcher is also shared by Ericsson and Simon, who argue that “social verbalizations may be quite different from the sequences of thoughts generated by subjects themselves while solving problems, performing actions, and making evaluations and decisions” (1984/1993: xiv). It follows that socially-motivated interactions such as explanations, descriptions, justifications, and rationalizations should be eliminated to prevent subjects from conforming to social norms that could change their mental processes. Hansen, however,

justifiably argues that trying to avoid social interaction in TA experiments “does not make much sense ... when *after* the experiments ... it is the experimenter who has to interpret the verbal reports” (ibid: 518, emphasis in the original). The lack of subjects’ explanations and justifications, in particular, leaves the researcher with “all kinds of subjective interpretation, especially if there is no clarifying dialogue of any kind with the subject after the experiments” (ibid.). To compensate for this, TA has been typically triangulated with immediate retrospective dialogues, delayed retrospective dialogues, interviews, or any combination of these (see, for example, Hansen 2006).

Barbosa and Neiva, for instance, found that “concurrent protocol data, together with data obtained by means of immediate retrospection, enabled [the researchers] to determine the origin of most problems the subjects encountered during the [TAP] experiment” (2003: 143). The authors also found that delayed retrospection helped “further explain and define the problems these subjects faced during the translation process and allowed [the researchers] to confront the delayed retrospection data with those obtained either spontaneously or by means of immediate retrospection” (ibid.).⁷¹ These two “post-process data elicitation techniques” were combined with the TAPs obtained from two different experimental set-ups aimed at testing the effects of the researcher’s intervention on subjects’ verbalizations (ibid: 141). Following Ericsson and Simon’s (1987) suggestions, the subjects (foreign language learners and professional translators) in Barbosa and Neiva’s study were first trained in the TA method through a number of warm-up exercises, and then later exposed

to do the thinking-aloud protocol in two different set-ups. The first was an unassisted think-aloud protocol, i.e., the students would record their verbalizations’ while doing the translation of an academic text extracted from an introduction to linguistics manual on an audiotape ... The second experiment, carried out with a different text, from the same textbook, involved a senior researcher’s presence not only to act as a monitor, intervening to remind the subjects to think-aloud whenever they paused for longer than approximately five seconds, but also to take notes during audio recording sessions (ibid.).

Contrary to the common belief that researchers’ interventions “inevitably disrupt the cognitive processes of subjects submitted to think-aloud procedures,” the subjects in

⁷¹ Unlike concurrent verbalization, retrospection “does not interfere with the actual translation process, but it is prone to memory failure, which affects its reliability” (Göpferich and Jääskeläinen 2009: 181). As indicated previously, immediate retrospection would seem to yield more reliable data than delayed retrospection.

Barbosa and Neiva's study "responded to the researcher's queries without signaling that those interruptions affected their thinking processes" (ibid: 142). The only exception to this was a case in which a subject explicitly complained that the researcher's interruptions were disturbing. In addition to the impact that social interaction might have on the ecological validity of the data obtained by means of thinking aloud, this monologue verbal reporting method has also been criticized for being unnatural and creating an artificial situation that forces subjects to talk aloud to themselves. I will discuss this aspect in the following section.

4.1.2 Collaborative Translation Protocols

Although think aloud protocols "are still predominantly the main tool for gaining access to the translation process" (Kusmaul and Tirkkonen-Condit 1995: 180), the artificiality surrounding them led some researchers to have the subjects of their experiments translate jointly either in pairs (House 1988; Kusmaul 1991, 1995; Matrat 1992; Séguinot 1996; Barbosa and Neiva 2003; Bergen 2009) or in small groups (Hönig 1990, 1991; Schmid 1994; Pavlović 2007). Translating in pairs generates so-called "dialogue protocols," while translating in small groups generates "group protocols" or "joint translation protocols." Stressing the collaborative endeavor derived from joint translation, Pavlović (2007) fittingly proposes the common term "collaborative translation protocols" (CTPs) to refer to the protocols obtained from collaborative translation tasks. In these tasks, "the construction of the source text meaning and the emergence of the target text are a result of individual cognitive processing as well as the interaction among the members of the group" (ibid: 46; cf. Pavlović 2009: 83).

This collaborative mode of translation has naturally led to discussions revolving around the advantages and disadvantages of using CTPs over TAPs as a tool for eliciting data on translation processes. After all, as Bernardini points out, "[a] plea for environmental validity is unsustainable in this case: TAPs are either strictly monological or *not* TAPs at all" (2001: 243, emphasis in the original). There is little doubt that CPTs do not meet Ericsson and Simon's criteria concerning the levels (i.e. L1 and L2) of verbalization and the elimination of social interaction required for generating ecologically valid TAPs. However, I agree with Pavlović that "the very things that invalidate CTPs in terms of Ericsson and Simon's criteria may be the very things we would *like* to find out about the translation processes, for instance, how and why decisions are made" (2007: 48, emphasis in the original).

Verbalized decision-making processes in collaborative translation are indeed a by-product of the natural communicative situations in which subjects discuss translation problems and negotiate proposed translation solutions. CPTs have therefore been reported to (a) be less artificial and (b) yield richer data than TAPs (e.g. House 1988, 2000; Séguinot 2000a; Barbosa and Neiva 2003; Pavlović 2007, 2009). House, for example, found in her comparative study of monologue vs. dialogue translation protocols that “the introspective data produced by pairs of subjects is less artificial, is richer in translational strategies and simply much more interesting” (1988: 95; cf. House 2000: 159). Concerning the richness of data, Barbosa and Neiva also point out that the dialogue protocol produced by the two professional translators of their study who translated a text collaboratively “made it clear that indeed more data could be obtained when two people working together had to negotiate in order to decide whose solution would be implemented” (2003: 151). Similarly, Séguinot states that “[o]ne way to increase the amount of information available is to provide a second person in the translation setting” (2000a: 145). She therefore decided to use “a dialogic situation to increase the amount of verbalization in the think-aloud protocol” that she obtained in her study of management issues in translation (*ibid.*). Kussmaul and Tirkkonen-Condit remark that later TAP studies “have shown, however, that the richness of data depends on the type of subjects and the translation brief, and, above all, on the priorities of the researcher. The data that one researcher find poor may seem rich to another researcher” (1995: 180).

As far as the alleged artificiality surrounding the use of TAPs is concerned, Lauffer states that one of the professional translators in her study who appeared to feel comfortable with thinking aloud admitted “‘I’m not talking at all now. I could talk more but that would slow me down and it doesn’t feel normal’” (2002: 65). Another subject thus found it very difficult to verbalize because “having to think about talking while translating took him away from the actual work” (*ibid.*). House states that in her study of the use of translational aids she was “left with a general *déjà vu* impression that the talk generated appeared to [her] often slightly ‘un-natural’ and forced” (2000: 159). For Kussmaul, TAPs also create “a somewhat artificial situation” (1991: 91). House therefore suggests “giving preference to dialogic think-aloud tasks in which pairs of subjects might engage in more ‘natural’, less strained and less pressured introspective exercise that resembles ‘real life’ activities much more than the laboratory-type

individual thinking-aloud practices” (2000: 159). Göpferich and Jääskeläinen, however, indicate that, although dialogical thinking aloud may be “less artificial and thus less embarrassing for ... inexperienced or more introverted” participants, the subjects of their experiments (Göpferich 2006a, 2006b, 2007; Jääskeläinen 1999)

quickly forgot about the experimental situation if there was a relaxed and trustful relationship between the experimenter and the subject. Some subjects even reported that they are also thinking aloud when working alone in a real translation situation, so that, to their minds, the experimental situation hardly differed from a natural translation situation (2009: 172).

Kiraly also reports that several subjects in his study “mentioned that they regularly talk aloud to themselves when they translate at home” (1995: 93), which would seem to support Krings’ claim that “thinking aloud while translating is an almost natural type of activity to which most of the criticism leveled at verbal report data does not apply” (1987: 166; cf. Pavlović 2007: 45-46). Krings further stresses that “[t]his conclusion is strengthened by the observation that translating is often accompanied by ‘inner speech’ as one can easily verify by self-observation or by observing the lips of a translating person when he or she is not ‘speaking’” (ibid.). He therefore regards TAP data as highly valid and reliable.

Another argument against the use of joint translation for research is that this mode of translation “does not provide access to the solitary translation process” (Jääskeläinen 2000: 78). That is, in collaborative translation we do not observe “one mind at work but two or more, and we record thoughts that would never have occurred to a single translator” (Kussmaul and Tirkkonen-Condit 1995: 181). Göpferich and Jääskeläinen warn us that, when analyzing dialogue protocols, one should “realize that the mental processes they reflect differ from the mental processes of an individual who translates alone, who does not have to take social interaction into account and who is not influenced, either positively or negatively, by the ideas of his or her partner” (2009: 172). Furthermore, as Kussmaul and Tirkkonen-Condit point out, “group-dynamic processes ... may distort the results” obtained by means of group protocols (1995: 181-182). For example, in collaborative tasks one translator may adopt

a leading role not because he or she is a better translator, but because of personality traits. Thus, solutions may be accepted not because they are better but because they are proposed by the more dynamic person. Also, one of the subjects may hold back his or her ideas for reasons of politeness – or even chivalry (ibid: 182).

In a similar fashion, Barbosa and Neiva state that the fact that subjects have to negotiate translation procedures to complete a given task “may lead to what Kussmaul (1995) calls the ‘danger of after-the-event rationalization’” (2003: 152). In other words, when a subject is “confronted with a request from his or her partner to explain a specific solution, [the subject] might be tempted to find arguments to support his or her solution that were not taken into consideration when the subject first thought about it” (Barbosa and Neiva 2003: 152). Pavlović, for instance, reports that “[a]ll of the nine subjects who took part in [her] pilot study used this opportunity to comment on some aspect of group dynamics” (2007: 50). One of the subjects admitted that she “kind of had the feeling sometimes that [she] was pushing too hard with the suggestions that [she] liked” (ibid.). In contrast, other subjects expressed their satisfaction with the way their opinions were “respected,” while others mentioned the need to “compromise” when choosing among translation variants (ibid.).

In their study of students’ perceptions of monologue vs. dialogue verbal reporting, Li and Cheng found that the students (31 translation undergraduates) of their experiments “had more positive experiences with joint translating than individual translating” (2007: 43). In addition to students’ views on and preferences towards the two modes of translation, the authors examined students’ perceptions of the amount of verbalization, translation speed, and translation quality based on the analysis of the data obtained from two questionnaires (administered after each TAP experiment). Concerning the amount of verbalization, Li and Cheng found that students felt they had produced more verbal data in joint translating than in their individual translations. Yet, as regards translation speed, “a bit over 50% of the students felt they translated faster in joint translating than in individual translating, [while] the other half felt their speed was more or less the same or even slower” (ibid: 51). As far as translation quality is concerned, almost 40% of the students thought they had translated “better or much better in joint translating,” while 60% did not perceive any qualitative difference (ibid.).

In light of their findings, Li and Cheng conclude that joint translating seemed to be more popular among their students “and hence more inductive for the participants to speak out their thoughts” than with individual translating (ibid.). The authors also observed that the amount of verbal data produced by their students “was much smaller than some of the TAP studies carried out with non-Asian research subjects” and hence suggest it would be interesting to compare joint translating among students with

different cultural backgrounds (ibid.).⁷² In a similar fashion, Lauffer states that “it would be interesting to evaluate how culture relates to the success or failure of think-aloud protocols during translation” (2002: 65). She claims that “[i]n the English Canadian context, it is not natural for translators who work alone to talk while translating and therefore the information may not be as easy to obtain as in another more oral culture” (ibid.). Göpferich and Jääskeläinen remark that the ease of fluency and the amount of verbalization are two aspects that “merit further attention in terms of methodology” (2009: 182). As far as these two aspects are concerned, contradictory findings have been reported in the literature:

the silent Finns seem to fluently verbalize their thought processes (Jääskeläinen 1999), German subjects sometimes have great difficulty (House 1988), British community translators have no problems verbalizing (Fraser 1993) while to Danish professional translators thinking aloud is an embarrassment (Jakobsen 2003), etc. On the basis of these findings, it has been speculated that language typology might play a role in the amount of verbalizations produced: translating between typologically distant languages, like English and Finnish, might require more processing at the conscious level than translating between close relatives, like French and English or German and Swedish. However, translating between English and Chinese seems to bring conflicting results, ranging from reluctant (Li and Cheng 2007) to fluent verbalization (Shih 2006a). This makes one speculate about the role of cultural factors ...; perhaps factors relating to social hierarchy and power relations play a role here as well? (Göpferich and Jääskeläinen 2009: 182-183).

As Göpferich and Jääskeläinen further point out, “the above speculations bring us back to the suggestion not to rely solely on the methodological groundwork done in cognitive psychology” (ibid: 183). Research in this field and in that of information processing, among others, suggests that, “[u]nder the right circumstances (verbally encoded information, no social interaction, no interferences, no instruction to *analyse* thoughts), [thinking aloud] is assumed not to interfere with the mental processes and to provide a faithful account of the mental states occurring between them” (Bernardini 2001: 244). For reasons explained above, however, the answer to the question of whether TA affects translators’ processes and products “can only be ‘Yes’,” even if TA experiments are carried out under optimal circumstances—e.g. when translators do not have individual problems or negative experiences, they are not bilingual, they translate into their L1, they are not cognitively stressed, they have been trained in the TA method, they

⁷²Li and Cheng argue that “joint translating may be considered more conducive for participants, especially those from more reserved cultures, for instance some Asian countries, to speak out their thoughts” (2007: 43).

translate consciously (at least partially), and they have something to report (Hansen 2005: 514).

Due to the shortcomings involved in the use of TAPs, some researchers have suggested that a more comprehensive and natural (i.e. less artificial) way of investigating translation processes would be to carry out collaborative translation experiments. However, as Jääskeläinen points out, “it could also be argued that asking two (or more) people to translate together is just as artificial a translating situation as a think-aloud experiment, since most translators (students and professionals alike) work alone” (2000: 78). Yet, Pavlović remarks that “[i]n search of naturalness of one kind (talking to someone else vs. talking to oneself) the other kind of environmental validity (real-life relevance) [need] not be neglected” and that “[n]aturally occurring instances of collaborative translation ... [could] provide a possible source of authentic data” (2007: 46). What seems to be clear is that at this stage of translation process research “it is impossible to determine whether thinking aloud or joint translating would be ‘the’ ideal method to investigate translating” (Jääskeläinen 2000: 78).

One way out of the dilemma is to view different research methods as more or less suitable to investigate particular aspects of the translation process. In other words, “the choice of methodology to be used in examining translation processes depends on the aims of the project” (Pavlović 2009: 82). Clearly, the object of research is different in joint translation and individual translation, and so are “the variables that may account for the differences between the two experimental conditions” (Jääskeläinen 2000: 74). Given that in collaborative translation settings

subjects have to justify their suggestions and to argue in favour or against their partner’s suggestions, this is an ideal method for didactic purposes, both for the subjects involved in the experiments themselves and for other student translators, who, by analyzing successful strategies which become obvious in dialogue protocols, can increase their own repertoire of strategies and thus improve their translation competence (Göpferich and Jääskeläinen 2009: 172).

Pavlović thus stresses that, although studies involving collaborative translation tasks embedded in pedagogical settings “may or may not tell us something about the processes in the minds of individual professional translators, they will certainly help us understand better the social, as well as cognitive aspects of acquiring such a complex skill as translation” (2007: 51). She therefore states that “[t]he use of CPT as a research method seems to be particularly suited for studies aimed at improving translator

education” (ibid.). The pedagogical value of joint translation was acknowledged by House as early as in 1988, when she argued that “teaching translation (to advanced foreign language learners) in and as interaction ... might be preferable to the still overwhelmingly popular practice of asking students to translate in splendid isolation” (1988: 96). In contrast, individual translation could perhaps be better suited to elicit data on the cognitive processes of professional translators working in their natural environment. Despite teamwork being an increasing practice among professional translators nowadays, it would seem that their working environment tends to be more representative of the solitary translation processes they typically engage in on a daily professional basis.

4.1.3 Written Reports and Translation Diaries

In addition to the verbal reports described earlier, the pool of available methods and tools in translation also includes written reports used to elicit data on translation processes and products. These reports have been typically referred to in the literature as “problem reports” (Gile 1995), “control sheets” (González Davies 1998), “written protocols” (Scott-Tennent, González Davies, and Rodríguez Torras 2000, 2001a, 2001b; González Davies and Scott-Tennent 2005), or “Integrated Problem and Decision Reporting” (IPDR; Gile 2004), among others. Despite the differences in terminology, all these reports have been developed with a common goal in mind: that of providing a systematic retrospective method for reporting on translation problem solving within the context of translator training. More specifically, the use of problem reports aims at improving the teaching of translation by facilitating the analysis of introspective data on students’ translation problems, the strategies applied to solve such problems, the type of sources and/or aids consulted, the final solutions adopted, and the rationale for these solutions. Different types of questionnaires (e.g. Orozco Jutorán and Hurtado Albir 2002), “translation diaries” (e.g. Fox 2000), “recording sheets” (Atkins and Varantola 1998), or “answer sheets” (Varantola 1998), among others, have also been used to collect data on different aspects of translation with a pedagogical aim in mind (see below).

Like verbal reports, the methods and tools described in this section (and in following sections) also have their particular strengths and weaknesses for research into translation processes. Gile, for example, summarizes the main advantages of using problem reports for translator training as follows: (a) They “force students to think

about what they are doing and about problems they encounter, thereby raising their awareness of such problems;” (b) they remind students of the two main phases involved in the translation process (i.e. the comprehension phase and the reformulation phase); (c) they “help the instructor identify the cause of errors that could otherwise be attributed to more than one source;” and (d) they “help the instructor monitor the progress of the group’s awareness of methodological issues” (1995: 124). In González Davies’ study of student assessment by medical specialists, “the students were required to hand in a control sheet with each of their translations which included the problem in the source language, the strategy they used to solve it, and the final text in the target language (TL) presented in three columns so as to aid visualization” (1998: 95). Like Gile, González Davies found that the control sheet “helped both the students and the instructor to become aware of the translation process” (ibid.). From the students’ point of view, this reporting tool “enabled them to systematize their knowledge, justify solutions, and approach the text with more confidence” (ibid.). From the teacher’s perspective, the control sheet “helped to clarify the learning stages of the students and favored reflective teaching” (ibid.). Similarly, Gile states that IDPR “has shown its didactic usefulness in a process-oriented training approach over the years,” thus requiring little effort for trainers to collect “readily available information” on translation problem solving (2004: 2).⁷³ He further states that the “distinctive features” of this reporting method

arise from the fact that this report on problems encountered, on steps taken to solve them, and on the rationale for the final decisions made, either in the form of footnotes or as a set of comments and explanations which follow the translation, is an *integral part of translation assignments*. While IPDR is only one way to obtain this information, it collects it systematically, in written form, from the students, without cues from the instructor except the initial instruction and feedback when reports are inadequate (ibid: 3, emphasis in the original).

For Gile, IDPR provides a “means to raise [students’] awareness of various components of the translation process and to promote best efforts towards maximum quality” (ibid.). Similarly, for González Davies and Scott-Tennent written protocols provide “a means for the students to make visible their translating and reasoning processes ... [thus improving their] awareness of their thinking process and of their evolution in their acquisition of translation competence” (2005: 165). This is also true with regard to

⁷³ Gile stresses, however, that the “effective advantages of [this reporting] method for specific research projects have yet to be explored” (2004: 10). Hansen (2006), for example, explores the (dis-)advantages of IDPR as compared to two methods of retrospection (see below). Pavlović (2007, 2009) also discusses the main advantages and disadvantages of using IDPR for research into translation processes.

translation diaries that are kept to record translation processes. In Fox's study of the use of translation diaries in a process-oriented translation teaching methodology, for example, the students were asked "to keep a record, or diary, of how they went about their translation, what problems they had found, how they had solved their problems and what the reasoning was behind the decisions made when producing their final texts" (2000: 118). She arrived at the conclusions that keeping a translation diary encourages

learners to think critically and to reflect upon the task of translating a text; to assess for themselves the acceptability or appropriateness of different solutions to different translation problems; and, as self-confidence increases, to assume personal responsibility for their decisions ... Translation diaries provide teachers with the means of discovering individual shortcomings and errors (some of which might *never* have been contemplated in the teachers' own agendas) thereby enabling them to solve or irradicate these rapidly and effectively (ibid: 128, emphasis in the original).

Raising students' meta-cognitive levels of awareness is clearly one of the main advantages, and indeed the primary goal of keeping translation diaries and/or problem-solving reports during the translation process. Some researchers have claimed, however, that these reporting tools threaten the reliability and the validity of the data collected as they "might make the translator or the translation student more aware of his or her problem-solving processes, etc., and thus change the process" (Göpferich and Jääskeläinen 2009: 181). Another problem that affects introspective data collected by means of written reports is the degree of thoroughness with which subjects complete these reports. Gile, for example, warns us that "[w]ith students not familiar with the [IPDR] system, it generally takes a short while before compliance is achieved. Some students do not know what to report in spite of instructions received, and some ignore the reporting requirement" (2004: 7). It follows that written reports, like verbal ones, also provide an incomplete picture of the translation process. In fact, Gile argues that the main limitation of IDPR "probably lies in the non-comprehensive nature of the data spontaneously provided by the students" (ibid: 10). To compensate for this, he suggests introducing

some more specific questions and/or instructions. For instance, students might be asked to answer a set of questions on the relative difficulty of the text or on selected aspects of the assignment that researchers might be interested in, possibly with assessments using numerical scales for difficulty, for the relative importance of various factors, for the relative length of various translation components, etc. (ibid.).

In contrast to IDPR, González Davies and Scott-Tennent's (2005) written protocols have a particular reporting format. These protocols were designed to conduct an experimental study embedded in a pedagogical setting that aimed at exploring students' "problem-spotting and solving strategies and procedures that emphasize noticing, deciding and justifying skills" regarding the translation of cultural references (ibid: 161). Their protocols consist of a "standard sheet" with six columns:

[I]n the first, [students] write down the problems found in the source text, in the second, the range of possible solutions, in the third, the advantages of each solution, in the fourth, the disadvantages or reasons to reject some of them, in the fifth, their final solution, and in the sixth, a justification for their choice (ibid: 165).

Nevertheless, González Davies and Scott-Tennent's written protocols can also adopt a similar semi-open-ended format to that of IDPR to account for different student personalities to be respected.⁷⁴ That is, "[i]f a student prefers to use a different format [to the one described above], it is accepted as long as it is clear, to the point, and they keep to the assignment" (ibid: 165). One should not ignore, however, the potential impact that different reporting formats may have on the type of data collected. All the written reports described so far as well as the online search report (see 5.7.3 for details) that I designed for the purpose of this study elicit data in a more or less structured way, i.e. in a way that is biased by the researcher's own theoretical principles and understanding of the object of study. TAPs, in comparison, have the advantage of collecting data in a highly unstructured way. That is, thinking aloud "predetermines data collection far less than in other models with a more rigid structure [...] in which the range of results is considerably restricted by the data collection tools in direct proportion to the extent of their structuredness" (Krings 2001: 218, cited in Göpferich 2009a: 30) Pavlović, for example, argues that collaborative translation protocols

are a rich source of data ... in the sense that they convey the 'messiness' of human translation processes in all its glory. IPDR is usually a neat summary – frequently self-censored – of what was done during the task. In contrast to this, CTPs show all of the many steps – in the case of students and novices, often unnecessarily convoluted – taken to get there (2009: 85-86).

In her study of sources of translation problems, Hansen (2006) compares IDPR with two retrospection methods, namely Retrospection with Replay using Translog (R+Rp)

⁷⁴ IDPR has no specific reporting format; Gile only suggests using footnotes or comments for students to report all their problems (2004: 3).

and Retrospection with Replay combined with immediate dialogue (ID) between the subject and the observer (R+Rp+ID). As Hansen explains,

[w]hen using the retrospection methods with Translog and replay, subjects are given a translation brief and are asked to work on a realistic translation task. During the translation they are alone in the room. As soon as they have finished, the process and product are saved and the writing process is replayed. The subjects see all their cursor movements, pauses and revisions on the screen and describe, in retrospect, what thoughts went through their minds during the process. They comment on the problems they encountered and the strategies and aids they used in order to solve them. These comments are recorded and transcribed. The only differences between R+Rp and R+Rp+ID are the observer's role and the combination of the replay with an immediate retrospective dialogue (2006: 5).

When comparing these methods, Hansen found that IDPR requires more time and effort than R+Rp, which “does not take much of the subject's time... [and] is carried out at double or even triple writing speed” (ibid: 10). She also observed that “R+Rp is very easy for the subjects to carry out,” which may account for the larger number of problems reported with this method than with IPDR (ibid.). Another reason for this difference may be, as briefly indicated above, the degree of thoroughness with which subjects complete the reports (ibid: 11). As Gile himself acknowledges, IDPR “does not claim to provide comprehensive information; reporting in writing about all the problems and decisions takes time and effort, and students cannot be relied on to do it thoroughly” (2004: 8). Indeed, the students using IDPR in Hansen's experiments did not report all their translation-related problems though they were instructed to report all of them (2006: 12). In this regard, Pavlović points out that, no matter how well instructed subjects are, they “tend not to write down all the problems that come up in the verbal protocols” (2007: 56). This, however, can be compensated for by combining written reports with other data collection tools. In my study, for example, I used direct observation by means of screen recording software (see 5.7.4) to capture the participants' translation, Web searching, and reporting activities carried out on their computers.

Another aspect that deserves attention from a research perspective is the point in time at which subjects choose to complete written reports. In Hansen's study, for example, “subjects [chose] themselves when to write the reports of their problems and decisions – parallel to every act of problem-solving, after having finished the first draft, or after having written the final target text” (2006: 7). In a similar fashion, the participants of

my study freely decided when to complete the online search reports to describe the Web searches they performed for translation problem solving. They choose to do so *before*, *parallel to*, *after* translation, or *any* combination of these. Carrying out documentary research and reporting about it before starting a translation task would not seem to interfere *directly* with the actual translation process (although it may of course influence certain decision-making processes). In contrast, completing a report while the translation is still being carried out may indeed affect the translation process. Some of Hansen's students, for instance, indicated that "they had felt disturbed by writing the reports and that they had sometimes forgotten their ideas and thoughts in relation to the translation itself. With R+Rp the process seems to be more natural, as it is not interrupted at all" (ibid: 15).⁷⁵ Yet, Pavlović argues that "if the report writing is left for after the translation is finished, the subjects are likely to forget what problems they encountered during the task" (2007: 56). Interestingly, both the disruption of the translation process and memory-related aspects concerning the recall of information are precisely the type of problems described by the student participants of my study with regard to the completion of the online search reports (see 6.3.2.2 for more details).

4.1.4 Data Sheets and Questionnaires

Most of the factors described above are also likely to affect the data collected with other similar reporting tools such as different types of data sheets. Aktins and Varantola (1998), for example, used what they call "recording sheets" in their study of dictionary consultation in the L1 or L2 translation tasks carried out by 71 subjects from 15 different language backgrounds and 32 Finnish translation students.⁷⁶ Although the focus of their article is on methodological aspects, the authors provide answers to the following five questions: How do people consult dictionaries? What kind of information do they look for? What is the most useful information found in a dictionary entry? Do users find what they look for? Are they satisfied with the information they obtain? What do they do when they are frustrated? When do people use an L2 monolingual dictionary? The answers to these questions are provided through a number of case studies that

⁷⁵ The students nevertheless felt that with IDPR "they could work undisturbed at home" (Hansen 2006: 15). With R+RP (which took place in the researcher's office), however, they felt "rather stressed during the process, especially due to time constraints" (ibid.).

⁷⁶ The 71 subjects were the participants of a EURALEX Workshop on Dictionary Use held in Oxford in 1991.

illustrate the various dictionary look-up and decision-making processes (and strategies) involved in the use of different types of dictionaries for L1 and L2 translation.

The research methodology in Aktins and Varantola's study was devised for and tested at the 1991 EURALEX Workshop on Dictionary Use, and consisted of a questionnaire to elicit data on user profiles and a recording sheet to record the details of every dictionary look-up. The research participants "worked in pairs, one partner using dictionaries, and the other recording every step of this activity on the [sheets] designed for this purpose" (ibid: 85). One could naturally argue that since the recording sheets were used by the observing partner and not the dictionary user, the recording process did not affect the translating process. The study's experimental design nevertheless seems to have a major drawback (see Aktins and Varantola 1998: 86-101 for a discussion of the main limitations of the study). This relates to the fact that the research participants were not asked "to produce a written translation, simply to look up any expressions they felt were necessary to allow them to translate the passage" (ibid: 85). According to Aktins and Varantola, the reason for this is that the focus of the study "was on the strategies of dictionary use and not on the dictionary users' skills in translation" (ibid.). Yet, as Mackintosh points out, "to get a true picture of how dictionaries are used in translation, the testing process should emulate a natural translation process as closely as possible" (1998: 127). Furthermore, as I will discuss in 5.2.2, information-searching processes are considered here to be contingent upon the (translation) task in which they are embedded.

Varantola (1998) also adopted the methodology developed for and tested at the EURALEX Workshop in her study of the use of reference sources in translation, in particular, the use of dictionaries. There are, however, two main differences with regard to Aktins and Varantola's study. First, in this study the participants were non-translators whose dictionary look-ups and search processes in L1 and L2 translation occurred within a would-be-translation task. In contrast, Varantola's participants were advanced students of translation working on an actual L1-L2 translation task, "where the subject matter, while within a special field, [was] still familiar to the lay person" (1998: 179). Second, in Aktins and Varantola's study the dictionary look-ups and search processes were recorded by observers, while in Varantola's study the student translators recorded

their own reference needs and search processes in “answer sheets.”⁷⁷ As discussed above in relation to written reports, this recording process may affect the reliability and validity of the data collected as far as the completeness of the reports and their effects on the translation process are concerned. An exception to this would be questionnaires, “which are answered completely outside the translating situation” (Göpferich and Jääskeläinen 2009: 181). Questionnaires are thus valuable sources of data to collect information on subjects’ background variables, such as educational profiles, linguistic ability, and professional experience (information that some early TAP studies, for example, failed to collect in detail), to take them into account in the analysis of subjects’ translation performance, among others. Questionnaires, however, like the recording sheets used in the two studies described above, tend to elicit data in a rather highly structured way. In said studies, the questionnaire consisted of five questions (one demographic question, one rating scale question, one dichotomous question, and two semi-open questions) and the recording sheet of ten, mostly open-ended and single-choice questions. In contrast, all the written reports discussed previously, although having a particular reporting format that guides the respondents’ account of problem-solving activities, only elicit open-ended data.

All in all, the studies on dictionary consultation described above shed some interesting light on users’ habits with regard to their referencing needs and dictionary look-up processes in translation. Atkins and Varantola, for example, were impressed by “the amount of reassurance sought from ... dictionaries, particularly about L2 collocation, by even the most skilled of non-native L2 speakers, however experienced in translation they may be” (1998: 115). Similarly, the findings of Varantola’s study seem to corroborate her initial hypothesis that translators “need equivalents, but they also need reassurance: therefore [they] do not like to find equivalents which they do not recognise” (1998: 188). For Varantola, it is particularly important that dictionary “examples clarify the distinctions between the various L2 equivalents offered, that despite the space constraints they are not over-simplified, and that they highlight the most typical and therefore the most frequently occurring usages” (ibid.).

Varantola also found that her subjects’ skills regarding the use of dictionaries were rather poor. She thus observed a number of indications that would appear to corroborate

⁷⁷ These answer sheets are a slightly modified version of the recording sheets used by Atkins and Varantola (1998).

two further hypotheses: (a) that translators “try to find non-dictionary type information in dictionaries because it is not readily and systematically available in other sources;” and (b) that they “also need information relating to longer stretches of text than a single lexical item” (ibid: 189). Concerning the different types of information needed by translators, Varantola’s experiment shows

that not all of this is lexical information of the type to be found in dictionaries, bilingual or monolingual, general or specialised. It is difficult to conceive of how the users could have found in their print dictionaries information about collocations that look harmless enough but prove almost impossible to verify ... The same applies to the problem of the stylistic appropriateness of L2 expressions. It is, I believe, obvious that for translators tackling even non-highly-specialised text [sic] more is needed in the way of reference sources than print dictionaries: access to relevant parallel corpus material becomes essential (ibid.).

In short, Varantola arrives at the widely accepted conclusion that both users’ dictionary skills and the quality of the dictionaries must be improved, and that translators need reference sources other than dictionaries to successfully translate a specialized text into a foreign language. This obviously applies to L1 translation as well, thus justifying the need for possessing adequate information-searching skills that would allow translators to exploit all the possibilities offered not only by printed sources but also by electronic reference material as well as the variety of resources available on the Web. Before discussing the main factors involved in information searching, which I will do in Chapters 5 and 6, I will first return to the other major research method available for investigating translation processes, that of direct observation.

4.2 Research via Direct Observation

Direct observation is considered one of the most effective ways of collecting ecologically valid data on behavior (Dishion and Granic 2004: 143). Unlike in participant observation, the “direct observer” does not try to become part of the phenomena being observed. Instead, the researcher aims at reducing the degree of invasiveness “so as not to bias the observations” (Trochim 2001: 161). Trochim, for example, states that “[u]nobtrusive measurement presumably reduces the biases that result from the intrusion of the researcher or measurement instrument” (ibid: 164). This is not to say, however, that observations can be entirely bias-free. From the perspective of the researcher, it would be naïve to ignore the subjective value of human judgment

embedded not only in social and cultural environments but also in research settings. From the perspective of measurement, most instruments simply tend to introduce a foreign element in the environment being researched.

It would then seem best for researchers to aim for the least invasive environmental conditions so as not to interfere with the research data. In the case of direct observation, technology advances have, as further discussed below, significantly improved the possibilities of investigating behavior in the least unobtrusive way possible.

4.2.1 Note Taking

In addition to the research methods described above, TA has also been combined with empirical observations of subjects' non-verbal behavior. These observations have been "usually conducted in two ways. Firstly, the researcher is present to take notes and observe the overall process. Secondly, the event is recorded with a video camera so it can be analyzed in closer detail at a later time" (Lauffer 2002: 62). Both methods have been used especially for observing translators' use of paper-based reference material. In this section, I will report on studies that have employed note taking for this purpose. In the next section, I will describe studies that have used a video camera to record subjects' research activities during translation.

Studies that have examined subjects' use of reference material via note taking include, as shown above, those of Atkins and Varantola (1998) as well as Livbjerg and Mees (1999). Like the latter researchers, Mackintosh (1998) combined note taking with thinking aloud in his study of dictionary use in L2-L1 translation. Aimed at drawing implications for creating electronic dictionaries tailored to the needs of specific user groups, Mackintosh's study consists of two experiments that were carried out with students from the School of Translation and Interpretation at the University of Ottawa. The first experiment aimed at gathering general information on students' dictionary use, for which the students "were asked to translate a specialized text [in economics] with the help of various dictionaries and a term bank" while thinking aloud (ibid: 126). Their verbalizations were audiotaped and their actions and comments on the use of dictionaries observed and recorded in forms specifically designed for this purpose.⁷⁸ The second experiment was designed to further explore certain findings obtained in the

⁷⁸ These forms are the same as the ones developed for the EURALEX Workshop and used by Varantola (1998) as well as Atkins and Varantola (1998) in their respective studies of dictionary use.

first experiment “on the topic of definitional metalanguage (i.e., the language used in dictionary definitions)” (ibid.). The research method chosen was

a controlled experiment. In this experiment, the subjects were given nonsense words (i.e., made-up words) in L2 contexts. The nonsense words represented concepts with which the typical subject should be quite familiar ... The subjects were also given an L1 or L2 definition for each nonsense word, and asked to provide an L1 equivalent for the nonsense word (or failing that, an explanation of the concept in-L1), based on the definition. Finally, they were asked to underline any items they did not understand in the definition (Mackintosh 1998: 129).

To measure the students’ comprehensibility of the definitions for the various concepts included in the test, they were given “a sheet containing eight L2 contexts and four [L1] and four [L2] definitions to go with the contexts” (ibid.). The results of the first experiment show that the students conducted dictionary look-ups mainly during the “course of the translation process, rather than beforehand, despite the strategy favoured by many translation educators ... who suggest that, for comprehension purposes at least, dictionary use should occur mainly before translation” (ibid: 137). Interestingly, Mackintosh’s findings indicate that “the subjects who looked up most problem items before translating produced more effective translations” (ibid.). As Mackintosh points out, it would be interesting to “further investigate whether dictionary use prior to translation does indeed produce more effective translations” (ibid.). Mackintosh also observed that the subjects of his study “were overly thorough in their dictionary use” and therefore suggests teaching student translators how to balance persistence and thoroughness with time constrains (ibid.). He argues that this skill “may become increasingly necessary if the storage space of electronic dictionaries is tapped to its full potential. Translators will have to be trained to be more selective if they are to cope with larger volumes of information” (ibid.).⁷⁹

The results of the second experiment show that the student translators had a tendency to avoid L2 definitions. Mackintosh consequently states that they would benefit from dictionaries that “provide both L1 and L2 definitions in the same entry” (ibid: 139). He furthers explains that “[p]arallel access to definitions in both languages allows translators to compare the two definitions, and therefore, ensure equivalence between

⁷⁹ From a similar perspective, that of translation competence in an electronic age, Pym claims that “the postmodern abundance of information makes the production of alternative TTs easy, which means that more emphasis has to be placed on the elimination of possible TTs” (2003: 494). He goes on to argue that students should “be taught to *mistrust* websites, for instance, or at least to evaluate them with suspicion” (ibid., emphasis in the original).

the concepts” (ibid.). In other words, dictionaries that contain both definitions *and* equivalents would best satisfy the needs of student translators. Notwithstanding the pedagogical implications of Mackintosh’s findings, Schneider argues that the study’s

experimental design has serious shortcomings. Firstly, only the texts used in the hypothetical translations contain ‘infrequent words’; the text used in the actual translation does not contain any item from this category. Secondly, the so-called text employed in the actual translation is not a text at all, but consists of eleven totally unrelated sentences. These factors reduce comparability considerably and further reduce the value of the results (2001: 156).

As far as methodology is concerned, however, Schneider prefers the observation method (i.e. note taking) employed by Mackintosh as well as Atkins and Varantola over that of subject-generated data in Varantola’s study. For Schneider, the fact that Varantola’s subjects “had to record their activities themselves ... casts some doubt on the reliability of the findings” (ibid: 157). In Mackintosh’s study, direct observation was also “preferred over indirect reporting methods, such as surveys by questionnaire, because direct observation allows the researcher to see what dictionary users *really* do, rather than relying on what users *say* they do” (1998: 126, emphasis in the original).

Direct observation via note taking (using a logbook) was also the preferred and only method employed by Künzli (2001) in his study of the reference sources used by two groups of subjects: three translation students in their first year of study at the University of Geneva and three translators who had graduated from this University and who had between four and eight years of professional experience. The two groups were observed at their usual workplace while translating a magazine text from English into German and consulting their own sources of reference when needed. Künzli decided to observe his subjects in their natural work environment and with sources of information they were accustomed to use to overcome a number of methodological limitations found in other studies dealing with resource consultation, among others—e.g. Krings (1986), Jääskeläinen (1989, 1999), and Kussmaul (1995).⁸⁰ For Künzli, said limitations refer to a number of research design aspects worth reproducing here at length:

– Choix de populations étrangères aux préoccupations des traductologues (des étudiants en langues étrangères et non en traduction).

⁸⁰ In all these studies as well as most of the studies described earlier, the choice of reference material was determined by the researchers. In some cases, subjects had the possibility of bringing their own sources of information to the experiments.

- Validité écologique limitée de par (a) le choix du texte, souvent peu représentatif du travail prototypique du traducteur, ou, à la lumière des verbalisations des sujets et de la qualité de leurs traductions écrites, trop difficile pour eux; (b) le lieu d’observation qui est souvent la place de travail du chercheur et non celui du sujet; (c) l’impossibilité pour les sujets d’avoir accès à leurs sources d’information habituelles; (d) la création d’un cadre d’observation envahissant du fait du recours à la réflexion parlée d’une part, et à l’enregistrement du sujet sur vidéo d’autre part.
- Description insuffisante de la démarche méthodologique (caractéristiques des sujets, lieu et conditions d’observation, procédure standardisée, etc.) qui rend difficile la comparaison des données.
- Erreurs dans l’interprétation des données dues à l’attribution de liens de cause à effet souvent plausibles, mais inadmissibles dans le cadre d’études corrélationnelles. Il s’agit ici du lien entre la préférence pour un dictionnaire (monolingue vs bilingue) et la qualité de la traduction (ibid : 509-510).

By designing a study that would overcome these limitations, Künzli aimed at analyzing the relationship between experience of translation, the preference for a certain type of reference material (in particular monolingual vs. bilingual dictionaries) and the quality of translation (ibid: 510). Unlike all of the studies of resource consultation described earlier—except for Pavlović’s (2007)—Künzli’s research focuses on the use of non-print sources of information, in particular electronic dictionaries, functions in text processing, and reference to human experts (2001: 510). The results obtained “show a correlation between the range of information sources used, expertise of translation and translation quality” (ibid: 507). No correlation was found, however, between the “preference of a certain type of source (e.g. monolingual [sic] vs. bilingual dictionaries)” and translation quality (ibid.). Künzli concludes that his findings have a number of implications “for translation research methodology, as it should be reminded that correlational results do not permit the attribution of causal links, and translation pedagogy, where the criticism often expressed towards the use of bilingual dictionaries seems unjustified in the light of our data” (ibid.).

4.2.2 Video Recording

Notwithstanding the value of note taking for direct observation purposes, one should not ignore the possibility that this method may elicit incomplete data and thus involve a “considerable margin of error” (Pavlović 2007: 52). Yet, these drawbacks can be easily overcome by exploiting the possibilities afforded by technology. For example, as briefly indicated above, video cameras can be used to supplement verbal reports with behavioral data. In this case, the position of the camera will determine the type of data

collected. For example, the camera may be directed at the translator to record his or her non-verbal behavior. This was the case in Lauffer's study, in which a video camera was set up "to record facial expressions and body language ... [as] indicators of mental processes" (2002: 62).⁸¹ The camera was also used to record "the think-aloud verbalizations and the non-computerized tasks such as consulting with colleagues and using paper reference materials" (ibid.). Similarly, Dancette (1997) used a video camera to record subjects' non-verbalized behaviors, in particular, their dictionary look-ups. In other cases, the camera may be positioned behind the translator to record his or her translation processes. Séguinot (1989c, 1996), for example, used a video camera for this purpose, i.e. to capture subjects' translation-related activities carried out on a computer.⁸² Similarly, in Désilets, Barriè, and Quirion's observational study of translators' use of wiki resources (in particular Wikipedia, Wiktionary, and OmegaWiki), the translators' screens were "captured as video" (2007: n.p.). According to Désilets, Barriè, and Quirion, the video material as well as the "audio ... and text documents collected during [their] contextual inquiries provide[d] [them] with a detailed account of what the subjects did and why" (ibid.).

Although video cameras can provide useful information about what is going on during the translation process, they are often criticized for being invasive and creating unnatural environmental conditions. Subjects may feel anxious at being observed and hence change their behavior. This concern is echoed by Lauffer, who argues that a video camera "can definitely be a factor of intimidation that makes the set-up feel more like a laboratory than a natural translation setting" (2002: 66). Lauffer conducted an observational study with three professional translators, namely "a junior and a senior translator at Toyota Canada, and a third translator who [had] worked with the Ontario Government's Translation Service" (ibid: 60). The study took place in the natural working environment of all three translators, who translated a routine text using their own "computers, databases, and electronic and traditional reference materials" (ibid.).

In addition to thinking aloud and retrospective interviews, Lauffer employed several observational tools, namely the keystroke-logging program *Translog*, the screen

⁸¹ This, however, "leaves the researcher with the same problem of identifying non-explicit messages and classifying e.g. facial expressions, nods of approval and disapproval, etc." (Kovačič 2000: 102; cf. Pavlović 2007: 52).

⁸² Nowadays, keystroke loggers and/or screen recorders are typically used to register subjects' on-screen activities (see 4.2 for more details).

recorder *Camtasia Studio*, and a video camera. When she asked the participants about the study, “all three translators replied that they had felt comfortable translating but had been aware of the camera recording them” (ibid: 66). To minimize this effect, she suggests replacing “a large camera on a tripod ... [with] a very small camera that creates a video file directly into the computer. The researcher would then not have to run the camera, and could observe from a less intrusive position” (ibid.). Similarly, Pavlović emphasizes that if a video camera is used to record non-verbal behavior, “it should be small and unobtrusive, and should be positioned out of the subjects’ field of vision, such as at an elevated position” (2007: 54). Bernardini goes one step further and argues that if the least invasive environmental conditions are to be ensured, one should

renounc[e] the wealth of information provided by video-recording so as to check the well-known tendency of subjects to monitor their verbal [and non-verbal] performance more carefully in this condition. Rather, alternative, much less invasive techniques could be used, such as eye-movement tracking and sound recording. It is also possible to write a simple macro to instruct the computer to record every single keyboard stroke and mouse-click performed by the subject. These can then be replayed in the same order and with the same timing, allowing the researcher to observe corrections, hesitations, movements backwards and forwards through the text, and so on (2001: 256).

In a similar fashion, Lauffer states that “combining the video recording with other methods of observation, especially Translog, minimizes the central role the camera once held in translation observation” (2002: 66). For Lauffer, Translog was “an extremely important tool” in her study to record the participants’ translation processes, “which could then be reviewed by the translator and the researcher” (ibid.). I will describe the main features of this key-logging program as well as how it can be combined with other research tools and data sources in the following section.

4.2.3 Keystroke Logging

Keystroke logging has long been employed as a research method in cognitive studies of digital writing. According to Spelman Miller and Sullivan, “as an observational tool, keystroke logging offers the opportunity to capture details of the activity of writing ... [and of] how language users navigate through the task of producing or understanding text” (2006: 1-2). Due to the shortcomings of thinking aloud as a method for eliciting subject-generated verbalizations from writers,

observation that generates indirect but detailed information concerning the activity of writing has met favour with some researchers as an alternative method of data elicitation. Following the use of

rather unsophisticated direct observation and video-recording methods ..., the advent of computer-based technology has made available more versatile and discrete methods to record the progression of the writing event unobtrusively without the intervention of video recorder or researcher-observer (ibid: 4).

During the 1990s, the need to improve the understanding of translation processes by supplementing the traditional qualitative TA approach with quantitative data became more pronounced in translation studies. As a consequence, the key-logging program “*Translog* was developed by one of the *TRAP* members, Arnt Lykke Jakobsen, together with the computer specialist Lasse Schou” (Hansen 1999b: 7).⁸³ *Translog* was first developed in the DOS environment in 1995 to record and create a time log of every keystroke of all the editions and revisions (including changes, deletions, additions, and cut-and-paste operations), look-ups in integrated dictionaries, and cursor movements made by translators during their text production processes. As more process-oriented researchers started to use *Translog*, “it became relevant to develop a more up-to-date interface, and a version for *Windows* labelled *Translog2000* was developed towards the end of 1999” (Jakobsen 2006: 97). Following the suggestions made by fellow researchers, the new version incorporated additional features such as the linear representation of the writing process, the recording of mouse clicks, and a replay function, which can be used for immediate retrospection. In later versions more features were gradually added, including the possibility of combining key-logged data with video/audio recording as well as screen recording. The current version, *Translog 2006*, offers Unicode and XML support as well as “the integration with eye-tracking software and the ability to both record and play back eye movements and words in focus” (Schou, Dragsted, and Carl 2009: 39).

There is little doubt that *Translog* “has gradually found its way to research and teaching institutions throughout the world” (ibid: 40). Evidence of this worldwide dissemination is the vast number of “articles and conference papers, mainly in the area of translation process research, but also in the field of translator training” (ibid.).⁸⁴ The first volumes reporting on studies using *Translog* in combination with TA, among others, are the ones edited by Hansen (1999c, 2002a) and Alves (2003). Later publications, in particular, the

⁸³The translation project *TRAP* (1996 to 2001) was launched by the Copenhagen Business School (CBS) in order to promote translation process research (Hansen 1999: 7).

⁸⁴ See Schou, Dragsted, and Carl (2009) for an overview of the historical evolution of *Translog* and the main areas of research in which the program has been used.

volumes edited by Göpferich, Jakobsen, and Mees (2008a, 2009), also include contributions drawing on Translog, albeit mainly in combination with eye tracking (see below). Furthermore, a dedicated volume edited by Mees, Alves, and Göpferich (2009) has paid tribute to the central role that Translog has played in our discipline for the past ten years.

In general, keystroke logging is considered a highly unobtrusive research method as well as one of the most effective and accurate ways of collecting reliable data on text production processes.⁸⁵ Jakobsen, for example, states that Translog is “a research tool by means of which we can increase the power and accuracy of direct observation” and recollection (1999: 10). He further points out that the important research qualities of “[n]on-subjectivity, accuracy, and exhaustiveness ... can be achieved with the help of a computer, which records data very reliably: automatically, accurately, comprehensively, and non-subjectively” (ibid: 14). Mackintosh, however, claims that direct observation “is not without drawbacks” (1998: 126). For him, the most significant shortcoming is “the lack of access to important non-visual information, particularly cognitive processes” (ibid.). Yet, although key-logged data may not have “the rich suggestiveness often found in the qualitative data elicited by the TAP method,” verbal reporting “is no more a direct description of the mental processes we are after than a *Translog* representation is” (Jakobsen 1999: 15). Both thinking-aloud and key-logging data “are at best only symptoms of an underlying motivating mental activity ... Neither makes sense except in terms of some idea or theory of how translation happens” (ibid.). It follows that the interpretation of data elicited by either method can hardly be non-subjective. As Lorenzo points out,

[d]espués de estos años de trabajo la ambición de penetrar realmente en la “caja negra” de la cabeza del traductor se ha hecho quizá más modesta, aceptándose que por el momento lo que está en disposición de captar son ciertos síntomas de un determinado tipo de actividad, signos que están sujetos a interpretaciones siempre subjetivas, pero que en cualquier caso pueden aportarnos conocimientos sobre dimensiones nuevas (1999b: 21).

In thinking aloud, the main indicators of cognitive processing in translation are silent pauses and hesitation phenomena, among others. In writing processes, time delays (i.e.

⁸⁵ Subjects, however, need to be “familiar with the computer as a writing medium [for] keystroke logging [to] offer [...] a natural writing environment in which writers can feel comfortable and work undisturbed with their texts” (Lingdren 2005: 13).

pauses), editions, and revisions offer indirect evidence of cognitive processing underlying text production. The analysis and interpretation of key-logged data as evidence of cognitive processing, however, is not as straightforward as it appears at first. As Lindgren explains, “[t]races, i.e. pauses, deletions, insertions and movements, can reflect cognitive activities, but their internal structure, interaction and functions are complex and cannot be directly interpreted from the log files” (2005: 14). It is important to note that key-logging programs only record writing processes and not translation processes per se. Given that the latter involve the complex relationship between two texts, identifying cognitive processing activities may be even less straightforward in the case of computer-recorded data than in that of verbal protocol data. This seems particularly true when it comes to correlations between writing pauses and translation problems. Unless key-logged data is combined with other data sources for triangulation purposes, “conclusive distinctions between cognitive activities and traces in the log file cannot, currently, be made” (ibid.). Without additional data, it would be very difficult to know, for example, if a given pause refers to a problematic item that has already been processed or one that is about to be processed.⁸⁶ In Lorenzo’s words, “no puede saberse en principio si estamos en una fase de planificación de lo que se va a escribir o de reconsideración o revisión de lo escrito” (1999b: 25).

Furthermore, determining the average time length for different types of pauses—e.g. pauses that represent time delays at a macrolevel (e.g. between words, sentences, and paragraphs) and pauses that represent delays at a microlevel (e.g. within words, morphemes, syllables, etc.) (Jakobsen 1998: 84)—can be a complex activity as subjects’ pause behavior may be affected by factors like writing speed and text type.⁸⁷ Wengelin, for instance, states that “setting a pre-determined pause length for all writers, independent of their writing speed is a strategy that should be treated with caution since writing speeds are not taken into account” (2006: 111). Göpferich, building on Wengelin (2006), adds that “[z]u beachten ist dabei, dass neben der Schreibgeschwindigkeit auch viele anderen Faktoren einen Einfluss auf Pausenlängen haben, wie z.B. die zu erstellende Textsorte” (2008: 49). Lorenzo nevertheless admits

⁸⁶ For an overview of the pausological study of digital writing production, see, for example, Spelman Miller (2006) and Wengelin (2006).

⁸⁷ For studies focusing on the pausological analysis of translation cognitive activities, see, for example, Jakobsen (1998, 2003), Hansen (2002b), O’Brien (2005), and Englund Dimitrova (2006). For a more detailed discussion of the pausological study of writing and translation, see Göpferich (2008: 48-51).

that key-logging programs like Translog provide a number of indicators that allow for the accurate identification of problems that cause interruptions in the translation process. As Lorenzo explains,

[s]i la pausa viene seguida de una corrección, por ejemplo, podemos deducir que se trata de una reconsideración de la unidad corregida. Pero además hemos comprobado ... que por lo general el traductor no pulsa la barra del espacio de separación entre palabras hasta que no da por concluido el procesamiento de la unidad de traducción que ha acaparado su atención ... Siendo de todas formas lo más frecuente la pausa ante la unidad que produce dificultad en el proceso, al menos cuando no va seguida de la corrección de un elemento anterior, puede pensarse que la pausa pospuesta indica una inseguridad respecto a la solución que se acaba de dar a un problema, sobre todo si la duración de la pausa excede considerablemente a la de una simple lectura recapituladora del segmento que se acaba de procesar (1999b: 26).

Based on the results of her Translog study, Lorenzo concludes that the interpretation of pauses as indicators of translation problems is of key importance, “ya que una interpretación correcta del significado de las interrupciones en la actividad de la traducción nos permite, al lado de las correcciones del texto, formarnos con gran rapidez y facilidad una idea general del proceso de traducción” (ibid: 41). In addition to the automatic analysis of pause length frequency, location of pauses, insertions, deletions and revisions, keystroke-logging programs like Translog can generate different time statistics (Lingdren 2005: 12). Rothe-Neves, for example, uses this option to analyze a number of temporal aspects in her study of the influence of working memory features on translation performance, namely “fluency rate,” “average keystroke time,” “average production time,” “average clause time,” and “editing rate” (2003: 103). Adding to the difficulties in the analysis and interpretation of key-logged data, aspects surrounding the ecological validity of said data also deserve attention from a research point of view. Jakobsen, for instance, argues that “experiments run with *Translog* have ecological validity” (1999: 15). This claim is based on previous experiments in which subjects “indicated that they forgot they were part of an experiment ... and that they had not paid attention to the fact that their text production was being logged” (ibid.). Neunzig, however, views the translation process in Translog “as rather ‘unrealistic’” (2000: 96). He argues that the program “cannot disguise the fact that the translation is embedded within an experiment, and ... does not provide access to or record on-line Internet or CD-Rom help programmes” (ibid.). Similarly, Göpferich points out that

[e]in Nachteil aller derzeit verfügbaren Schreib-Logging-Programme ist, dass sie nur die Tasten- und Mauseaktionen aufzeichnen, die innerhalb des Programms geschehen, nicht aber beispielsweise Rechercheprozesse im Internet, die während des Verfassens oder Übersetzens eines Textes durchgeführt werden. Auch können sie selbstverständlich nicht aufzeichnen, welche Notizen während der Textproduktion auf Zetteln oder Ähnlichem gemacht werden (2008: 41).

Göpferich adds, however, that this problem, i.e. the lack of data on research activities carried out both online and offline, can be easily resolved by combining a keystroke-logging program with screen recording software and a video camera (ibid.) Yet, she also states that the considerable difficulties involved in the synchronization of data obtained from different sources should not be ignored (ibid.). For Lauffer, a “potential setback with Translog is that translators have to translate into a program they do not normally use. Certain features such as spelling and grammar checks, italics, underlining and highlighting are not available” (2002: 67).⁸⁸ Although the three professional translators of her study had all “tested [Translog] before using it, each translator ran into minor difficulties when attempting to use a feature that was not available” (ibid.).⁸⁹ The computer program Proxy, in the development of which Neunzig was involved in as part of the PACTE research project, was designed to “overcome these deficiencies” (Neunzig 2000: 96). According to Neunzig, Proxy makes it possible

to operate in the natural working environment of the translator (Word, WordPerfect), thereby ensuring ecological or situational validity, since the subjects need not even know that their work is part of an experiment, and it also allows for recording of all steps and use of on-line resources. In addition, these records, like TAPs, have teaching applications: they can be consulted by students with a view to learning from their mistakes or imitating procedures which lead to satisfactory solutions (ibid.).

While Proxy works as a key logger,⁹⁰ it also serves as a screen recorder,⁹⁰ a type of program that I will discuss in greater detail in the following section.

4.2.3 Screen Recording

Like keystroke-logging programs, screen recorders such as Blueberry’s BB FlashBack or TechSmith’s Camtasia Studio record and create a time log of all the keystrokes, revisions, and editions (including changes, deletions, and additions), keyboard shortcuts,

⁸⁸ In this regard, it is important to remember that “the medium of the computer and the particular writing tool used affects and mediates the writing processes” (Spelman Miller and Sullivan 2006: 8).

⁸⁹ All three translators nevertheless admitted that they liked working in Translog, and one of them even showed a very positive attitude towards using a split screen (ibid.).

⁹⁰ For more information on Proxy, see Neunzig (2001: 103-104) and PACTE (2005: 611-612).

cursor movements, and mouse clicks made during the process of typing a text. Unlike keystroke-logging software, however, some screen recorders like Camtasia or Catmovie do not “generate a log-file for later quantitative analysis” (Sullivan and Lindgren 2006: 157). The main advantage of screen recorders is that they capture *any* screen activity carried out on a computer.

Although screen recorders have originally been developed to create software demonstrations, presentations, tutorials or other training materials, they can also be used for research purposes. In translation studies, various research groups such as the PACTE Research Group and the PETRA Research Group in Spain, the TransComp Research Group in Austria, and the CPT Research Group in Switzerland have used screen recorders, among others, for research into translation processing and competence acquisition (see details below).⁹¹ Here, screen recording is considered “particularly useful for analyzing the research activities which form an integral part of translation processes, as they provide a detailed account of which electronic sources or web-sites the subjects are using during translation” (Göpferich and Jääskeläinen 2009: 173). One should not ignore the fact, though, that screen recorders do not show the exact (non-)textual elements on which subjects focus their attention (Göpferich 2008: 54). However, mouse movements and clicks can serve as indicators of subjects’ interactions with screen objects. Furthermore, the lack of accurate information on subjects’ units of attention can be compensated for by combining screen capture with other methods such as (non-)verbal reporting and/or eye tracking.⁹² The latter method is, as further discussed in 4.2.4, employed for exploring subjects’ eye movement behavior and visual attention (O’Brien 2006: 185). I

Another aspect worth considering is that screen recording software, like any other data collection tool, introduces a foreign element into the translation process and may consequently interfere with said process. As mentioned earlier with regard to the use of video cameras, subjects may feel uneasy being observed and hence may change their behavior. Screen capture programs are nevertheless considered highly unobtrusive tools as they work “in the background and [are] invisible to the subject. [They do] not affect the translator’s natural working environment, an important factor in maintaining the

⁹¹ The PACTE Research Group, in particular, has been combining Proxy with Camtasia since the year 2003.

⁹² As indicated previously, additional observational tools (e.g. a video camera) would be required to record off-screen activities.

ecological validity of the data” (Asadi and Séguinot 2005: 523; cf. Göpferich 2008: 54). Despite said ecological validity and the accuracy of the data collected with screen recorders, there are, to my knowledge, surprisingly few studies that have used these tools to investigate the online research activities of translators.⁹³ Exceptions are the studies conducted by Lauffer (2002) as well as Asadi and Séguinot (2005). As briefly mentioned above, Lauffer combined Camtasia Studio with other data collection tools in her observational study of translation processes. She found that the screen recorder “was most useful in following the search paths and helping understand how and why the translators searched for information” (2002: 69). Asadi and Séguinot also used Camtasia Studio “to record a real-time account of the translation process ... including all searches of electronic resources” (2005: 523). Yet, as these studies only deal with research activities in passing, their accounts of said activities are understandably not very detailed. Lauffer nevertheless explains that the professional translators of her study

looked for words, expressions, terms, titles and collocations using a variety of resources including dictionaries, websites, databases and advice from colleagues. All three translators used paper and electronic dictionaries and glossaries as well as bilingual and monolingual websites to search for information. One translator used a parallel concordance website to see how expressions and strings of text had been translated in the past. The translator who had done the most translating, relied heavily on past experience when searching for equivalences. Body language and eye movements captured with the camera strongly indicated internal searching. He used very few external searching tools. On the other hand, the translator with the least amount of experience did a lot of external searching, often looking in several places to confirm assumptions (2002: 69).

The subjects in Asadi and Séguinot’s study were also professional translators, more precisely, “nine translators in the linguistics department of one pharmaceutical company working on the kind of text that required their specialized experience” (2005: 522). Asadi and Séguinot observed that these translators naturally had different translating styles and that they applied one of three main global strategies. Asadi and Séguinot refer to these as the translation drafting strategy, the drafting and checking strategy, and the revision strategy, each involving its own degree of research consultation. For example, the group of translators who preferred the translation drafting strategy appeared to spend

⁹³ Similarly, relatively few studies using screen capture have been conducted in the field of digital writing. One such study is that of Degenhardt (2006), who employed Camtasia Studio and Camtasia to investigate the writing processes of university students. Geisler and Slattery (2007: 185-200), like Degenhardt, provide an overview of the advantages and disadvantages of using screen capture to study digital writing activities (cf. Dam-Jensen and Heine 2009: 9).

“very little time verifying their translation choices. The productions using this strategy produced the highest word count and had the lowest research time” (ibid: 537). In contrast, the group that favored the drafting and checking strategy “produced a draft with moderate revision, and the use of dictionaries or reference sources ... This group was more likely to research terms within the text segment being produced and did not move on from a problem without some preliminary research” (ibid.). In addition, translators in this group “systematically reread the text segment for spelling errors but left some of the changes in meaning to the revision stage” (ibid.). Finally, the group of translators who favored the revision strategy

invested time in getting to the bottom of a problem right away. These productions reflect a goal to complete a revised text. These professionals translated a text segment and then verified their translation with an authoritative source before moving on. This group checked terminology with hardcopy specialized references, and Internet sources to check parallel texts for context, or to compare the frequency of use of one translation variant over another. It is interesting to note that the subjects who used this strategy were all revisers and this role clearly affected their global strategy for this task (ibid.).

On the basis of these findings, Asadi and Séguinot conclude that “[o]n one side of the scale were translators driven to produce, with the intention of doing research in a revision stage. On the other side of the scale were translators focused on providing a finished product, one text segment at a time” (ibid: 539). This side of the scale was dominated by the group of revisers. Finally, there were also those translators who preferred to “shift between producing text and researching terms” (ibid.).

Other studies that report on the use of screen recording software for research into translation processes include the longitudinal studies carried out as part of the research projects *TransComp* (University of Graz) and *Capturing Translation Processes* (Zurich University of Applied Sciences).⁹⁴ *TransComp* was launched in 2007 to explore “the development of translation competence in 12 students of translation over a period of three years and compare [...] it to that of 10 professional translators” (Göpferich and Jääskeläinen 2009: 183). Although, at the time of this writing, the project has not yet

⁹⁴ In addition to screen recording, research methods in the *TransComp* project include thinking aloud, keystroke logging, Webcam recording, retrospective interviews, and questionnaires (Göpferich and Jääskeläinen 2009). The *Capturing Translation Processes* project also “uses a multi-method approach that combines observation of the workplace situation, questionnaire surveys, and semi-structured preliminary interviews ..., screenshot recordings [using Camtasia Studio] ..., retrospective viewings and commentaries of recorded translation processes as well as ... keystroke logging and eye-tracking” (Massey and Ehrensberger-Dow 2010: 132; cf. Massey and Ehrensberger-Dow forthcoming).

been finished and no results can be reported at this stage, it is worth noting that the subjects' use of Internet and electronic resources will be recorded in Camtasia Studio (the use of printed resources will be registered by observers). The research tools used by the subjects and their research competence will then be analyzed according to the following criteria: (a) the type of problems that lead subjects to carry out searches; (b) the type of information they search for “(lexical items, relationships between units of information, encyclopaedic information on aspects of the source text, etc.);” (c) the sources of consultation (e.g. the source text, their long-term memories, or external resources); (d) the type of problems (comprehension problems, target-text production problems, or both) they try to solve with the help of external resources; (e) the type of reference works they consult “for the different kinds of problems (monolingual dictionaries, bilingual dictionaries, encyclopaedias, parallel texts, etc.);” and (f) the extent to which subjects “only search until they have found an acceptable target-language equivalent or ... they go beyond that, for example, to gain more comprehensive understanding” (Göpferich 2009a: 32).

The *Capturing Translation Processes* project, launched in 2009, also aims at exploring translation processes and the development of translation competence. As part of this project,

students are being monitored at different points in their translation careers (i.e. early in their undergraduate program, shortly before graduation, and after gaining professional experience). In addition, the translation processes of professional translators at their workplace are being analyzed and compared with those of students to help us understand and release expert knowledge. The data in this project is being combined with data collected earlier from students who participated in an internally-funded pilot project (2007-2009). The translation versions include English/French/Italian into German and German into English/French/Italian (i.e. translation into L1 and into L2) (Zurich University of Applied Sciences' Institute of Translation and Interpreting 2011).

Forming part of this “large-scale research project on translation processes” is the sub-project *Translation Tools in the Workplace*, which is “designed to explore the impact of Translation Memory (TM) and research tools and resources on professional translation processes” (Massey and Ehrensberger-Dow, forthcoming). Unlike both the *TransComp* and *Capturing Translation Processes* projects, which primarily explore translation processes and competence acquisition, the main goal of the *Translation Tools in the Workplace* sub-project “is to ascertain how information literate student, novice, and

professional translators in Switzerland actually are, which will then allow us to identify problem areas and user needs in order to optimize information” (ibid.). This project comprises three main research phases, the first of which “examines the self-reported resource use and information behavior of professional translators” via two surveys conducted among freelance translators and translation teachers (ibid.). This phase “was preceded by a pilot study of revision-related research practices among instructors in our institute [i.e. the Zurich University of Applied Sciences’ Institute of Translation and Interpreting in Switzerland] and students at various levels of our undergraduate degree program in translation” (ibid.).⁹⁵ The second research phase combines the several research methods referred to above in order “to observe actual tool use and research practices in the workplace and gain insight into the cognitive processes involved in these aspects of translation” (ibid.). Participants in this phase include student and professional translators with different degrees of translation experience. Finally, the third phase focuses on the “evaluation and generalization, the behavior reported, observed, and described in phases 1 and 2 of the sub-project will be used to identify problems and user needs so that we can optimize the way students, novices, and professionals are trained to acquire information literacy” (ibid.).

At the time of this writing, as Massey and Ehrensberger-Dow point out, “the sub-project is in its first phase, with the pilot study and the first of the two main surveys – of freelancers – having been completed” (ibid.). I will report on the preliminary results obtained in this phase—which, given its focus on translators’ information behaviors, bears significant importance for this study—throughout my data analysis chapters. This will in turn allow for the comparison of Massey and Ehrensberger-Dow’s findings with my own.

4.2.4 Eye Tracking

Another method that has only recently started to be applied to translation research is eye tracking. This is a method used to explore subjects’ eye movements and visual attention as a representation of their cognitive processing. To do so, an eye tracker, i.e. “a device that monitors and records the movement of an individual’s eyes” (O’Brien 2006: 185), is required. Eye trackers in the past

⁹⁵ The preliminary findings from this pilot study can be found in Massey and Ehrensberger-Dow (2010a).

were large head-mounted devices, but in more recent times, they have taken the form of monitors that look like a flat-panel computer monitor which contains special diodes that reflect light off the pupil and monitor fixations, gaze paths and pupil size as the subject interacts with an object on-screen. An example of a modern eye-tracker is the Tobii 1750 ... In addition to the eye-tracking hardware, eye-tracking studies are also aided by software which captures eye movement data during a study. An example of such software is Tobii's *ClearView* analysis software (ibid.).

Visual attention, according to O'Brien, has been investigated for "over a century with early studies being limited to simple ocular observations and introspection" (2006: 185). One of the areas in which eye tracking has been most extensively applied is reading (Jakobsen and Jensen 2008; Jensen 2008). Here, some "basic facts" have been well documented regarding "the typical duration and length of saccades and the typical duration of fixations" (Jakobsen and Jensen 2008: 103). The duration of eye fixations is thus known to be affected by factors such as word familiarity, predictability, length, and complexity as well as lexical and/or syntactic ambiguity (ibid., cf. Göpferich 2008: 56-57). More recently, eye tracking has been successfully used to examine subjects' cognitive processing and cognitive load not only in reading but also in domains such as comprehension, writing, language acquisition, bilingualism, psycholinguistics, psychology, neuroscience, and computer science (Duchowski 2003; O'Brien 2006; Doherty, O'Brien, and Carl 2010). Topics that have been investigated with the aid of eye tracking include "mental activity during problem solving ..., cognitive workload during strategy shifts ..., emotional stimulation through audio stimuli ..., and strategies for reading news on the Web ..., to name but a few" (O'Brien 2006: 185-186). Nowadays, eye tracking is commonly used in the field of human-computer interaction (HCI) as well as in usability studies (ibid: 186).

In translation studies, eye tracking offers an alternative method to further investigate translation cognitive processing. O'Brien, for example, one of the first researchers to apply eye tracking to translation process research,⁹⁶ reports on the results of translators' cognitive load when dealing with various types of translation memory matches in her 2006 article (see also O'Brien 2008). O'Brien argues that "[o]ne of the most interesting aspects of eye-tracking for translation studies is the link that has been firmly drawn between cognitive effort and eye movement," especially, pupil dilation (2006: 186). For

⁹⁶ Kornelius used eye tracking for examining subjects' reading of dictionary entries as early as 1995. In addition, Keller (2006) applies eye tracking in an attempt to optimize the design of terminological entry structures.

Jakobsen et al., the possibility of using eye tracking to study translators' visual attention "across the source and target text has opened up an exciting new research field" in translation (2008: 123). The author further states that the study of eye movements in translation can "draw on existing reading research up to a point, but needs to develop its own body of knowledge" according to translation-specific features (ibid.).

According to Jensen, the vast majority of eye tracking studies in reading have focused on single words or short strings of words, while relatively few studies have used "larger text units for investigating cognitive processing of reading" (2008: 158; cf. Jakobsen and Jensen 2008: 103). In contrast, the *Eye-to-IT* project (see <http://cogs.nbu.bg/eye-to-it/?home> for details) involves a number of experiments on reading and translating not only single words or individual sentences "but also longer texts, simulating the normal process of translating (or interpreting) whole texts" (Jensen 2008: 158). More specifically, the project aims at exploring the combination of "eye-tracking and key-logging in order to create new research opportunities for studying translation processing, particularly with respect to how source text comprehension and target-text production are coordinated" (Göpferich, Jakobsen, and Mees 2008b: 2).

One of the main achievements of the *Eye-to-It* project has been the development of the "Gaze-to-Word Mapping (GMW) tool," which allows for the automatic—as opposed to the manual—identification of words based on gaze fixations (ibid.).⁹⁷ A further achievement related to the project has been the publication of a dedicated volume on the use of eye tracking (often used in combination with other methods) for research into translation cognitive processing (cf. Dam-Jensen and Heine, 2009: 8). The volume, edited by Göpferich, Jakobsen, and Mees, focuses on "the way translators read, and especially ... [on] how the human brain is capable of controlling and coordinating such a complex interlingual process as translation" (2008b: 3). It includes studies that investigate translation and reading processes in general and, more specifically, cognitive

⁹⁷ Jensen nevertheless reminds us that the GWM tool "assumes a linear style of reading where one line of text is read before proceeding to the next line (down)" (2008: 159, building on Hyrskykari 2006: 93, 124). This naturally poses the question of how the tool "will cope with non-linear reading, for example when translators shift their attention between the source text and the target text ..., or when they scan a sentence or paragraph repeatedly" to find appropriate renderings (ibid.). To test the accuracy and validity of eye-tracking data in non-linear reading modes, Jensen designed an experiment involving "masked-unmasked text" to compare linear and non-linear modes of reading. Contrary to Jensen's expectations and in spite of problems linked to the research method, the results of his study "tentatively suggest that the same degree of accuracy can be achieved in non-linear reading tasks as in linear reading tasks" (ibid: 173). The overall degree of accuracy and validity of eye-tracking data, however, continues to be a major concern for some translation researchers (see below).

effort when using translation memories, viewing subtitled media, and reading and/or understanding food labels.

Other eye tracking studies in translation have focused on the application of the method for evaluating machine translation output (Doherty, O'Brien, and Carl 2010) as well as for studying the effects of time pressure and text complexity on translators' gaze fixations (Jakobsen et al. 2008); the production of online help texts (Heine 2008); the mental simulation of speed in text processing (Rydning and Janyan 2008); various aspects of translation directionality (Jensen and Pavlović 2009; Alves, Pagano, and da Silva 2009); and time as well as behavioral differences between different modes of translation (Dragsted, Hansen, and Sørensen 2009).⁹⁸ Concerning the information behavior of translators, Massey and Ehrensberger-Dow state that

eye-tracking adds another dimension ... [i]n showing what translators are looking at and for how long, these data enable us to pinpoint specific problems on a page or web site. They also allow us to see what resources and potential solutions are looked at and then rejected, an important aspect of the decision-making process which screenshot recordings alone cannot show (forthcoming).

In their preliminary study of the information behaviors of student and professional translators, Massey and Ehrensberger-Dow found that eye-tracking data had helped them identify the reasons why a particular ST segment was problematic for one of their graduate students (ibid.). They found that “while the screenshot recordings and verbal protocol” suggested the student’s insecurity and confusion in researching that particular item, the eye-tracking data revealed “systematic research procedures” being adopted by the student (ibid.).

In addition to the research topics mentioned above, methodological and technical aspects of eye tracking have been the object of discussion among numerous researchers (e.g. Jensen 2008; Winther Balling 2008; Carl 2008; O'Brien 2006, 2009; Alves, Pagano, and da Silva 2009). O'Brien (2006), for example, while acknowledging that eye tracking offers a new supplementary and exciting method for research into translation, calls for a cautious application of this new methodology. In her 2009 publication, she discusses the methodological challenges of eye tracking in greater detail, establishing five categories or types of challenges: “research environment, research participants, ethics, data explosion and validity” (ibid: 251). With regard to the

⁹⁸ For an overview of different eye-tracking studies in translation as well as a detailed discussion of various types of eye movement measures and eye-tracking data formats, see Göpferich (2008: 56-63).

research environment, i.e. the conditions under which eye-tracking-based research into translation takes place, O'Brien distinguishes between three influencing factors, namely "equipment, accommodation and familiarity" (ibid: 252). First, as far as equipment is concerned, she states that desk-top-mounted eye tracking devices that "resemble[...] a normal computer monitor" are less invasive from the point of view of the research participants and are therefore more ecologically valid, yet less accurate than the more invasive head-mounted systems (ibid.). The costs involved in acquiring an eye tracker, the need to constantly upgrade the system's analysis software, and the "steep learning curve" associated with the use of the system represent additional difficulties (ibid: 252-253). A second type of challenge in setting up an adequate research environment stems from the need "to find a space which needs specific requirements for conducting eye-tracking research," above all with regard to "light, sound, and familiarity of the surroundings" (ibid: 253). Given that "measuring cognitive effort" is often of central importance in translation process research and based on the assumption that pupil dilation reflects such cognitive effort, O'Brien stresses the importance of controlling other factors that might influence pupil dilation, e.g. "light intensity, sound, caffeine, drugs, substance abuse, eye colour and even heavy eye make-up" (ibid: 253). A third environmental challenge to the ecological validity of eye tracking, one that is also typical for other methods, is that of the familiarity of the subjects with the working/experimental environment (see below).

With regard to the second category of challenges, the research participants, O'Brien emphasizes the importance of finding the *right* participants. Especially when wanting to study professional translators, she sees both general and eye-tracking-specific problems. In particular, she points to the need of (a) clearly defining the notion of professional translator and distinguishing it from concepts such as semi-professional or novice or student translator; (b) finding "an adequate number of participants who fit the specific profile"⁹⁹ (ibid: 255); and (c) who have adequate translation competence; and (d) who are generally suitable for this type of research (e.g. who know how to touch-type or have adequate language competence) (ibid: 257).

⁹⁹ O'Brien, referring to Göpferich, Jakobsen, and Mees (2008a), points out that the average number of participants in eye-tracking studies is twelve, and states that "making valid generalisations on the basis of such numbers is questionable" (2009: 255).

Thirdly, O'Brien stresses the importance of ethical questions in eye tracking, and in similar types of research in general, and calls for researchers to obtain approval from the ethics committee of their respective organizations, to provide detailed information about their proposed research, and to inform the participants of their study of their rights, i.e. individual anonymity, security of the data obtained, and the option to pull out of the study at any time (ibid: 259).

A fourth challenge for eye tracking researchers, one that is closely related to the number of participants, is that of "data explosion" (ibid: 260). As O'Brien writes, "[t]he nature and extend of the data generated, especially when using eye tracking and keyboard logging, represents another challenge" (ibid.). She adds, "[e]ye tracking alone produces a veritable sea of data" (ibid: 261).¹⁰⁰ The use of additional tools, e.g. keystroke loggers, will further increase the amount of data to be analyzed. As O'Brien states, "the effect on the lone researcher, even with a small number of participants, can be overwhelming" (ibid.).

The issues mentioned above lead to a fifth methodological challenge, the question of "the validity of research design" (ibid.). In addition to the aspects described above, O'Brien sees the validity of any study on translation processes challenged by the fact that "the capacity of one researcher to thoroughly analyse the amount of data that translation process methods can produce is limited" (ibid.). Researchers therefore often select source texts that are short, usually limited to "200-300 words" (ibid.), yet, according to O'Brien, this length does not reflect the professional realities of most professional translators. Furthermore, she sees the general design of eye-tracking research potentially compromised by the fact that translators who are usually used to working in a variety of electronic environments and with access to numerous digital and print resources "are asked to translate, without using the Web, a dictionary, or their own glossary, a text type they do not normally work with in a tool they have never encountered before" (ibid: 262). Finally, O'Brien states that the type of text being translated (general vs. specialized) has an impact on the validity of the study as well.

¹⁰⁰ This includes "gaze plots showing the number and sequence of fixations, hotspots showing the areas on the screen that were most frequently fixated, video files showing the eye gaze, reading and text production data which are sometimes overlaid with concurrent or retrospective protocols" (ibid., cf. Göpferich 2008: 56). In addition, eye tracking generates "a very large data file with millisecond-based data on the position of the eyes according to the X, Y coordinates of the screen, the left and right pupil sizes, the validity of the data at any point in time, the fixation number, etc." (ibid.).

She argues that “if we want to investigate what professionals normally do in their usual working environments, then we need to select texts that will help us answer that question” (ibid.).

In addition to the challenges outlined by O’Brien—for which she offers a number of practical solutions—the accuracy and reliability of eye-tracking data have been questioned by researchers such as Jensen (2008) and Alves, Pagano, and da Silva (2009). Jensen, for example, designed an experiment to test the “overall accuracy” that can be expected from an eye tracker along with its ability to correctly identify subjects’ word fixations in linear and non-linear modes of reading (2008: 157). The results of his experiment show that accuracy was “slightly better for very long words but worse for short and medium-length words” (ibid.). The results also indicate that “detection accuracy was the same for non-linear reading as for linear reading, or indeed better” (ibid.). Yet, Jensen claims that even “the best measures obtained in his experiment show that about 20% of all known fixations ... go undetected, which means that an error rate of 20% or more (sometimes much more) can be expected” (ibid: 173). He therefore suggests improving detection accuracy, i.e. “the association of fixations with text units,” by manually examining “gaze points and fixations” (ibid.) Alves, Pagano, and da Silva call for the “standardization of procedures in the treatment and analysis of eye-tracking data as the choice of filter and the type of data used can yield different results” (2009: 288-289). This, in turn, may influence the reliability of eye tracking for establishing the minimum average fixation length in translation (ibid: 289). For Heine (2008: 145) and Göpferich (2008: 59), eye tracking is yet to be fully developed as a research method in translation. In Göpferich’s words, “[d]ie Vielzahl der Faktoren, von denen Augenbewegungen abhängen, bedeutet leider, dass Augenbewegungsmessen – zumindest beim heutigen Erkenntnisstand – kein effizientes Verfahren etwa zur Bestimmung der Verständlichkeit von Texten sind” (ibid.). O’Brien (2009) nevertheless reminds us that the possibilities offered by eye tracking as a supplementary method for research into translation should not be neglected. Eye tracking for her “certainly adds a very rich dimension to the tools and methods we have for investigating [translation], and the challenges involved in implementing it, while not insignificant, can be overcome” (ibid: 266).

Other methods from which translation researchers could potentially benefit are those from the neurosciences, in particular, electroencephalography (EEG) and imaging

techniques such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET).¹⁰¹ Yet, as Göpferich and Jääskeläinen state, these methods “require extremely artificial experimental situations in which the subjects must not move, not even their eyes and mouths, because such body movements cause artefacts which distort the recordings reflecting the cerebral activities caused by the cognitive translation processes proper” (2009: 171). I therefore agree with Lorenzo that “[m]étodos más ambiciosos de observación de los procesos mentales, como los basados en experimentos neurológicos, no parecen de mucha utilidad aplicados a un proceso tan complejo como la traducción” (1999b: 23). However, these methods appear to be more suitable for investigating interpreting processes, which, unlike translation processes,

do not involve eye movements because an auditory input can be provided. For example, in fMRT experiments involving simultaneous interpreting, the subjects have to perform the interpreting task by thinking to themselves in a tube without actually speaking, and all this in an extremely noisy environment. This is obviously not an authentic interpreting situation, although it may yield interesting data for research purposes for which ecological validity is not an issue (Göpferich and Jääskeläinen 2009: 171).

Brain research into simultaneous interpreting includes studies using EEG (e.g. Kraushaar and Lambert 1987; Gran and Fabbro 1988; Kurz 1994, 1996a, 1996b; Grabner et al. 2007), PET (e.g. Tommola et al. 2000), and fMRT (e.g. Krick et al. 2003; Kalderonova 2006/2007; Ahrens et al. 2010). In translation studies and as discussed earlier, more modest methods borrowed from psycholinguistics and cognitive science (seem to) lend themselves more to the study of translation processes. As we have seen in previous sections, these methods include various types of verbal and written reporting, among others. Verbal protocols, in particular, were predominantly used (and often combined with video recordings, questionnaires and/or interviews) during the first decade of translation process research, i.e. from the mid-1980s to the mid-1990s. The use of different verbal protocols for research into translation, however, made the comparison of results across several TAP studies particularly challenging. The methodological shortcomings associated with verbal protocols led to the development, in the late 1990s, of more rigorous methodologies by supplementing TA with other methods like keystroke logging. More recently, other sophisticated methods like screen recording and eye tracking have also found their way into translation process research.

¹⁰¹ For a detailed description of these methods, see Göpferich (2008: 63-65).

Clearly, all the methods described above have their own strengths and weaknesses, thus “provid[ing] access to specific aspects of the translation process while leaving other aspects in the dark” (Göpferich and Jääskeläinen 2009: 173; cf. Göpferich 2008: 65). Methodological triangulation seems therefore necessary to gain a more comprehensive, yet indirect picture of cognitive processing in translation. The choice of methods for any translation process-oriented research will be naturally constrained by a number of factors, including the very nature of the research project; the type of research questions asked; the availability of both research participants and equipment; approval from the relevant ethics committee; funding opportunities; the capacity of the researcher or research team to handle the amount of data generated during the study; and last, but not least, the ontological and epistemological positioning of the researcher(s) involved in the project. In the following chapter, I will describe the research methodology and research design of this study, taking into consideration the above mentioned factors.

5. Exploring the Web Search Behaviors of Translation Students

In this chapter I will describe the study that I designed and carried out to explore translation students' search behaviors for seeking and retrieving translation-related information on the Web. To do so, I will first develop the theoretical framework and the key concepts (section 5.1) that informed the research questions and research aims of my study (section 5.2). I will then discuss the research approach, methods, and design (sections 5.3 and 5.4) that I used to explore the study participants' translation-embedded Web search behaviors. This discussion will be followed by a detailed and contextualized account of the setting in which the study took place (section 5.5) as well as of the research participants' backgrounds (section 5.6). Finally, I will discuss in detail the main research stages involved in my study, mainly the collection of data, its processing, and analysis (sections 5.7, 5.8, and 5.9).

5.1 A Priori Framework and Key Concepts

Over the past decades translation studies has witnessed a wealth of research that has produced many different results in a variety of subject areas. This has been the case even for research projects with the same object of study, a phenomenon that can be explained in terms of “our different starting points. Looking at a particular question will lead to one answer, starting with a different question will lead to another” (Séguinot 2000b: 91, building on Chesterman 1997: 42-46). According to Popper,

[o]bservation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem. And its description presupposes descriptive language with property words; it presupposes similarity and classification, which in their turn presuppose interests, points of view and problems (2002:61).

Although I do not endorse the basic epistemological premises of Popper's philosophy of science in this thesis,¹⁰² I share his view of the nature of scientific inquiry as one being driven by specific interests, perspectives and/or problems in a given area of knowledge. In this study, scientific inquiry is driven by questions on how translation trainees use the Web as an external resource to satisfy their information needs within the context of

¹⁰² In my view, genuine empirical research and scientific rigor is not only necessarily attained through hypothesis-testing.

domain-specific translation. More specifically, I am interested in exploring translation students' Web search behaviors to seek and retrieve information that (a) may be used for, and (b) eventually lead to translation problem solving.

As noted earlier, Web search behavior is a rather broad concept that may apply to a wide range of phenomena within human information behavior (HIB). Web searching (or Web-based information search) can be presented under different headings such as information behavior (IB); information seeking (IS) or information-seeking behavior (ISB); information search behavior (here referred to as ISchB); information retrieval (IR); and interactive information retrieval (IIR) (cf. Wilson 1999: 263; Aula 2005: 5). In this section, I will briefly draw on these concepts to depict the a priori theoretical and integrative framework that I originally built for the study of Web search behaviors embedded in translation problem solving. From the point of view of Web searching, this integrative framework is perhaps best illustrated by Wilson's (1999) *nested view* of the different research areas within the general field of information behavior. According to Wilson, these areas

may be seen as a series of nested fields: information behaviour may be defined as the more general field of investigation ..., with information-seeking behaviour being seen as a sub-set of the field, particularly concerned with the variety of methods people employ to discover, and gain access to information resources, and information searching behaviour being defined as a sub-set of information-seeking, particularly concerned with the interactions between information user (with or without an intermediary) and computer-based information systems, of which information retrieval systems for textual data may be seen as one type (ibid: 262-263).

Wilson's view is taken on by Ingwersen in his proposal to develop a holistic conceptual framework that integrates several models of information seeking and information retrieval (IS&R), where IS&R is seen as "a process of cognition for the information-seeking actor(s) or team in context" (2005: 215). In this integrative framework,

[a]s information behavior (IB) is regarded, generation, acquisition, use, and communication of information—as well as information seeking—are affected. Typical information-seeking behavior is acquisition of information from knowledge sources, for instance, from a colleague, through (in)formal channels like social interaction in context ..., or via an IR system ...; IIR involves information acquisition via formal channels like the Internet, or from other organized sources. Information acquisition, use, and interaction are thus regarded central phenomena of IB, including IS&R (ibid: 216).

Spink, Park, and Cole (2006) also propose an integrated HIB framework for the coordination and integration of the different HIB levels, or areas of research, albeit from a

multitasking point of view. The relationship among these areas is naturally a close one: information behavior may inform the overall principles of information seeking, which in turn may inform the design of IR systems and users' interactions with these systems (IIR). Web searching is mostly associated with IIR, a field in which user-centered approaches taking both the information searcher and the IR system into account developed over time to counterbalance the strong system-orientedness of IR studies (Aula 2005: 6). For the purpose of this study, however, I primarily drew on the field of IS. I did so mainly for two reasons: (a) information searching is considered here a subset of IS, a process during which users may search for information via a computer system or the Web, and (b) IS strongly emphasizes humans as opposed to systems. As Pinto Molina and Sales Salvador observe,

[w]e thus align ourselves with the new paradigm which, since the 1980s, has arisen in this area of research within the field of documentation and has marked a shift from the traditional system oriented approach, focused essentially on the process of information search (the way users enter into contact with an information system or make use of particular information), to a user-oriented approach that is more concerned with users' individual knowledge. It follows that stress now starts to be laid on the observation of the context and circumstances that impel a user to require information, and on the individual features that influence how the information is sought and used. An active role is now, besides, being given to the user, with increasing stress being laid on the situational context (2007: 533).

In short, unlike IIR studies, this study does not aim at understanding search processes to improve the usability of information-retrieval systems or users' interactive experiences with these. Rather, it seeks to understand information needs and information uses as a potential means to inform translation decisions that may in turn lead to translation problem solving. Nevertheless, the search context and the use of IR systems such as search engines are of course taken into account in this study.

5.1.1 Cognitive and Problem-solving Approach to Information Seeking

As indicated previously, “[t]he field of library and information science (LIS) has historically been a leading discipline in conducting research that seeks to understand human information-related behaviors” (Spink and Cole 2006: 1). Said behaviors have been primarily studied from cognitive, behavioral, affective and, more recently, social perspectives. Yet, the predominant framework for the understanding of HIB has traditionally been what Spink and Cole refer to as the “information-seeking/problem-solving approach” (ibid: 3) further looked at below. The theoretical basis for this Web

searching study was informed by this approach. I nevertheless drew on and borrowed key notions from other cognitive as well as affective-oriented information-seeking models such as the ones briefly described below. These models, understood here as simplified representations of complex processes, are better seen as complementary rather than opposing, therefore contributing to the conceptualization of HIB within the integrative framework discussed in the previous section.

From a cognitive and problem-solving point of view, Brown (1991), for example, conceives of information seeking as a goal-driven activity aimed at satisfying needs through problem solving. This view is similar to Wilson's (1999) proposed model of ISB in which problems are considered the cause of uncertainty. Moreover, solutions to problems become people's goals and the resulting behaviors may be seen as goal-determined behaviors (ibid: 265; cf. Wilson 2005: 35). More specifically, Wilson posits that

en route to the goal, the individual moves from uncertainty to increasing certainty and that there are stages in the problem-resolution process that are identifiable and recognisable to the individual. These stages are: *problem identification* (where the person is asking the question, 'What kind of problem do I have?'), *problem definition* ('Exactly what is the nature of my problem?'), *problem resolution* ('How do I find the answer to my problem?') and, potentially, *solution statement* ('This is the answer to the problem', or, if a pragmatic rather than theoretically-based definition has been found, 'This is how we are going to deal with the problem.'). (1999: 266, emphasis in the original).

Earlier ISB models also view information seeking as problem-solving processes aimed at reducing uncertainty. In sense-making theory, for example, ISB consists of four main elements: (a) "a *situation* in time and space, which defines the context in which problems arise;" (b) "a *gap*, which defines the difference between the contextual situation and the desired one (e.g. uncertainty);" (c) "an *outcome*, that is, the consequences of the Sense-Making process;" and (d) "a *bridge*, that is, some means of closing the gap between situation and outcome" (Wilson 1999: 253, emphasis in the original). According to Wilson, Dervin (1983, 1996), the main proponent of the sense-making approach to ISB, "presents these elements in terms of a triangle: situation, gap/bridge, and outcome" (ibid.).

From a cognitive and affective perspective, and similar to Dervin's sense-making theory, Kuhlthau's (1991) user-centered research on information seeking also views the information search process as involving

the user's constructive activity of finding meaning from information in order to extend his or her state of knowledge on a particular problem or topic. It incorporates a series of encounters with information within a space of time rather than a single reference incident. Uncertainty and anxiety are an integral part of the process, particularly at the beginning stages ... The individual is actively involved in finding meaning which fits in with what he or she already knows, which is not necessarily the same answer for all, but sense-making within a personal frame of reference ... Evidence of the transformation of information into meaning is present in the products or presentations in which users share their new knowledge with others (ibid: 361).

Kuhlthau's model thus sees affective characteristics like uncertainty, anxiety, confusion, clarity, confidence, and (dis-)satisfaction as being integrated within cognitive structures (ibid., cf. Kuhlthau 2005). It therefore complements earlier models—like Dervin's model mentioned above or Ellis' (1989) information behavioral model—by adding users' feelings and thoughts to the IS process. In this study, I also look briefly at certain affective dimensions of information-seeking processes embedded in translation. These dimensions concern the research participants' perceived levels of search goal *success*, search outcome *satisfaction*, and search task *difficulty* (see 5.2 for more details).¹⁰³

A common feature of the ISB models mentioned above—which have naturally evolved since the early days of their conception—is that they view IS as the purposive seeking of information in relation to a goal (Spink, Park, and Cole 2006: 138-139; Case 2008: 80). Moreover, the initial state of the IS process is one that relates to a “problematic situation” (Wersig 1971), an “anomalous state of knowledge” (Belkin 1980 and 2005), an “information need” (Wilson 1981), a “gap” (Dervin 1983), or a situation of “uncertainty” (Wilson 1999). Conversely, “[t]he goal state is the resolution of the problem or cognitive state” (Spink, Park, and Cole 2006: 139). In this study, ISB is also conceptualized as purposive information seeking in relation to a goal, a process thus characterized by Wilson's problem-solving stages outlined above. Concerning these cognitive stages, Foster (2004, 2005a, 2005b, and 2006) claims that ISB models such as the ones mentioned earlier suggest (a) clear starting and ending points as well as (b) the

¹⁰³ Exploring these affective dimensions will hopefully make a contribution, not so much within the field of information science (see, for example, Kim 2008), but to process-oriented studies that have examined other affective factors in translation such as translators' personal involvement with translation tasks (Jääskeläinen 1999); their attitudes and self-image with regard to routine translation tasks vs. non-routine tasks (Laukkanen 1993, 1996, 1997); their professional self-image and subjective theories of translation (Tirkkonen-Condit and Laukkanen 1996); and their previous experiences and emotions (Hansen 2005), to name but a few.

linear sequencing of stages in-between. With regard to Foster's first suggestion, I agree with Case that information

needs shift stochastically as each relevant piece of information is encountered. One bit of knowledge may raise questions, lead to another fact or to a new conclusion, and so forth, which changes one's knowledge state and hence what one finds relevant and worth seeking (2008: 79, building on Harter 1992).

Case further states that a number of scholars "would agree that, however information needs are characterized, they are not something fixed and long-lasting" (ibid.). Viewing information needs as dynamic and evolving entities throughout the search process is indeed particularly useful for understanding IS processes. For analytical and theoretical reasons, however, in this study the initial and final states of translation-embedded IS processes were identified through the stages of translation problem definition and solution statement, respectively. Given that information seeking is originally envisaged here as motivated by the need to solve a (translation) problem, an activity that has "a clear-cut and short-term end" (Case 2008: 88), I adopted Wilson's (1999) problem-solving stages described earlier as indicators of the different IS process stages (see 5.1.3 for more details). With regard to Foster's second suggestion, that concerning the sequencing of IS stages, I will discuss the (non-)linear nature of both translation and IS processes against the findings of this study in section 6.3.2.

5.1.2 Cognitive and Problem-solving Approach to Translation

Like ISB, translation-related phenomena have also been studied from cognitive, behavioral, affective, and social perspectives, among others. If, however, as Sirén and Hakkarainen suggest, "we see translation as one kind of *human information processing*, [then] cognitive psychology is an obvious framework in which translation can be productively studied" (2002: 72, my emphasis). From the perspective of cognitive psychology, and as shown in Chapter 3, translation processes have also been regarded as problem-solving activities in process-oriented research. Tirkkonen-Condit, for example, argues that translation is a goal-oriented action where the solving of "an individual translation problem ... will cause at least temporary *uncertainty* in the course of target text production" (2000: 123, my emphasis). Moreover, she states that "[p]revious research on translation processes suggests that proficiency in translation involves tolerance of *ambiguity* and *uncertainty*" (ibid., my emphasis) (cf. Tirkkonen-Condit 1997: 79).

As indicated previously, in the cognitive approach to translation studies, “the emphasis lies on the application of translation solutions – sometimes called strategies or procedures – to specific problems, on the discussion about what goes on in the translators’ mind and on exploring what lies behind translation competence” (González Davies 2004: 14). A central discussion therefore inevitably revolves around what constitutes a translation *problem* and from *whose* perspective. Although such a discussion is provided in 3.1.2, it is important to underscore that here “problems” constitute those particular source text items that the research participants explicitly identified as problematic for translation in the online search reports, and as manifested in, and inferred from the participants’ recorded translation processes and their resulting products (see 5.3 for an overview of the research methodology I used for this study). This chimes in with Livbjerg and Mees’ view, who also “consider translation problems – and hence define ‘translation unit’ – from the perspective of the participating subject” (2003: 129; cf. Lörcher 1991; Krings 1986). For Livbjerg and Mees, “[a] translation unit is any word or phrase in the text, or any aspect of such word or phrase, which is verbalized by any single participant and for which he or she expresses any degree of doubt about its proper translation” (2003: 129). It is from this perspective that translation problems in this study are considered self-constructed or idiosyncratic entities as suggested by Krings (1987: 167-169) and cognitive psychologists in general. As Séguinot points out, “[p]roblems, for the cognitive psychologist, do not actually exist ‘out there’. It is our perception that identifies something as a problem. In other words, it is the construct of an individual” (2000b: 90, emphasis in the original).¹⁰⁴

In addition, as Sirén and Hakkarainen state, “in translation studies, ‘problem’ most often refers to different textual elements which cannot be translated without deliberation, if at all ... ‘Problem-solving’, then, refers to such deliberation and rendering a textual element (or omitting it)” (2002: 76). This view is similar to that of Lorenzo, who considers problem solving a process of deliberation in which “el traductor presenta más de una alternativa de traducción o para cuya solución expresamente razona o argumenta” (1999a: 128) (cf. Pym 1993: 29; Pavlović 2007: 83). Thus, translation

¹⁰⁴ Jääskeläinen states that “the use of *translation problem* ... as a concept referring to individual difficulties in translation has been criticized on the grounds that, in translation theory, the use of the concept should be restricted to specific kinds of (universal) problems” (1993: 102, emphasis in the original). Empirical studies of translation have shown, however, that translation problems may be individual as well as common across different subjects (e.g. Krings 1987; Lörcher 1991).

problem solving is taken here to involve purposeful activities in relation to a goal, that of making a more or less problematic decision to solve a particular translation problem that may not be necessarily serious or difficult (cf. Sirén and Hakkarainen 2002: 77, building on Bereiter and Scardamalia 1993). In other words, self-constructed translation problems may vary in degree of significance and nature, which may in turn influence the type of “solution paths [taken] from the initial to the final state” (Sirén and Hakkarainen 2002: 77) of translation problem-solving processes. As briefly indicated above, in this study said states acted as indicators of the initial and final states of Web searching processes, as further discussed below.

5.1.3 Translation Problem-solving Stages as Indicators of Web Searching Stages

Drawing on the a priori theoretical framework developed above, I conceptualized Web search behaviors as involving goal-driven actions aimed at meeting the research participants’ information needs for translation problem solving. I monitored said behaviors through what I refer to as “Web search tasks.” A Web search task may involve one or more online search sessions performed to address a *single* information need that is motivated by the desire to solve a translation problem. While in my terminology, a Web search task will always include a search session, i.e. a temporal series of online actions aimed at satisfying a *specific* information need (cf. Jansen et al. 2007), it is not limited to or synonymous with the notion of search session. Rather, it is a more comprehensive concept that also includes the identification and formulation of a specific search need; the formulation of one or more search goals; and the selection of a search outcome. A Web search task is thus conceptualized here as involving four main information-seeking/problem-solving stages, or units of analysis:

- The *search need*, or recognition of an information need as perceived within the context of translation problem solving (Wilson’s problem identification).
- The *search goal(s)*, or type(s) of information required to potentially satisfy a specific information need (Wilson’s problem definition).
- The *search process*, or online actions carried out within one or more search sessions that may address a single or multiple information needs (Wilson’s problem resolution).
- The *search outcome(s)*, or type(s) of information potentially selected and/or used to (a) satisfy a search need, and (b) eventually solve a translation problem

(Wilson's solution statement)—i.e. where the latter is not necessarily a consequence of the former.

These information-seeking/problem-solving stages, which affect the translator's role as an information user, processor, and producer (Pinto Molina 1999, 2000), were taken to indicate when a Web search task embedded in translation problem solving was initiated, processed, and completed. The theoretical premises and assumptions described above provided the basis to formulate the research questions presented below.

5.2 Research Questions and Aims

Based on the conceptual framework that I developed in previous sections as well as on the evolving characteristics of the study that I designed and implemented in a pedagogical setting (see 5.5. for more details), my main objective is to answer the following research questions:

- What type of self-generated Web search tasks did the participants of this study carry out to eventually solve the problems they encountered in their translations of two popular-science texts? Web search tasks are, as indicated above, characterized by the participants'
 - search needs,
 - search goals,
 - search process,
 - and search outcomes.
- Concerning the affective dimension of Web searching for translation problem solving, how did the participants of this study perceive their search tasks in terms of
 - search goal success,
 - search outcome satisfaction,
 - and search task difficulty?
- How do the participants' perceptions of Web search success compare to their search performance for translation problem solving?

Many Web search studies have addressed similar IS-related phenomena, albeit in connection with a wide variety of research foci such as users' individual characteristics (e.g. gender, cognitive and learning styles, prior knowledge, and computer experience), subjects (e.g. students, academics, and professionals), and situations (e.g. work, educational, and everyday life settings) (cf. Martzoukou 2005). My investigation focuses on Web search behaviors (monitored through Web search tasks) in connection with a number of user- and translation task-related attributes. In particular, the user attributes of this study concern the participants' levels of *translation expertise*, *Web search expertise*, and *source-text domain knowledge*. I will return to these attributes in more detail in section 5.2.1. Task attributes refer to the characteristics of the *source-text types* and the *translation briefs* used in this study. I will return to these attributes in more detail in sections 5.2.2 and 5.7.1.

The main goal of this study is therefore to answer the research questions formulated above (or any other questions that may have arisen throughout the course of the investigation) by examining the participants' Web search tasks in connection with their profiles (user attributes) and the main characteristics of the translation tasks (task attributes) they carried out for this study. Another equally important goal is to assess the suitability of the research tools I chose and/or developed for this Web searching study. To do so, I designed a specific syllabus for an introductory course on scientific and technical translation with English and Spanish (see 5.5 for more details). Before further looking at issues of research design, however, I will first describe the nature of the selected research attributes and the rationale for their selection.

5.2.1 Rationale for the Selection of User Attributes

As briefly indicated above, the selected user attributes of this study include the participants' levels of translation expertise, Web search expertise, and domain knowledge—the latter sometimes referred to as “subject expertise” in both the translation studies and ISB literature. As far as research on expertise is concerned, the field of cognitive psychology has once again proved very productive. Drawing on Bereiter and Scardamalia (1993: ix), Sirén and Hakkereinen state that there are two main approaches to expertise: one that characterizes it by diverse criteria, thus focusing on “differences between novice and expert performance;” and another that focuses on “the process of acquiring expertise,” thus emphasizing “differences between **experts** and experienced **non-experts**” (2002: 73, emphasis in the original). As shown in

Chapter 2, this distinction has also been manifested in the cognitive approach to translation studies, where numerous researchers have examined expert translation processes on the one hand and processes of expertise acquisition on the other. While the former type of studies tends to have a theoretical aim, the latter generally shares “a concern for transferring research findings to translation pedagogy” (Tirkkonen-Condit 2002: 5; cf. Sirén and Hakkareinen 2002: 71).

Two major approaches to the study of translation expertise seem therefore to dominate the translation studies literature: (a) comparisons between professional and novice translators that aim at characterizing features of expertise (e.g. Tirkkonen-Condit 1989, 1990; Jääskeläinen 1989; Jääskeläinen and Tirkkonen-Condit 1991; Jensen and Jakobsen 2000; PACTE 2005); and (b) developmental studies that aim to increase our understanding of the development of expertise, which in turn may help novice translators shorten their learning curves in becoming expert translators (e.g. González Davies 1998; PACTE 2000, 2002, 2003; Orozco Jutorán and Hurtado Albir 2002; Kiraly 2005, 2008; Scott-Tennent, González Davies and Rodríguez Torras 2000, 2001a, 2001b; González Davies and Scott-Tennent 2005). To my knowledge, most studies favor the novice-expert approach and relatively few longitudinal studies have been conducted on the development of translation expertise. This study somewhat embraces the first approach by attempting to determine the participants’ level of translation expertise (which involves their translation problem-solving performance, among others). The main purpose for so doing is, however, that of establishing potential correlations between different levels of translation expertise and Web search behaviors embedded in domain-specific translation.

Yet, the notion of “translation expertise” remains difficult to define and is still subject to controversial discussion in translation studies (e.g. Hurtado Albir 1999; Vienne 2000; Pym 2003; Kiraly 2000a; González Davies 2004; Kelly 2005). In our discipline, expertise is often referred to as “competence,” “proficiency” and/or “professionalism.” In discussing translation competence, for example, “the term is often linked to other concepts and qualities seen to be a requisite for the task of translation, most prominently the following: *knowledge, skills, awareness, expertise*” (Schäffner and Adab 2000: x, emphasis in the original). In this study, I take the qualities of *knowledge, skills, and awareness* along with that of *experience* to be indicators of translation expertise, as further discussed in 5.7.2 and 5.7.4. I also take translation expertise to involve

translation processes “that are observed to result in good performance” (Tirkkonen-Condit 2005: 406). This implies that the study of “processes must be accompanied by an evaluation of product quality as well, if the aim is to pin down those process features that are found to be conducive to good quality” (ibid.). I will return to aspects of translation assessment for research purposes in section 5.8.1 below.

Furthermore, as stated in 2.3, I do not take expert performance to equal professional performance, or professionalism. The latter refers here to the ability of a translator to join the community of full-fledged translators who earn their living by translating, while the former concerns, as indicated above, translation processes that result in good quality performance. This distinction is based on the premise that not all professionals are able to reach expert performance as shown, for example, by Gerloff (1988) and Jääskeläinen (1990). According to Séguinot,

we seem to see the professional as the consummate [sic.] expert. Yet empirical studies of translation have shown that some professionals do not show greater competence than some students (for example, Krings 1988, Tirkkonen-Condit 1989, Jääskeläinen 1989, Lörcher 1991). This has led researchers to speak of successful and unsuccessful strategies rather than assuming that the status of the subject, that is the degree of experience, will always correlate directly with the quality of the translation (2000b: 98).

Kiraly’s distinction of “translation competence” vs. “translator competence” (2000a: 13) seems particularly useful to illustrate the differences between translation competence (or expertise) and professionalism. For Kiraly, translation competence involves the ability to produce acceptable texts in the target language, while translator competence concerns the ability to join and participate in new communities such as “the group of educated users of several languages, those conversant in specialized technical fields, and proficient users of traditional tools and new technologies for professional interlingual communication purposes” (ibid.). Kiraly’s notion of translator competence seems to have added a new dynamic dimension—that of socio-professional ethics, norms, and conventions—to the apparent didactic persistence on translation competence and related sub-competences (Torres del Rey 2005: 148). Nevertheless, componential models of translation competence (TC) such as those developed by PACTE (2000, 2002, 2003, 2005) seem useful for our discussion of the user attributes selected for this study. In multi-competence models of translation, *skills* and *knowledge* are usually clustered around a number of interrelated sub-competences that make up the notion of TC.

PACTE defines this notion as “the underlying knowledge system needed to translate” (2005: 610).

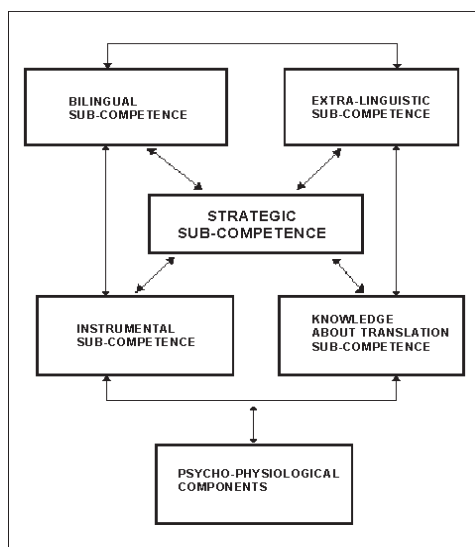


Figure 1. PACTE’s (2005: 610) Model of Translation Competence

As Figure 1 shows, PACTE identifies five sub-competences, each involving its own set of skills and knowledge, including linguistic and textual knowledge; world, *subject*, and bicultural knowledge; translation principles and professional knowledge; as well as *documentary research skills*, among others (ibid.). The strategic sub-competence is thus central to PACTE’s model. It integrates all the others and, as with all procedural knowledge, encompasses all the procedures used to solve problems arising during the translation process. The model also identifies psycho-physiological components that involve “cognitive and behavioural (memory, attention span, perseverance, critical mind, etc.) and psychomotor mechanisms” (ibid.). Similarly, Kelly identifies six hierarchically arranged sub-competencies that make up her notion of translation (macro)competence (2002: 14). For Kelly, these sub-competencies are communicative and textual; cultural; thematic; professional instrumental; psycho-physiological; as well as interpersonal and strategic.

As PACTE’s research shows and as Kelly observes, both *subject/thematic knowledge* as well as *instrumental competence*—the two additional user-related attributes explored in this study—are two factors that seem to have an impact on translation performance, thus allowing for the distinction of different levels of translation competence, or expertise. First, PACTE considers subject knowledge (as well as encyclopedic and bicultural knowledge) part of their extra-linguistic sub-competence (2005: 610), while Kelly

conceives of thematic sub-competence as involving “los conocimientos básicos sobre los campos temáticos en los que trabaja el traductor, los cuales le permiten el acceso a la comprensión del texto de origen o de la documentación adicional que emplee” (2002: 14). Second, PACTE’s instrumental sub-competence “is made up of knowledge related to the use of documentation sources and information technologies applied to translation” (2005: 610). Similarly, translators’ professional instrumental sub-competence for Kelly involves

el uso de fuentes documentales de todo tipo, la búsqueda de terminología y la gestión de glosarios, bases de datos, etc., el manejo de las aplicaciones informáticas más útiles para el ejercicio de la profesión (tratamiento de textos, autoedición, Internet, correo electrónico), además de otras herramientas tales como el fax, el dictáfono, etc. Comprende asimismo conocimientos básicos para la gestión del ejercicio profesional (contratos, obligaciones fiscales, presupuestos y facturación, etc.), así como de la deontología y el asociacionismo profesional) (ibid: 14-15).

Subject knowledge and research skills are also considered two key factors which impact users’ Web search performance. As far as research skills are concerned, Kim claims that “[a]nother factor that affects search behavior is *experience* or *expertise* in information searches” (2001: 235, my emphasis). As a case in point, Kim refers to

Fenichel’s (1981) study, which compared search performance on an online database system, [and] found that users’ search experience influenced their search performance. Novice searchers retrieved information more slowly and made more errors than experienced searchers. Not only were novice searchers slower and more prone to error but another study (Penniman, 1975) found a significant difference between novice and experienced searchers in their search patterns as well (ibid.).

As it can be seen, Kim equates search experience with search expertise, a rather common phenomenon among studies of Web search behavior. Some of these studies establish the amount of experience a user has as a criterion to determine the user’s level of expertise (e.g. Lazonder, Biemans, and Wopereis 2000; Palmquist and Kim 2000; Saito and Miwa 2001; cf. Aula 2005; Martzoukou 2005). According to Aula, this view is consistent “with the ideas of the information foraging theory ..., which states that foraging strategies evolve over time toward the most effective and efficient ones” (2005: 25). Like Aula, I see, however, two main “drawbacks” in categorizations of expert vs. novice searchers based on their levels of experience *only*. The first drawback refers to the fact that “in such a division ... groups are internally heterogeneous,” while the second concerns the lack of “consensus on what constitutes relevant experience”

(*ibid.*). In other Web searching studies, however, expertise has been characterized as involving the *knowledge* and *skills* required to use the Web and other Internet resources successfully for information seeking (Hölscher and Strube 2000: 338). In this study, the qualities of *knowledge* and *skills* along with that of *experience* concerning the use of the Web for information seeking and retrieving were taken into account to determine the participants' level of Web search expertise (see 5.7.2 and 5.7.4 for more details).

Despite the difficulties associated with definitions of expert vs. novice users, Web search studies “have generally proposed that experts are more sophisticated in their searching than novices are” (Aula 2005: 25). What this means is that

[e]xperts use longer and more complex queries, are better aware of the features of the system they are using, and sometimes employ imaginative strategies for searching (*e.g.*, copying and pasting search terms from documents) (Aula & Käki, 2003; Hölscher & Strube, [2000]; Jenkins *et al.*, 2003; Lazonder *et al.*, 2000) ... Novices, on the other hand, are known to have several misconceptions as how to search engines work. They believe that the authors of Web pages need to register their pages with search engines, they believe that search engines can extract semantic meaning from the pages, they use natural language in their queries, they try to express several searches at the same time, and they over- or under-specify their search requests (Brandt & Uden, 2003; Pollock & Hockley, 1997). In their search performance, these misconceptions typically result in longer task completion times, a smaller number of tasks being completed and less efficient search strategies (Khan & Locatis, 1998; Lazonder *et al.*, 2000; Palmquist & Kim, 2000; Saito & Miwa, [2001]) (*ibid.*: 25-26).

In addition to Web search expertise, domain knowledge (or subject expertise) also seems likely to have an impact not only on translation but also on Web searching. As far as the latter is concerned, Kim refers to Marchionini, Lin, and Dwiggins' (1990) study, which is based on a hypertext information system, to explain that they

found that both groups of experts (search and subject experts) outperformed the novices. Although no difference between the two expert groups was detected on their success rate, their search styles differed. Subject experts tended to spend more time reading the retrieved information, whereas search experts spent more time on search-preparation and modification work. Hsieh-Yee (1993) examined and compared effects of the user's search experience and subject expertise on the use of online database systems. She concluded that in online searches, users' search experience affected their use of search strategies and played a more important role than subject expertise (2001: 235-236).

Foltz (1996) thus argues that domain knowledge is critical to comprehension, especially when dealing with hypertext as opposed to linear text. Some researchers have also found out that “learners do not benefit from searching for information on the Internet

when domain knowledge is low” (Desjarlais and Willoughby 2007: 3). For instance, Willoughby et al. conclude that low domain knowledge appears to prevent successful learning using the Internet, thus making it necessary to find ways to support less knowledgeable learners (2006; cf. Lawless, Schrader, and Mayall 2007). Conversely, “a user with more knowledge of the domain can be expected to utilize more appropriate terms in the queries and to know more terms (synonyms) related to the topic” (Aula 2005: 26). According to Aula,

[n]ot surprisingly, both traditional IR research and studies addressing Web searching have found domain experts to approach search tasks differently from novices. Domain experts have been claimed to plan their search beforehand, to use more sophisticated queries, and to be more efficient and effective in performing search tasks (Downing *et al.*, 2005; Hölscher & Strube, [2000]; Jenkins *et al.*, 2003; Navarro-Prieto *et al.*, 1999; Vakkari, 2000) (*ibid.*).

Furthermore, Web search expertise and domain expertise are known to have combined effects. For instance, some researchers have found that users with “high domain expertise and low Web search expertise were reluctant to use advanced query formatting, but their domain expertise allowed them to compensate for this by being more creative in thinking about the query terms” (Aula 2005: 26, building on Hölscher and Strube 2000). This seems to suggest that Web search behaviors are not only influenced by domain knowledge and Web search expertise but also that interactions between these two factors are highly intrinsic.

According to a study by Massey and Ehrensberger-Dow (forthcoming), translation experience also seems to correlate with successful information behavior. Massey and Ehrensberger-Dow “determine[d] the manner and success of information behavior shown by” different groups of translators with various levels of translation experience, in particular “beginners, advanced students, recent graduates, and experienced professionals.” Based on the analysis of the participants’ performance “at certain source text (ST) segments containing translation problems,” the authors found that for a particular term

most of the beginners researched the term but only one-third were successful. All of the advanced students researched the term, most of them very quickly and successfully, although one (unsuccessfully) referred to online bilingual dictionaries rather than the resources that the other students accessed by using Internet search engines. Finally, all of the recent graduates researched the term and came up with a successful solution. We had hoped for a higher research and success rate as students gain experience, and that is exactly what we found. What we did not expect was

that the advanced students and recent graduates would be faster and more successful than the professionals (ibid.).

Massey and Ehrensberger-Dow offer four possible explanations for these results. First, as the professional translators were working into their L1, the authors suspect that these professionals “may have been overly confident, whereas the students might have been cautious because they were translating into their second language” (ibid: 17). Second, “the professionals were not translating at their customary workplaces,” which may have affected the ecological validity of the study. Third, both the student and novice translators were younger than the professionals, and this suggests that the former “might be part of a generally more media-competent cohort” (ibid.). Finally, and perhaps, most importantly, “the students and recent graduates had all participated in a course in research techniques as part of their undergraduate program and were accustomed to using Internet resources as part of their translation course demands” (ibid.).

Based on previous research both into Web searching and translation, domain knowledge, Web search expertise, and translation expertise are the user attributes that I took into account for my study of Web searching embedded in translation. Furthermore, given the different linguistic backgrounds of the participants who enrolled in the introductory translation practice course that I designed for the purpose of this study, language directionality inevitably became another factor to consider in my research. I will return to this aspect, i.e. language directionality, in sections 5.4 and 5.6 below. First, however, I will describe the task-related attributes that I pre-selected for this investigation.

5.2.2 Rationale for the Selection of Task Attributes

According to Wildemuth and Hughes, “information behaviors are undertaken within the context of some purpose, goal, or activity. In other words, the person’s information behaviors are situated within the context of some *larger task* or set of tasks” (2005: 275, my emphasis). In this study, for example, the context of the larger task in which Web search behaviors are embedded is that of popular science translation (see 5.4 for more details). The term “task” in the IB literature, however, may sometimes be problematic as it is often used interchangeably. Said term tends to refer to both (a) the *larger task* or *context* in which information behaviors are embedded, and (b) the “specific *search goals* undertaken or the *search tasks* assigned to study participants” (ibid., my emphasis). Some terminological clarification is therefore required. On the one hand, I

refer to the larger task of translating a domain-specific text as the “embedding task,” a notion taken from Pirolli and Card’s theory of information foraging (1999: 644).¹⁰⁵ Information foraging theory argues that humans’ adaptive success to information “depends to a large extent on a vast and complex tributary of cultural tasks that engage our physical and social environments” (ibid: 643). According to Pirolli and Card, these tasks are everyday tasks that have been

characterized as ill-defined problems (Reitman, 1964, 1965). Such tasks require substantial acquisition and integration of knowledge, typically from external sources (Simon, 1973), in order to better define goals, available courses of action, heuristics, and so on. Such tasks might include choosing a good graduate school, developing a financial plan for retirement, developing a successful business strategy, or writing an acceptable scientific paper. The structure of processing and the ultimate solution are, in large part, a reflection of the particular external knowledge used to structure the problem. Consequently, the value of external information may often ultimately be measured in the improvements to the outcomes of an embedding task (ibid: 644).

In our discipline, translation tasks have over the past decades provided the context for the study of translation behaviors. In the field of information behavior, however, the “tasks that form the contexts for information behaviors” are still an “under-studied phenomenon,” although they should be of a primary concern in IB-related research (Wildemuth and Hughes 2005: 275). Wildemuth and Hughes nevertheless refer to several IB theories that address the contextual nature of tasks, in particular, Allen’s (1996 and 1997) person-in-situation approach to the understanding of information needs as well as Dervin’s (1999) and Savolainen’s (1993) sense-making approach to information behavior. Allen (1996: 88), for example, views information needs as embedded within and influenced by a wide range of social as well as situational contexts. This view is similar to that of Dervin and Savolainen, who use constructivist assumptions to conceptualize information seeking and information use as shaped by individuals’ experiences with, and sense-making of their world.

Similar to Wildemuth and Hughes, Vakkari states that some information-seeking studies “start the analysis of information needs and seeking by scrutinizing the activity they are

¹⁰⁵ Pirolli and Card also refer to this notion as the “task environment” (ibid.). In Hansen’s terminology, this notion is referred to as the “work task,” which he considers “to be the situation in which a need for information emerges” (2005: 393). He argues that the “rationale for developing a framework for work task information seeking and retrieval is grounded in a believe that IS&R should not be treated in isolation, but rather as embedded in a larger task context” (ibid: 392). In other words, if one wishes “to understand the dynamic nature of IS&R processes, one needs to adopt a broader perspective, both situationally and contextually, which includes the tasks people perform” (ibid.).

part of. Information seeking is seen as embedded in the activity that generates it” (1999: 822). Yet, as Vakkari points out, “there are only a limited number of advanced attempts at analyzing empirically how information seeking is related to the various features of the activity (work) processes it supports” (ibid.). Wildemuth and Hughes thus argue that, although the work of the authors mentioned above “points in an appropriate direction, further investigation is needed to more fully understand how people’s experiences of information needs and their information behaviors are embedded within their accomplishment of other tasks” (2005: 276). It is from this perspective that the translation tasks selected for this study were a major consideration in my analysis of translation-embedded Web search behaviors. In particular, I paid special attention to the *source-text types* and the *task descriptions* (or briefs) used in the translation embedding tasks of this study (see 5.7.1 for details).

On the other hand, and as stated in 5.1.3, I use the notion of “Web search task” to refer to the participants’ search needs, search goals, search processes, and search outcomes embedded in translation problem solving.¹⁰⁶ Each of these constituent elements is treated as a unit of analysis for categorizing the research data of this study. Several taxonomies have been proposed for “classifying task types, users’ types of information needs, or users’ goals in information searches” (Aula 2005: 29). Taxonomies based on users’ search goals, for instance, tend to distinguish between close-ended search goals that yield fact-finding or known-item searches (where the answer to a specific question is unambiguous), and open-ended search goals that yield exploratory/topic/unknown-item/subject searches (where the search outcome is open and not known in advance). These taxonomies, which tend to adopt the form of dichotomies, include Matthews, Lawrence, and Ferguson’s (1983) “known-item” vs. “subject” searches; Marchionini’s (1989) “closed” vs. “open” tasks; and Navarro-Prieto, Scaife, and Roger’s (1999) “fact-finding” vs. “exploratory” tasks, to name but a few. Other taxonomies classify search tasks/questions/needs according to their degree of specificity and/or complexity such as Saracevic and Kantor’s (1988) “specific” vs. “broad” questions; Cutting et al.’s (1992) “specific” vs. “general” needs; and Qiu’s (1993) “general” vs. “specific” tasks.

Most of the taxonomies described above are, however, based on users’ searches on online database systems, online catalogs, or electronic resources. Taxonomies that

¹⁰⁶ We should remember at this point that Web search tasks are not a research attribute in this study but rather its main object of investigation.

specifically address searches performed on the Web include, for example, White and Iivonen's (2001) "open" vs. "closed" questions as well as "predictable" vs. "unpredictable" sources (the latter distinction involves searching for a known Web site as opposed to an unknown one); Broder's (2002) "navigational" Web searches (the goal is to find a known Web site), "informational" Web searches (the goal is to obtain information), and "transactional" Web searches (the goal is to carry out an activity via the Web); and Rose and Levinson's (2004) "navigational," "informational," and "resource" searches (where the latter involves finding something different to information). In addition, the topics of users' searches as well as their queries have been examined in depth by Jansen, Spink, and Sarecevic (2000) as well as Spink et al. (2001), among others (cf. Kim and Allen 2002: 111; Aula 2005: 29-30).

5.3 Research Approach and Methods

5.3.1 Grounded Theory

As indicated earlier when discussing the research approach of this study, I used grounded theory as originally developed by sociologists Glaser and Strauss in the 1960s to explore the study participants' search behaviors aimed at seeking and retrieving translation-related information on the Web.¹⁰⁷ I also used this qualitative approach to try and establish tentative correlations among the participants' identified Web search behaviors and the research attributes described in previous sections.

According to Glaser and Strauss, grounded theory is concerned with the "discovery of theory from data systematically obtained from social research" (1967: 1). This process of theory discovery must be "*grounded* or rooted in observation; hence the term" (Trochim 2001: 160, emphasis in the original). In addition, the elements of the theory discovered must be (a) "conceptual categories and their conceptual properties," and (b) "hypotheses or generalized relations among the categories and their properties" (Glaser and Strauss 1967: 35). Both categories (the conceptual elements of the theory) and properties (the conceptual aspects of the categories) are concepts that emerge from the

¹⁰⁷ Grounded theory is commonly used in qualitative Web search studies that strongly consider the context in which searchers seek and retrieve information on the Web with a view to identifying relevant search factors, practices, styles, etc. Mansourian, for example, stresses that "considering the context of search is a pivotal factor in understanding users' behaviours, feelings, and thoughts during the period of information seeking in an online environment" (2008: 202).

data and may “vary in degree of conceptual abstraction” (ibid: 36). Complex and iterative processes of data collection, coding, and analysis help establish not only such categories and their properties but also relationships among them, i.e. to formulate hypotheses. These hypotheses may seem unrelated during the early and open stages of the research process. However, “as categories and properties emerge, develop in abstraction, and become related, their accumulating interrelations form an integrated central theoretical framework—*the core of the emerging theory*” (ibid: 40, emphasis in the original).

Researchers are subsequently more engaged with the generation of theory during the later stages of the research process. During these stages they are also concerned with the integration of the newly generated theory in an open-ended scheme or framework used to interpret the data in relation to the theory (ibid: 41). This process of theory integration within an open-ended framework is what I strived for in 8.1 and 8.2 by revisiting my theoretical premises and assumptions in the light of the main research findings. First, however, I went through the main research stages of data collection, coding, analysis, and planning. These iterative research stages allowed me to identify a number of sub-categories and their related properties with regard to the core categories, or units of analysis. Such units of analysis involve, as stated in 5.1.3, the search needs, the search goals, the search actions, and the search outcomes of the research participants. Only upon the establishment of key (sub-)categories and their properties was I able to tentatively hypothesize on the relationships among these and the research attributes selected for this study. To do so, I combined this exploratory research approach with a number of qualitative and quantitative research methods for data elicitation as well as data analysis. More specifically, I used Case study research combined with direct observation and survey research.

5.3.2 Case Study Research

I used case study research to investigate the participants’ Web search behaviors embedded in the translation tasks that they carried out within the specific research context of this study, i.e. that of teaching and learning about scientific and technical translation (see 5.5 for details). Case study research, a method extensively used in the social sciences, focuses on the in-depth investigation of one or more individual cases (e.g. single individuals, groups, institutions, communities, etc.) embedded in a real-life

context. From this perspective and applied to translation studies, Susam-Sarajeva defines “case” as

a unit of translation or interpreting-related activity, product, person, etc. in real life, which can only be studied or understood in the context in which it is embedded. A case can be anything from a translated text or author, translator/interpreter, etc. to a whole translation situation or source/receiving system (2009: 40).

Case study research thus focuses not only on the main case(s) or unit(s) of analysis being researched but also on the context in which the case(s) are embedded. Furthermore, depending of the design adopted for case study research, there can be single-case studies or multiple-case studies, both of which can be further divided into holistic or embedded case studies (ibid: 41, drawing on Yin 1994: 41-42). Single-case studies that focus on one unit of analysis and examine only its “global aspects” make use of a ‘holistic design’ (ibid.). As an example of a single holistic case, Susam-Sarajeva refers to “the Danish translation of the first *Harry Potter* book” (ibid.). If, however, “a single-case study not only focuses on the unit as a whole, but also draws attention to sub-units of analysis, it becomes an ‘embedded case study’: for example, retranslations (sub-units) of the musical *My Fair Lady* into Swedish” (ibid.). Conversely, multiple-case studies that focus on more than one case can be either holistic or embedded. For example, “[a] multiple-case study comprising holistic single cases could be ... a comparative study of the Finish, Swedish and Russian dubbed or voiceover versions of the Disney film *Lion King*” (ibid: 43). An example of “[a] multiple-case study with embedded single cases could be ... Spanish and French translations of various short stories (sub-units) by Ernst Hemingway and Jack London (ibid.). In light of these definitions, my investigation of Web searching for translation purposes seems to fit the characteristics of a multiple-case study with embedded single cases whereby I compare the participants’ Web search tasks (the single cases or sub-units of analysis) embedded in their English translations of two science-popular texts in Spanish (the main cases or units of analysis).

The ability to conduct comparative analyses is perhaps one of the main advantages of carrying out a multiple-case study with embedded single cases. Comparisons may, in turn, lead to the drawing of more solid conclusions and/or provide a richer basis for replication (see 5.3.2.2 for a brief discussion of replication). Yet, as Susam-Sarajeva points out, in translation studies the multiple-case study method is significantly less

common than the single-case study method: “In our discipline, the main characteristic of case study is understood as ‘singularity’ [thus focusing] on one translated text, one author, a single translation situation, etc.” (ibid: 38). This “‘singularity’ in case study method as it is employed in translation studies today is in fact based on the rarity of multiple-case studies conducted within our discipline” (ibid: 43). Multiple-case studies, however, “have considerable advantages over single-case studies in terms of the rigour of the conclusions which can be derived from them” (ibid: 43-44).

Another way of strengthening scientific rigor in case study research (or, for that matter, any other type of research) is to use multiple research methods and sources of data. Trochim, for example, states that “a combination of methods” can be used “to conduct a case study” (2001: 162). For Susam-Sarajeva, case study research is

an overarching research method which can include different sub-methods (Yin 1994:13, Gillham 2000:13), such as surveys, interviews, observations, research in archives, etc. Although qualitative methods are primary in case study research, quantitative ones, such as statistics, can also have their place in the array of evidence (Gillham 2000:10) (2009: 40).

For this multiple-case study, I carried out methodological triangulation by combining the qualitative and quantitative sub-methods described in 5.3.2.1 and 5.3.2.2 below, namely *direct observation* and *survey research*. Methodological triangulation was particularly useful in gaining reliable context-dependent knowledge of how the research participants of this study used the Web as an external resource of consultation for translation problem solving.

5.3.2.1 Direct Observation

I used direct observation to study the participants’ Web search behaviors embedded in a translation pedagogical setting. According to Dishion and Granic, “[m]ost “naïve” consumers of behavior science research using direct observation express concern that this research is based on behavior performed under strange and unusual conditions” (2004: 143). Yet, “the conventions of science,” so Dishion and Granic, “refer to observations that occur outside the laboratory setting as ‘naturalistic’” (ibid.). For example, just as “observing a parent in the home in the process of parenting his own child is naturalistic” (ibid.), so is directly observing a translation student in the classroom in the process of translating.

The use of technology can, as shown in 4.2, be extremely useful for direct observation. For this study, for example, I used a screen recorder named “BB FlashBack” (see 5.7.4)

to register the participants' translation-embedded Web search tasks carried out on the computers they worked with in class. As indicated in 4.2.2 and 4.2.3, the use of recordings has often been criticized for potentially inducing anxiety among subjects. Yet, the screen-recorded data and my own in-class observations suggest that the screen recorder functioned in a most unobtrusive manner within a relaxed and friendly research environment. Some of the research participants stated in their one-to-one interviews (see below) that they did not feel anxious about the screen recordings and that the atmosphere in class was that of a regular classroom situation. This, in turn, may suggest that the use of screen recorders holds some promise concerning their suitability for both teaching and research purposes, as further discussed in 8.3.

5.3.2.2 Survey Research

According to Trochim, "survey research encompasses any measurement procedures that involve asking questions of respondents. A survey can be anything from a short paper-and-pencil feedback form to an intensive one-to-one, in depth interview" (2001: 108). Surveys therefore include "two broad categories: the questionnaire and the interview" (ibid.). In this study, the research participants were asked to complete two types of online questionnaires that were designed in and administered via SurveyMonkey, an application specifically developed to create online surveys (see www.surveymonkey.com for more details). The first type of questionnaire, which I will refer to as the "background questionnaire," aimed at eliciting demographic data (gender, age, academic qualifications, and working languages) as well as data on two qualities (knowledge and experience) of two of the three selected user attributes (in particular, translation expertise and Web search expertise). The second type of questionnaire, which I will refer to as the "online search report" (OSR), adopted the form of a written report aimed at gathering information on the third user attribute (domain knowledge) along with introspective data on the participants' Web search tasks performed for translation problem solving (see 5.7.3 for more details).

It is important to underscore that in this study questionnaires were not used for purposes typically associated with survey research. In this type of research, generalizations based on statistically significant results typically become the main objective. For the purpose of this study, however, I did not pursue statistical generalizations on the basis of a sample assumed to represent a specific population. In fact, given the main research method selected for this study (i.e. case study research), the question of

representativeness was not a crucial one. Replication, however, was. In discussing less conventional ways of understanding generalizations, in particular, those of analytic induction and logical inference, Susam-Sarajeva draws on Yin (1994: 31) and Mitchell (2000: 167-175, 180) to argue that “case studies cannot and should not be chosen on the basis of representativeness/typicality in order to assess the incidence of phenomena, because they are not sampling units” (2009: 49). The main goal of case study research should be “generalizing *into theory*, not generalizing over onto other case studies” (ibid., emphasis in the original). Yin further points out that in analytic generalization

a previously developed theory is used as a template with which to compare the empirical results of the case study. If two or more cases are shown to support the same theory, replication may be claimed. The empirical results may be considered yet more potent if two or more cases support the same theory but do not support an equally plausible, *rival* theory (1994: 31, quoted in Susam-Sarajeva 2009: 49).

Susam-Sarajeva concludes that “[t]he predominant logic in case studies is therefore that of ‘replication’, not ‘sampling’” (2009: 49).

In addition to the questionnaires mentioned above, I conducted one-to-one interviews with the research participants to ask follow-up questions and gain more in-depth knowledge about some of my phenomena of interest, especially the suitability of the research methods and tools selected for this study. I used audio digital equipment to record the individual interviews that would be later transcribed and coded. With regard to the design of the interviews, I followed the principles and techniques of semi-structured interviewing. Like “convergent interviewing” (Dick 1998: unpaginated), semi-structured interviews share the main advantages of both unstructured and structured interviews. The first aim at collecting broad information by asking general questions, while the latter serve the purpose of gathering information more efficiently by asking more specific questions. I could therefore benefit from semi-structured interviewing in two major ways. First, it allowed me to use a predefined set of guiding questions, which in turn facilitated the synthesis of data across the respondents. Second, I still had a degree of freedom in exploring other issues of interest that came up during my conversations with the participants.

5.4 Research Design

To investigate Web search behaviors within the context of translation problem solving, I designed a specific syllabus for an introductory course on scientific and technical translation with English and Spanish. The course, which lasted for a twelve-week period during one semester and had four participants,¹⁰⁸ provided the setting to collect the study's research data using a variety of sources, methods, and tools. Figure 2, adapted from Pavlović's (2007: 66) research design for the study of directionality features in collaborative translation processes, provides an overview of the research design for this study.

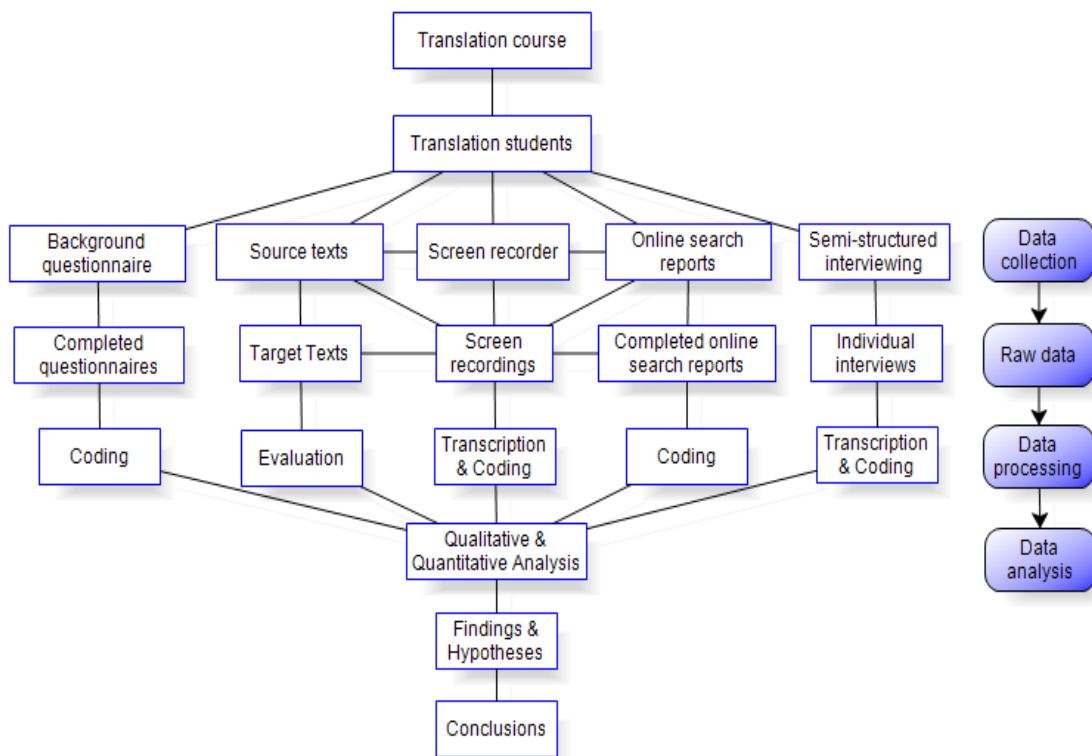


Figure 2. Research Design

Except for semi-structured interviewing, all the data collection tools referred to above were tested in a pilot study that preceded the main study. A total of four participants were recruited for the pilot study, which took place on February 12, 2009. Two criteria

¹⁰⁸ Let us remember at this point that, as indicated in 5.3.2.2, case study research is not based on sampling logic, which is primarily concerned with issues of sample size and representativeness. Rather, it is based on replication logic, which aims at generalizing into theory as opposed to generalizing onto other case studies (Yin 1994) (cf. Mitchell 2000; Susam-Sarajeva 2009).

were used for recruiting participants for the pilot study. First, their working languages had to include English and Spanish, regardless of their translation directionality. Second, they needed to have some experience in translation. These criteria were determined on the basis of the criteria used for course admission in the translation practice courses offered at the tertiary institution where the main study took place (see 5.5. for details). At this institution and as further explained in 5.6 below, students wanting to take a translation practice course in their respective language combination, which must necessarily include English, have to declare which is their first language and which their second language for translation purposes (see 5.6 for definitions of “first language,” “second language,” and “third language” in this study). The reason for this is that most translation practice courses offer translation from one’s second language into the first (i.e. L1 translation) and translation from one’s first language into the second (i.e. L2 translation) in an 80-to-20 proportion. Although experience in translation is not a formal requirement for enrolling in a translation practice course, most students who have taken the Spanish translation course in the past were familiar with translation through either previous training experiences or (in-)formal translation jobs.

In the pilot study, which lasted for almost two hours, the participants were first asked to fill in the background questionnaire for information on their declarative knowledge of (i.e. *knowing what*) and past experiences with translation, and Web searching. They were subsequently asked to translate a popular-science text from Spanish into English and use the Web as an external resource of consultation when needed. In addition, they were instructed to complete, at any chosen point in time (i.e. before, during, or after translation), an online search report to provide information on their source-text domain knowledge and their Web search tasks carried out for translation problem solving. All individual processes of translating, researching, and problem-solving reporting were screen-recorded in BB FlashBack.

It should be noted that no time limit was set to carry out all the required tasks (i.e. completing the questionnaire, translating the selected text, seeking and retrieving information on the Web, and completing the online search report). However, when the first participant had completed all the tasks and made this fact explicit, the other three participants seemed to have decided to finish their work soon thereafter as well. This phenomenon could be explained by the late hour of the study (approximately from 5:30

to 7:30 p.m.) and/or the tiring nature of the whole exercise. The consequence of this early finish was that only two of the participants completed all the tasks entirely. The two remaining participants completed the background questionnaire but only managed to translate one third and one half of the source text, respectively, and report on the Web search tasks they had performed up to that point. These two participants (a second-semester student of translation and a language teacher with a four-year BA degree in translation) were therefore excluded from the data analysis. Their participation in the pilot study was nevertheless useful as it helped detect and solve, prior to the main study, a number of problems concerning the design of both the background questionnaire and the OSR (see 5.7.2 and 5.7.3 for more details).

The remaining two participants—a PhD student of translation with three years of casual professional translation experience and a translation teacher with over 15 years of experience in the discipline (see 6.1.1 for more details)—were, however, included in the data analysis. Although this was done for reasons of data comparability (as further explained below, the participants of the main study also translated the source text that was used for the pilot study, among others), one should not ignore the fact that the data collected in both research settings is not directly comparable. On the one hand, the pilot study took place in a computer lab resembling an experimental situation, while the main study was conducted in a pedagogical setting (see 5.3.2.1 for brief description of naturalistic research). On the other hand, both the background questionnaire and the online search report were slightly modified after having been tested in the pilot study (see 5.7.2 and 5.7.3 for more details). As a result, these tools collected slightly different data from both groups of participants. This does not mean, however, that the performance of the two participants who entirely finished their translations and completed their respective OSRs during the pilot study should be neglected for research purposes. Quite on the contrary, their Web searching performance for translation problem solving is of particular interest here given that their backgrounds are very different from those of the participants in the main study.

Unlike the participants of the pilot study, who were specifically recruited for testing the main data collection tools (i.e. the background questionnaire, the screen recorder, and the online search report), the participants of the main study are four regular translation students who enrolled in the introductory course on scientific and technical translation. These students participated in a total of four screen-recorded translation and Web

searching sessions that were carried out in class as part of their coursework. In each session, the students had to translate a different domain-specific source text (ST) from Spanish into English, the first of which was the same popular-science text (see Appendix A) that was translated by the participants of the pilot study. As indicated in 5.2.2, the source texts for translation formed the main contexts, or embedding tasks, for information search and retrieval on the Web.

The participants of the main study also had to complete an online search report in each session to (a) specify their level of source-text domain knowledge and (b) describe the Web search tasks they performed for translation problem solving. Before the screen-recorded sessions took place, they were asked to fill in the online background questionnaire for a diagnostic overview of their knowledge of and experience with translation as well as Web searching. The questionnaire, which also served as a consent form for research purposes, was administered to those participants who were present in class during the first day of the course on March 2, 2009. Only one course participant was not present on this day and therefore completed the background questionnaire in my office one week after the course had started, i.e. on March 9. I was present in both survey settings, i.e. in class and in my office, which allowed not only for a maximum response but most importantly for any potential clarification respondents might have needed to understand the meaning of specific questions. The completed questionnaires were later processed for coding and analysis as further discussed in 5.8.2.

Two weeks after the completion of the background questionnaires, i.e. in week three of the semester, the course participants took part in their first screen-recorded translation and Web searching session on March 16. The participants had access to personal computers (PCs) as well as the Internet and were instructed to (a) use the Web as needed to conduct their documentary research, and (b) report on their search tasks by completing an OSR. This session was particularly important as it allowed not only for data elicitation but also to explain how to use the OSR. Concerning the latter, I described the contents of the OSR to the course participants and provided them with examples on how to use this tool. I also told them they could complete the OSRs at any point in time, i.e. the participants could follow whichever order of completion they felt most comfortable with. As a result, the progression of task completion became part of the data analyses provided in 6.3.2.

The first screen-recording session also enabled me to remind the participants of the rationale for using the online search reports. During the first two weeks of the course, I had advised them that every translation task carried out in class or at home would be complemented by a translation research report.¹⁰⁹ I told them that these reports would provide me with detailed information on their search tasks performed for translation problem solving and that I would use this information for research purposes, especially with a view to improving the teaching and learning of translation. Strong emphasis was placed on the latter goal by introducing the OSR as just another learning tool in the course. This, however, might have influenced the amount of time and effort that some of the student participants spent in completing their first OSR. I will return to this aspect in 6.3.2.1.

The second screen-recorded session took place in week four of the semester (March 23) followed by the third session in week five (March 30). The fourth and final session took place in week six (April 20), immediately after a mid-term break that lasted for two weeks. All four sessions produced a total of 16 screen recordings. Yet, one of the screen recordings obtained in the second session was corrupted and therefore none of the video files resulting from this session were used for data analysis. This allowed for the comparability of data across the participants of the main study. In addition, due to the wealth of information produced by the remaining twelve screen recordings as well to time and space restrictions, only eight of these recordings are analyzed here. These correspond to sessions one and three of the main study, for which I selected two popular-science texts (the first of which was also used for the pilot study). I will refer to these texts as “first embedding task” (or Task 1) and “second embedding task” (or Task 2), respectively (see 5.7.1 for more details). For sessions two and four, I selected two technical texts, in particular, two instruction manuals. I will analyze the screen recordings (seven in total) resulting from these sessions in future research projects focusing on comparative analyses of Web search behaviors embedded in scientific *and* technical translation. For the purpose of this study, however, I analyzed the eight screen recordings that resulted from sessions one and three of the main study as well as the two screen recordings that resulted from the pilot study. Thus, a total of ten screen

¹⁰⁹ Students had been advised to use both their own reference material and the Internet as needed for their translation-related research activities carried out either in class or at home. Yet, only one student decided (once) to bring her own laptop on which a multilingual electronic dictionary was installed. That instance did, however, not take place during any of the screen-recorded sessions that are analyzed in this study.

recordings represent part of the raw data that was later transcribed and coded for research purposes. The data resulting from the ten accompanying online search reports was also processed for coding, transcription, and analysis. Taking together, the ten screen recordings, online search reports, and translated texts provided the data sources for the analysis of Web searching embedded in translation problem solving. These data sources also provided the basis to explore the participants' procedural knowledge (i.e. *knowing how*) concerning both translation and Web searching.

Finally, one-to-one interviews were conducted in my office in weeks seven (March 29), eight (May 6 and 8), and nine of the semester (May 14). These interviews followed a structured process in which previous information from earlier research stages was systematically analyzed to improve interview efficiency. That is, preparing for the interviews involved the preliminary and systematic analysis of all sources of data, namely the background questionnaires, the screen recordings, the online search reports, and the translated texts. These preliminary analyses allowed me to follow-up on a number of aspects regarding the participants' Web search behaviors embedded in translation as well as the suitability of the methods and tools selected for this study. All four interviews were subsequently transcribed and coded for data analysis (see 5.8.4 for details).

5.5 Contextual Setting of the Study

The study took place at the University of Auckland's (UoA) Centre for Translation and Interpreting Studies as part of the introductory course on scientific and technical translation with English and Spanish. Translation practice courses are taught in all language combinations within the two postgraduate degrees in translation studies offered by the Centre: The Postgraduate Diploma in Translation Studies (PGDip in Translation) and the Master of Professional Studies in Translation (MProfStuds in Translation). Students enrolling in either program must take a total study load of 120 points, with 60 points usually taken in each semester. Any of these programs can be completed in one-year full-time or up to four years part-time, although part-time degrees are usually completed in two years. The average number of courses for a full-time student is four, and the expected workload per course is ten hours a week.

The PGDip in Translation is the first level in professional translator training offered by the University of Auckland, and is a fourth-year program that can be taken after completing a BA (often in a second language, but not always). For native speakers of English, students' level of competence in one of the languages offered for the Postgraduate Diploma must be equivalent to at least a 'B+' grade in a language course at third-year undergraduate level or above. Proficiency in English for non-native speakers must be to at least the standard of IELTS (International English Language Testing System) 7 or equivalent for academic purposes. The PGDip qualification, which is meant to prepare students for an entry-level job in the translation industry, covers a wide range of theoretical issues, hands-on translation practice, and electronic tools for translators. More specifically, there is a core of two theory courses, to which students can add elective courses, as well as a translation practice course with a second language. In the latter course, students generally learn to acquire practical translation skills by translating various types of texts in a wide variety of fields. As for elective courses, students have the option to learn about the electronic tools that are crucial in modern translation—including localization tools, translation memories, and terminology databases—the use and evaluation of Internet resources, professional issues, etc. Students also have the option to learn about the subject areas of law, medicine, and business, of special importance in New Zealand, and to increase both subject-area expertise and terminological knowledge in these fields. For non-native speakers of English, there is also an opportunity to study English discourse and grammar as well as the electronic editing and revising of English texts. Upon completion of the PGDip in Translation, students may become full members of the New Zealand Society of Translators and Interpreters (NZSTI) provided they receive a B grade average or better, and at least a B+ in the translation practice course.

The MProfStuds in Translation is a fifth-year qualification, which can build on those skills acquired in the PGDip in Translation. However, it is also a frequent choice for students who have already completed a BA (Honors) or a Masters in a different field, such as a foreign language, and who are looking for an alternative career option, or additional translation-specific skills. Students are also eligible to complete the MProfStuds in Translation if they have a Bachelors degree combined with either a professional qualification equivalent to one year's advanced study or at least three years of relevant professional experience. The MProfStuds qualification places equal

emphasis on the acquisition of theoretical knowledge and the honing of practical skills. Students have the opportunity to specialize in technical translation (including localization), literary translation, translation theory, or community interpreting. In addition, students must complete a 10,000 or 15,000 word thesis (depending on whether they choose a 30 or 45-point dissertation), as well as a practical translation project (which can also be 10,000 or 15,000 words). Both the thesis and the translation project must be supervised by staff members of the University of Auckland.

It is important to stress that students enrolling in either program must take the (30-point) translation practice course in their respective language combination as one of the core courses making up their curriculum. Most of the translation practice courses—taught by the language departments that make up the University of Auckland’s School of European Languages and Literatures, and School of Asian Studies—are usually only offered in the second semester and for three contact hours a week. However, the translation practice courses of the Centre’s main languages (Chinese, Japanese, French, German, and Spanish) can be offered as a two-part course (A and B) that spreads across two semesters and that is taught for two contact hours a week. This was the case with the Spanish translation practice course in which this study took place. While I taught part A of the course during the first semester of 2009 (from early March to early June) and focused on scientific and technical translation, a different teacher taught part B of the course with a focus on legal and business translation during the second semester of 2009 (from mid-July to late October). Part A of the course aimed at facilitating opportunities to achieve the following learning outcomes.

5.5.1 Intended Learning Objectives

The specific learning objectives of the course included the ability to:

- become familiar with the main textual and contextual features of certain scientific and technical texts
- reflect on the different phases involved in processes of scientific/technical translation according to different translation tasks and communicative situations
- develop documentary research skills with a special focus on terminology mining
- develop technical writing skills with a view to improving translation quality
- develop rigorous editing and proof-reading skills for translation quality assessment (TQA)

- acquire knowledge on legal, economic, and business aspects of professional translation.

In short, the course syllabus was originally designed to provide students with learning opportunities to start developing, at a fairly introductory level, both “translation competence” and “translator competence” (Király 2000a: 13) in scientific and technical subject areas. To do so, a learning-centered environment was aimed for and a functional approach to translation adopted, as further described below.

5.5.2 Methods and Approach to Teaching and Learning

The teaching format and methods chosen for the course consisted of lectures, guided group discussions, practical translation activities and tasks,¹¹⁰ translation assignments, and a team translation project. The course materials included a wide range of academic articles, PowerPoint presentations, and various scientific as well as technical source texts of an average 275-word length.¹¹¹ The teaching methods selected promoted both individual work and team work to develop students’ own specialized knowledge, intellectual skills, and interpersonal qualities. Students were provided with opportunities to actively participate in and reflect on their own learning processes, structure their own learning experiences, and relate them to the course syllabus. Ultimately, the goal was to help students gradually become independent learners and translation practitioners following what González Davies refers to as “an interactive approach that encourages student participation and dialogue” (2004: 2). According to González Davies, this approach “can be carried out by means of activities, tasks or project work that either mirrors the professional world or actually enables the students’ participation in authentic translation” (ibid.). Given the research agenda behind the Spanish translation course and as part of the compromises that I had to make in order to combine research goals with teaching ones, I decided not to have the course participants engage in authentic work requiring the participation of major translation stakeholders (such as members of the professional community) into the classroom. I nevertheless tried to

¹¹⁰ Following González Davies’ distinction, “*activities* are understood as concrete and brief exercises that help to practice specific points, be they linguistic, encyclopedic, transfer or professional” (2004: 22, emphasis in the original) and a *task* “as a chain of activities with the same global aim and a final product” (ibid: 23).

¹¹¹ This excludes the translation project, for which the students translated a source text of approximately 1,500 words.

adopt a learning-centered approach as opposed to a more conventional, transmissionist, and teacher-centered approach to learning.

In transmissionist and teacher-centered classrooms—critically referred to in the literature as the “*performance magistrale*” (Ladmiral 1977), the “‘who’ll take the next sentence’ (WTNS) approach” (Kiraly 2005: 110, alluding to Nord’s title of her 1996 article) or the “‘Read and Translate’ directive” (González Davies 2004:11)—, translation skills are believed to be passed on to translators-in-training by experienced teachers that evaluate students’ translations according to the instructor’s objectivist knowledge. Pedagogical epistemologies based on objectivism seem to prioritize standardized practices; teachers’ possession and distribution of universal and objective truths; teachers’ authoritarian role and control over learning processes, and learning goals; and students’ conformity and compliance, i.e. the expectations placed upon students to passively absorb relevant truths handed down to them (Kiraly 2000a). As González Davies states, a transmissionist approach to translator training involves “the traditional product-oriented and teacher-centred learning context where model translations are singled out to be received by unquestioning students who are instructed to ‘read and translate’” (2004: 14). Since the 1990s, however, there has been an increasing shift towards the development of professionally-oriented and learner-centered approaches aimed at a major re-thinking of traditional classroom activities in translator training (see, for example, Nord 1997; Chesterman 2000; Kiraly 2000a, 2004 2005; Bowker 2003; Torres del Rey 2005; González Davies 2004, 2005; Kelly 2005). In particular, Kiraly’s seminal work, *A Social Constructivist Approach to Translator Education* (2000a), can be seen as a major breakthrough and milestone in the development of alternative translation pedagogy.

Social constructivism aims primarily at the empowerment of trainee translators towards higher levels of commitment, responsibility (individual and collective), and autonomy. Social-constructivist epistemologies based on the notion of intersubjectivity, i.e. “a notion that all human knowledge is a matter of social accord” (Davis 2004: 203), view meaning as imposed on the world by us, rather than existing in the world independently of us. From this perspective,

[l]earning occurs when we become aware that some part of the mental models we have created of our world does not correspond to some new phenomenon that we perceive. We thus learn through

experience, adapting and adjusting our mental models as they prove incompatible with information with which we come into contact in our environment (Kiraly 2000a: 16).

Drawing on second-generation cognitive science, social constructivism found in situated praxis, team-based organization, project-based instruction (PBI), and problem-based learning (PBL), among others, the proper teaching methodologies to place neither teachers nor students but learning itself at the centre of learning processes. Situated praxis, in particular, can be seen as a major contribution to a more practice-oriented translation curriculum, higher levels of student motivation, and knowing-in-action methods. More specifically, situated praxis allows for the contextualization of understanding and knowledge as well as the active participation of students through meaningful, experiential, and authentic work, e.g. by enabling the participation of major translation stakeholders into the classroom, namely that of the professional community (see, for example, Kiraly 2000a; González Davies 1998, 2004; Risku 2002; Koby and Baer 2003). Other situational approaches to translator training, although of a different nature to that of social constructivism, include those advocated by Vienne (1994) and Gouadec (2003).

Based on the methodologies described above, social constructivism seems to represent what González Davies refers to as a “transformational” approach to learning (2004: 14). González Davies views this approach as facilitating “a student and learning-centered context that focuses on collaborative translation processes with the teacher acting as a guide and where procedures that bridge class work and extramural practice have a place” (ibid.). Given the introductory nature of the Spanish translation practice course and my own research foci, I decided to adopt an approach to teaching and learning that lies somewhere in between González Davies’ “transformational” and “transactional” approaches to learning (ibid.). The latter is “based on cooperative learning, [where] there is group work and interaction, but the teacher still has the final answer to the problems set in activities; a positive step towards powering students” (ibid.). Positioning myself somewhere in the middle of these two approaches meant that my role as a teacher was not an objectivist and/or authoritarian one in the sense that *only* I possessed final and true answers to questions raised in class. Quite to the contrary, my role was that of a guide as well as a mediator in the discussion and negotiation of answers among all class participants as any communicative situation involving group dynamics would require.

5.5.3 Approach to Translation

In addition to the various pedagogical approaches to teaching and learning in general, there are a number of approaches in translator training that are specific to the teaching of translation. These are “directly related to translation studies and observable mainly in class discussions, depending on how the teacher views texts and their translation” (González Davies 2004: 14). According to González Davies, approaches to translation include the so-called “*linguistics-based approach*,” “*cultural studies approach*,” “*cognitive approach*,” “*functionalist approach*,” and “*philosophical and poetic approach*” (ibid: 14-15, emphasis in the original). Although these approaches “can, and perhaps, should, overlap” (ibid: 14), I adopted a primarily functional approach to translation in my introductory course on scientific and technical translation.

Functional approaches to translation (e.g. Vermeer 1989; Nord 1997) see the process of translation as governed by a number of pragmatic factors, in particular the so-called *Skopos* or purpose/function of the translation. Translations are thus assessed on the basis of the accomplishment of their respective *Skopoi*. To establish the specific purpose or function of a given source text (ST) and that of its respective translation, Nord (1991) proposes a comprehensive model of ST analysis. In this model, a number of intra-linguistic and extra-linguistic factors are analyzed to produce a translation within a given communicative situation. More specifically, intra-linguistic factors provide information about the content, subject matter, and composition of the text; its lexical elements and syntactic as well as suprasegmental structures; and the presuppositions made by the author. Extra-linguistic factors allow for the pragmatic analysis of STs within a particular communicative act that is constrained by both the agents (sender, initiator/commissioner, translator/intermediary, user, message receiver) and the factors (situation-in-the-culture, time, place, and medium) involved in said communicative act. These pragmatic considerations also allow for the analysis of the translation brief, i.e. the details of the translation as regards the commissioner, intended addressee, function, etc. (ibid.).

In line with a functional approach to the teaching of translation, all the source texts translated as part of the course included a task description or brief with information about the commissioner and target text readers, among others. As indicated in 5.7.1, four of the selected source texts were used not only for teaching but also for research purposes. It is also important to note that whereas aspects of scientific and technical

translation were covered throughout the entire course, aspects of Web searching were only taught at the end of the course. This effectively means that the course participants were not exposed to teaching on the seeking and retrieving of information on the Web at the time of the study. The main reason for this was to avoid influencing students' Web searching behaviors as these are the main object of research from a non-developmental point of view. Unlike translation behaviors, I made no attempt to influence students' Web search behaviors until the end of the course, when the study's research goals had been accomplished.

Finally, it should be noted that the course participants received feedback on the translation of the source texts selected for research purposes just as on any other translation-related work in the course. In addition to the translation of said texts, the coursework included several translation assignments and one team translation project for which the participants chose their own source text. All this coursework formed the basis to progressively assess students' performance in the course according to the summative and formative assessment methods described below. As Kelly explains, summative assessment involves assigning "a grade, or an accreditation," while formative assessment involves "any marking, correction or comment which gives students feedback on their learning precisely in order to help them learn more, or better" (2005: 133, see also Kiraly 2000a: 152). Neither the in-class translations used for research purposes nor the various translation assignments and the team translation project were carried out under examination conditions.

5.5.4 Assessment of Translations for Didactic and Professional Purposes

Translation quality assessment (TQA) is possibly one of the most debated areas in translator training and has effectively become "a field of inquiry on its own" (Secară 2005: 39). This field "has the distinction of being one that interests a broad range of practitioners, researchers and organizations" for varied reasons (Williams 2001: 327).

Where these

were once primarily aesthetic, religious and political, they are now primarily professional and administrative (e.g., evaluation of students) and economic and legal (e.g., predelivery quality control/assurance; postdelivery assessment to ensure that terms of contract have been met by supplier) (ibid.).

Regardless of the purpose that TQA may fulfill, the key parameter to determine the level of translation quality continues to be its degree of acceptability, or adequacy. Yet,

there is no consensus on what constitutes a “‘good,’ ‘satisfactory’ or ‘acceptable’” translation (ibid.). Furthermore, in our discipline there are no universal models or absolute standards for the assessment of translation quality, mainly because said quality is “context dependent” (Secară 2005: 39, building on Pym 1992 and Sager 1989). Hence, the wide range of methods available for *assessing* and/or *evaluating* translation quality, methods that have primarily resulted from different theoretical approaches to translation.¹¹² Not only are there any unified standards for judging the quality of a translation, there is also no standardized way of naming this process of judging. The two terms most often used in this context are “assessment” and “evaluation.” Kiraly, for example, views the former as “gathering information about the quality of students’ emerging competence” and the latter as “attributing meaning to the information gathered” (2000a: 140).¹¹³ For others (e.g. McAlister 2000), evaluation involves determining the value of a translation. Yet others refer to this determination as assessment (Arango-Keeth and Koby 2000: 119, drawing on Maier 2000a: 137). Furthermore, as Maier points out, with the exception of Lauscher (2000) (see below), “many, if not most, use the two [terms] interchangeably, often without indicating that they consider the terms synonymous” (2000: 137). McAlister also argues that “the concept of translation evaluation is unclear in the relevant literature, where one finds the words (they are too inexplicitly defined to be called terms) *evaluation*, *assessment*, *criticism* and *analysis* used almost interchangeably” (2000: 231). I, like Lauscher, “will use **translation evaluation** and **quality assessment** as synonyms, both referring to a procedure that allows for prescriptive judgement” (2000: 150, emphasis in the original), where the latter is understood as “judgement that can claim validity in a specific evaluation situation” (ibid., building on Ripfel 1989: 84-85).

Broadly speaking, translation assessment and evaluation methods fall into two main categories: numerical or analytic marking systems and holistic marking systems (cf. Waddington 2001; González Davies 2004; Secară 2005). Numerical systems generally use (a) correcting scales that establish a typology of errors and (b) rating scales that

¹¹² Lauscher, for example, distinguishes among different evaluation models according to “the translation theories they rely on, the evaluation parameters and the procedures they propose” (2000: 151). McAlister (2000) provides a thorough overview of translation evaluation models stemming from different theoretical approaches to translation, arguing for a criterion-referenced evaluation framework that uses basic standards for professional accreditation, in particular, revision time.

¹¹³ Kiraly further distinguishes between “testing” and “marking.” For him, testing represents the sampling of performance and marking “an attempt to sort performance along a scale” (2000a: 140, building on Azwell 1995).

assign a value to each type of error (Martínez Melis and Hurtado Albir 2001: 284).¹¹⁴

More specifically,

[t]he correcting scale establishes and specifies the error types; it corresponds to a preliminary stage in the development of an assessment scale. Its objective is to decide on the elements that are to be taken into account; in the teaching context, it allows the student to become aware of his errors, and is thus an important instrument in formative assessment. The grading scale, moreover, assigns a value to each error; it is therefore useful in awarding grades and is an indispensable instrument in summative assessment (ibid.).

These scales, which are “key instruments in translation assessment (when it is the product that is to be assessed),” (ibid.) are typically used both in translator training programs and the translation industry.¹¹⁵ The main reason for the popularity of these scales in didactic as well as professional settings is commonly attributed to the use of “objective” criteria that define error types:

Translation services and teachers of translation alike have developed TQA grids with several quality levels, or grades, based on the number of errors in a short text. It is felt that quantification lends *objectivity* to the assessment (Williams 2001: 328, my emphasis).

However, scales are oftentimes criticized for the lack of transparent criteria indicating how evaluators assign numeric scores, or values, to errors. This process can be very subjective indeed, thus undermining the objectiveness usually claimed in numerical markings systems. While “[s]ome authors classify errors on a scale of more or less serious” (Martínez Melis and Hurtado Albir 2001: 281), some category schemes—such as the one developed by the American Translators Association (ATA)—“assign a weighting on a pre-defined scale to every translation error, rather than simply mark it as minor or major” (Secară 2005: 40). Another, perhaps, major disadvantage of numerical

¹¹⁴ There are nevertheless numerical marking systems such as the one developed by González Davies (2004) or the one that I used for this study (see below) that also assign positive marks for good translation solutions. As González Davies points out, “assessment need not always be error-based, but should also be success-based, i.e., points should be awarded for above average performance” (ibid: 33).

¹¹⁵ Existing TQA models include, for example, the Canadian Language Quality Measurement System (Sical) developed by the Canadian government’s Translation Bureau; the Council of Translators and Interpreters of Canada’s (CTIC) model; the Society of Automotive Engineers’ (SAE) J2450 translation quality metric (developed by SAE and General Motors); and the Localisation Industry Standards Association’s (LISA) Quality Model. These models, which have “a quantitative dimension,” are in contrast to translation quality standards, whose aim “is not the level of quality of a translation but a set of procedures for achieving that level” (Williams 2001: 329). Most European countries, for instance, have their own translation quality standards such as the Italian UNI 10574, the Austrian *Önorm* D 1200 and D 1201 Standards, the German DIN 2345 Standard, the Dutch *Taalmerk* Standard, the international ISO 12616 Standard and, more recently, the EN-15038 European Quality Standard for Translation Services (Arealillo Doval 2005).

marking systems that rate errors only as opposed to errors *and* good solutions is that they promote an image of *perfect* translation: “Correction is based on counting up the errors, often subtracting points for each of them from a notional ‘perfect’ version worth 10/10, 20/20, 100% depending on the national tradition of marking scales” (Kelly 2005: 132). Kelly argues that this traditional assessment form can be criticized from different perspectives:

- It is the translation as a product which is being evaluated, not student learning
- The concept of the perfect translation, however implicit, sits uncomfortably with any modern view of translation activity
- Emphasis is on what students do wrong, not what they have learned
- Calculating the exact value of a particular error is an immensely complicated task, and can easily end up being arbitrary, hard to justify and far from transparent
- Seemingly objective numerical values are in essence extremely subjective as the consideration of each individual error involves a large degree of subjective evaluation and decision-making (ibid: 140).

Despite the negative aspects of numerical marking systems, given the local context in which the introductory course on scientific and technical translation was embedded I developed a numerical marking system by combining categories of errors taken from several models (see below). Nevertheless, the analytic system that I used also accounted for well-solved translation problems by assigning positive marks to them. Furthermore, I combined said system with both formative assessment and Waddington’s (2001) holistic assessment model further described below.

The main reason for adopting a numerical marking system was to reduce any potential anxiety that the course participants could have felt by using much less normative assessment methods of the type required in the university system they all graduated in. In this system, strong emphasis is placed on the expression of grades in figures that are statistically distributed along a 100% marking scale. This type of assessment method is what Kelly refers to as “norm-referenced assessment,” or “the grading practice which establishes ‘typical’, or even compulsory, statistical distributions of grades, of the kind A = the top 10%, B = the following 25%, C = the following 30%, D = the following 25%, and E = the bottom 10%” (ibid.). The use of norm-referenced assessment systems that are based on a 100% marking scale is also common in other translation practice courses offered by the University of Auckland. In my translation practice course, I

decided to maintain a similar type of assessment, albeit in combination with a holistic assessment method to try and minimize any potential effects that the use of alternative assessment methods only might have had on teaching/learning processes, and ultimately, on research processes.

Table 1 shows the correcting and rating scales that I used for assessing translations in the course. The correcting scale combines a number of error categories and error types taken from two existing models, namely: (a) the analytic method developed by Hurtado Albir (1995) and (b) the translation evaluation tool known as “BlackJack” developed by the British translation agency ITR. According to Secară, the latter “was first designed for internal use, in an attempt to minimise the effort and time spent by translation reviewers, and to maximise the results by making a standard checklist available” (2005: 41, building on Eckersley 2002).

Table 1. Correcting and Rating Scales adapted from Hurtado Albir’s Error Analysis Method and BlackJack’s Translation Evaluation Model

Error Type	Error Description	Minor Error	Major Error	Plus Points
Mistranslation	<i>Contrasens, faux sense</i> or nonsense			
Accuracy	Unjustified omissions and/or additions; untranslated items/sections; inadequate renderings of main and/or secondary ideas; unresolved extra-linguistic and/or cultural references; deviations from brief and target text function			
Terminology	Inappropriate technical terms; inadequate treatment of acronyms, proper nouns and/or numerical values			
Language	Spelling errors and/or spelling deviations; typos; grammar and syntax errors; punctuation errors			
Style	Inadequate register, dialect, language standards, etc.; inadequate use of passive/active voice; inadequate degree of clarity and conciseness			
Consistency	Inconsistent use of technical terms and/or linguistic variations			
Format	Layout errors, font errors, double spaces, etc.			

The correcting scale above includes a number of errors that are grouped under eight different categories covering aspects of both content and style from a functional point of view. This correcting scale was complemented by a rating scale that distinguished among major errors (-1 point), minor errors (-0.5 points), good solutions (+0.5 point), and exceptionally good solutions (+1 point) to translation problems (cf. Hurtado Albir 1995; Waddington 2001). As Williams points out, “[o]ne way to circumvent the

drawbacks of quantification is to grade errors by seriousness: critical/major, minor, weakness, etc. The problem then is to seek a consensus on what constitutes a major, as opposed to minor, error” (2001: 328). For the purpose of my study, I considered mistranslations and problems of accuracy the most serious ones, followed by questions of style, terminology and consistency, and, finally, by language and formatting errors. Plus points were specifically awarded for above average performance to counterbalance the emphasis that error-based methods place on “what students do wrong” (Kelly 2005: 132; cf. González Davies 2004: 33). The sum of negative points minus the sum of positive points was subtracted from a total of hundred points and then assigned to the 100% marking scale outlined below, so as to reach a final grade for summative assessment. The correcting, rating, and marking scales were thus used for translations of an average 275-word length.

Table 2. Marking Scale (Error Analysis Method)

Grade	Number of Points	Number of Errors
A+	100	1 – 2
A	85 - 89	3 – 4
A-	80 - 84	5 – 6
B+	75 - 79	7 – 8
B	70 - 74	9 – 10
B-	65 - 69	11 – 12
C+	60 - 64	13 – 14
C	55 - 59	15 – 16
C-	50 - 54	17 – 18
D+	45 - 49	19 – 20
D	44 - 44	20 – 21
D-	0 - 39	22+

Obviously, the use of error-based assessment methods can hardly be justified in learning-centered approaches of the type advocated in section 5.5.2. In learning-centered approaches, assessment and evaluation place emphasis not on translation as a product but the learning process itself. Therefore, in said approaches alternative assessment methods are used based on, for example, professional standards such as the ones mentioned earlier or portfolios that include several translations considered by students to best reflect their own learning (cf. Kiraly 2000a: 147 and 161; Kelly 2005: 138-139). To try and counterbalance the product-orientedness of the numerical marking

system that I used in my translation practice course, I provided the course participants with formative assessment to emphasize their learning progress too. Consequently, every assessed translation was accompanied, on the one hand, by individual feedback/comments on each type of “error” identified and, on the other hand, by an overall translation assessment. The individual comments provided students with advice on possible strategies to avoid errors, rather than with final and deterministic solutions to problems. The objective was to compensate for a potentially promoted notion of a *perfect* translation by discussing this activity in relative terms instead of absolute ones. In other words, the ultimate aim was to present translation as problem solving where more than one solution, as opposed to *the* correct solution, might be viable to solve a given problem (cf. Pym 1992, 2007; Gile 2004). The overall translation assessment consisted of three or four paragraphs highlighting the strengths and weaknesses found in the student translations from a functional perspective, i.e. with regard to specific *Skopoi*, translation briefs, and communicative situations, among others. The overall translation assessments also provided students with feedback on their learning progress by comparing the translations being assessed with those they had previously done.

To further counterbalance the negative aspects typically associated with numerical marking systems, I combined such a system with Waddington’s (2001) holistic assessment method. In holistic assessment methods a single score is usually based on the overall assessment of performance rather than individual dimensions of said performance. Waddington’s scale, for instance, “is unitary and treats the translation competence as a whole, but requires the corrector to consider three different aspects of students’ performance” (2001: 314). These aspects refer to, as further shown below, the accuracy of ST content, the quality of expression in the target language (TL), and the degree of task completion (ibid.).

Holistic methods like Waddington’s (see also Kiraly 2000a: 160) seem to move in the direction of what Kelly refers to as “criterion-referenced assessment” (2005: 141). In this type of assessment, “grading is directly dependent on learning and is based on the degree of attainment of the intended learning outcomes which form the basis of the entire teaching and learning process” (ibid.). Criterion-referenced assessment is thus “essentially qualitative in nature and normally expressed in letters or in descriptive terms, [although] grades may be expressed in figures where the system requires” (ibid.). Another key characteristic of “[c]riterion-referenced models (Bensoussan/Rosenhouse,

Larose, Nord, House) [is that they] are based on discourse and full-text analysis and factor in the function and purpose of the text” (Williams 2001: 334). This, in turn, encourages the type of macro-textual analysis I aimed for using the overall translation assessments described above, thus compensating for the type of micro-textual analysis of norm- and error-based models (ibid.).

Table 3. Waddington’s (2001) Holistic Assessment Method

Level	Accuracy of transfer of ST content	Quality of expression in TL	Degree of task completion	Mark
5	Complete transfer of ST information; only minor revision needed to reach professional standard	Almost all the translation reads like a piece originally written in English. There may be minor lexical, grammatical or spelling errors	Successful	9 - 10
4	Almost complete transfer; there may be one or two insignificant inaccuracies; requires certain amount of revision to reach professional standard	Large sections read like a piece originally written in English. There are a number of lexical, grammatical or spelling errors	Almost successful	7 - 8
3	Transfer of the general idea(s) but with a number of lapses in accuracy; needs considerable revision to reach professional standard	Certain parts read like a piece originally written in English, but others read like a translation. There are a considerable number of lexical, grammatical or spelling errors	Adequate	5 – 6
2	Transfer undermined by serious inaccuracies; thorough revision required to reach professional standard	Almost the entire text reads like a translation; there are continual lexical, grammatical or spelling errors	Inadequate	3 – 4
1	Totally inadequate transfer of ST content; the translation is not worth revising	The candidate reveals a total lack of ability to express him- or herself adequately in English	Totally inadequate	0 – 2

As Table 3 shows, “[f]or each of the five levels there are two possible marks” (Waddington 2001: 314). This “allows the corrector freedom to award the higher mark to the candidate who fully meets the requirements of a particular level and the lower mark to the candidate who falls between two levels but is closer to the upper one” (ibid: 314-315). This basically translates into higher degrees of subjectivity than the ones obtained using numerical marking systems. For the purpose of my course, I tried to achieve a certain degree of intersubjectivity by combining, in a proportion of 70 to 30, the numerical marking system described above with Waddington’s holistic method, albeit adjusted to the 0-to-100 scale used at the University of Auckland. This combination of methods in such a proportion was actually one of the objects of investigation in Waddington’s study of the use of various translation assessment

methods (ibid: 315). Other similar combinations of assessment methods can be found, for example, in Scott-Tennent, González Davies, and Rodríguez Torras (2001b) as well as González Davies (2004).

Intersubjectivity was also aimed for by having a colleague from the UoA's Centre for Translation and Interpreting Studies co-assess and co-evaluate students' translations in the course, including the ones that are the object of research in this study. Students were also asked to peer-review their evaluated work and collectively discuss whether they thought their work had been fairly evaluated or not. In cases where they considered that their work had not been evaluated as fairly as they would have liked changes were discussed and negotiated to reach a satisfactory agreement. This means that assessment and evaluation principles remained relatively flexible and were discussed in class throughout the course.

Finally, an external assessor from the Spanish Department of Victoria University in Wellington evaluated the entire introductory course on scientific and technical translation. The use of external assessors for course evaluation purposes is standard practice at the University of Auckland, particularly at the postgraduate level. The external assessor gave very positive feedback regarding the course contents and materials, and described the level of difficulty as meeting national and international standards. He also described the feedback as highly detailed and comprehensive, and lauded the fairness of assessment.

5.5.5 Classroom Setting and Computer Resources

The translation practice classes took place in a computer lab where most translation courses are taught and where the course participants had access to PCs as well as the Internet. All PCs were equipped with the following applications at the time of the study: MS Office 2003 and 2007 Suites; Adobe Acrobat Professional 7; Endnote X1; NetLogin (an application that authenticates students for IT-related services) for the University's network, EC Mail or Webmail (the UoA student e-mail system); Cecil (the University's e-learning platform), SPSS 16 statistics collation program; NOD32 Anti-Virus; WinZip; and several multimedia players. Concerning translation-specific software, all the PCs in the computer lab were equipped with Déjà Vu X, SDL Trados 2007 Suite, SDL MultiTerm 2007, SDL Passolo 9, and Across v4. The Web browsers available in the PCs were Internet Explorer (IE) 7 or 8, and FireFox 5. While Google

was the default search toolbar installed for IE7 and FireFox 3, Windows Live Search (which has been recently renamed as “Bing”) was the default search engine for IE8.

Finally, although the course was to be taught for two contact hours a week, I used my office hour to teach classes for three weekly hours instead. The objective was not to compromise course contents with my own research agenda. Thus, students seemed quite happy about the additional class time as it allowed them to receive more training throughout the whole semester.

5.6 Research Participants

As stated earlier, four participants took part in the main study of this thesis. These participants were not randomly sampled, nor were they selected for research purposes. Rather, all the participants enrolled in the introductory course on scientific and technical translation as part of the degrees they were completing at the time of the study (see below). The study’s main population is therefore one naturally occurring within a real teaching and learning context. Hence, naturalistic research using the direct observation method described in 5.3.2.1 was considered suitable to observe the participants’ Web search behaviors in a natural setting with no attempt to influence said behaviors.

As Table 4 shows, the course participants are all females in their early to mid-twenties, except for Martha (all names are fictitious) who was 34 years old at the time of the study.¹¹⁶ While she and Laura are originally from New Zealand, Anna and Maria are from Taiwan and Russia, respectively. They are nevertheless New Zealand residents, thus having lived in the country for a number of years. More specifically, Anna moved with her family from Taiwan when she was eleven years old and completed her secondary and tertiary education in Auckland. Maria moved by herself from Russia when she was 20 years old, and also completed her tertiary education in Auckland. All four participants completed a three-year Bachelor of Arts (BA) degree at the University

¹¹⁶ I decided to assign pseudonyms to the research participants for two main reasons: first, to guarantee the participants’ anonymity and, second, to be consistent with the research approach (grounded theory) and the main research method (multiple-case study research) adopted in this investigation. As Jääskeläinen points out, the use of fictional names emphasizes “the fact that we are dealing with real people with human characteristics, and not with impersonal letters or numbers” (1993: 117). The latter is commonly used in experimental or quasi-experimental research, while the former is typical of case study research.

of Auckland, where they also completed a one-year BA Honors and/or one-year postgraduate degree.

Table 4. Age, Country of Origin, and Country of Residency (Translation Students)

	Age	Country of Origin	Country of Residency
Martha	34	New Zealand	New Zealand
Anna	22	Taiwan	New Zealand
Maria	24	Russia	New Zealand
Laura	23	New Zealand	New Zealand

Table 5 outlines the participants' academic qualifications according to the type of program they completed and the date their degrees were awarded. It also provides an overview of any additional training undertaken. As it can be seen, all participants have a BA in Spanish (major) and French (minor), except for Martha, who also majored in Spanish but minored in Latin American Studies from 1995 to 1997. Anna and Maria thus have a BA Honors in Spanish that was awarded at the end of 2008 and 2009, respectively. While Maria enrolled in the introductory course on scientific and technical translation as an elective paper within her BA Honors in Spanish, for Martha and Laura the course represented a core paper within their Postgraduate Diploma in Translation Studies (English and Spanish). This was also the case for Anna, who took the translation practice paper as part of her Master of Professional Studies in Translation (also with English and Spanish).

Table 5. Academic Qualifications (Translation Students)

	Degree	Awarded	Additional Training
Martha	PGDip in Translation Studies	27/09/2009	DELE* (Proficiency Level) (1996)
	BA in Spanish (major) and Latin American Studies (minor)	1/01/1997	DELE (Intermediate Level) (1995)
Anna	MProfStuds in Translation Studies	27/09/2009	
	BA (Honors) in Spanish	8/12/2008	
	BA in Spanish (major) and French (minor)	1/05/2008	
Maria	BA (Honors) in Spanish	27/09/2009	
	Bachelor of Law	In progress	
	BA in Spanish (major) and French (minor)	5/03/2009	
Laura	PGDip in Translation Studies	27/09/2008	
	BA in Spanish (major) and French (minor)	27/09/2007	DELE (Intermediate Level)

**Diploma de Español como Lengua Extranjera*

As part of their additional training, Martha and Laura obtained the *Diploma de Español como Lengua Extranjera* (DELE), albeit at different levels of proficiency. The DELE is an official qualification that accredits the level of competence and command in Spanish. It is issued by the Instituto Cervantes on behalf of the Spanish Ministry of Education and Science and distinguishes among the following levels of proficiency in Spanish:

- Diploma de Español Nivel A1 (Starter level): This qualification attests to sufficient linguistic ability for a very basic range of the most commonly simple expressions used in the Spanish-speaking world and in order to satisfy immediate [sic] needs of a concrete type.
- Diploma de Español Nivel B1 (**Inicial** / Beginner level): This qualification attests to sufficient linguistic ability for understanding and responding appropriately in most normal day-to-day situations and for expressing desires and needs in a basic way.
- Diploma de Español Nivel B2 (**Intermedio** / Intermediate level): This qualification validates sufficient linguistic ability to get by in average day-to-day situations in normal communication circumstances, which do not require specialized use of the language.
- Diploma de Español Nivel C2 (**Superior** / Proficiency level): This qualification accredits the necessary linguistic competence to integrate in situations requiring an advanced use of the language and knowledge of the cultural customs embedded within it (Instituto Cervantes 2009, emphasis in the original).

After two semesters forging a relationship with the course participants both inside and outside the university context, I believe Martha's level of proficiency in Spanish is very advanced (she was the most proficient user in the course). She lived in Brazil for one year before enrolling in her BA program at UoA. As Martha herself acknowledges, interferences from the Brazilian language partly explain why she did not obtain "A+" grades in her Spanish language acquisition papers throughout the BA program. Nevertheless, she was awarded "A" grades in said papers. After completing her BA, she lived in Peru for one year and then in Mexico for almost nine years. Although at the time of writing Martha is based in Auckland completing her Postgraduate Diploma in Translation Studies, she travels to Latin American countries very often where she spends rather long periods of time working as a tourist guide. Her lexis in Spanish is very rich, her comprehension abilities acute, and her oral skills idiomatic and fluent.

According to the participants' academic records, Laura's grades in Spanish are also within the "A" range, albeit slightly lower than Martha's grades. Laura spent one year in Mexico, an experience that significantly contributed to increase her lexis and improve

both her comprehension and oral skills in Spanish (the former perhaps better than the latter). Anna and Maria also have “A” grades in Spanish both in their BA and BA Honors degrees. Maria’s grades are, however, within the top ten percentile of the 100% marking scale used at the University of Auckland. Academically speaking, Maria *outperformed* the other course participants concerning all Spanish language acquisition papers. At UoA these papers provide four contact hours a week and involve a relatively high workload in terms of tasks, essays, and tests.

Students at the University of Auckland’s Spanish Department also have the opportunity to take part in the Spanish Study Abroad program, as Anna and Maria did in 2007 and 2009, respectively.¹¹⁷ Students taking Spanish Study Abroad usually do so during the New Zealand summer semester (which starts in early January and finishes in late February) at one of the Spanish or Latin American universities ascribed to said program. Anna, for example, completed Spanish Study Abroad at the Universidad de Salamanca (USAL) in Spain. This language and cultural experience led to a considerable increase of her vocabulary and helped her improve her comprehension skills in Spanish. However, she still did not feel confident enough with regard to her oral skills. In fact, she usually chose (and still does) to speak English with me and her classmates, something Laura also did on a regular basis. Maria completed Spanish Study Abroad at the Pontificia Universidad Católica de Valparaíso (PUCV) in Chile, for which she had obtained a University of Auckland Study Abroad Scholarship (Languages and Literatures). This experience also contributed to her reaching a proficient level in terms of comprehension and communication skills in Spanish. Unlike Anna and Laura, Maria took every opportunity to practice her Spanish oral skills in the translation practice course. Moreover, Martha, Anna, and Laura enrolled in their respective translation programs with a view to becoming professional translators, whereas Maria’s motivation for enrolling in the course was primarily to improve her language skills in Spanish. That is, she took the course as a vehicle for language acquisition and improvement, albeit with the secondary aim of finding out more about translation.

¹¹⁷ Spanish Study Abroad offers students in their second or third year of study the opportunity to take language and culture courses in Spain or Latin America for a minimum of four weeks (including at least sixty hours of taught classes) under the Study Abroad courses offered by the UoA’s Spanish Department. To be eligible to complete this program, students must have a minimum grade of “B-” in their language acquisition papers.

Students taking translation practice courses as a vehicle for language acquisition is indeed a relatively common scenario at the UoA's Centre for Translation and Interpreting Studies (CTIS). The main reason for this is that the Center offers professionally-oriented translation within a primarily non-translation and interpreting context (cf. Peverati 2007). As shown earlier, translation practice courses at the University of Auckland are taught by the language departments that make up the School of European Languages and Literatures, and the School of Asian Studies—the latter thus having the largest amount of students completing a translation program (about 70% of the Centre's student body). Since translation practice courses are offered both as elective courses in language-related programs and as core papers in translation-related ones, students motivated by language learning and/or translator training may enroll in said translation practice courses. Furthermore, although the translation practice courses in all language combinations are designed specifically to train future translators, some of these courses have a marked linguistic orientation, thus applying a predominantly contrastive linguistics and textual approach to translation. Catering for the needs of a student body with such different academic motivations is, of course, neither easy nor necessarily desirable.

Regardless of the motivations students may have for enrolling in a translation practice course at the University of Auckland, they must declare which is their first language and which their second language for the purpose of translation. As discussed earlier, English must necessarily be one of these languages. Here, first language or L1 is taken to be the language with highest competence at the moment of the study. Second language or L2 is the “language that has been mastered to a high level of competence” (Pavlović 2007: 82), in particular, that which would correspond to DELE level C2 described above regarding competence and command in Spanish (I am obviously extrapolating the levels of proficiency distinguished by the Instituto Cervantes to other languages). Finally, a third language or L3 is taken to be a language other than L1 or L2 that has been mastered to an intermediate or high level of competence—in particular, DELE levels B2 and C2 described above.

Most translation practice courses at the University of Auckland offer L1 translation (i.e. translation from one's second language into the first) and L2 translation (translation from one's first language into the second) in an 80-to-20 proportion. That is, 80% of the workload involves translation into the first language and 20% translation into the

second language. Final grades are thus based on the same ratio. Yet, the students in my introductory course on scientific and technical translation only translated from Spanish into English as the latter language was declared the L1 by all course participants. As Table 6 shows, this directionality involved L1 translation for Martha and Laura, and L3 translation (i.e. from one's third language into the first) for Anna. Translation for Maria, however, involved her L2 and L3. She nevertheless declared English to be her L1 and Spanish her L2 for the purpose of the translation practice course. Although students are strongly advised not to work with second and/or third languages only (i.e. excluding their first language), there is nothing that prevents them from enrolling in the translation practice courses provided they have an adequate level of competence in said languages. A language adviser within each department determines students' level of language competence based on previous grades, an interview and/or a language test.

Table 6. Spoken Languages (Translation Students)

Participant	L1	L2	L3
Martha	English	Spanish	Portuguese
Anna	English	Mandarin	Spanish
Maria	Russian	English	Spanish
Laura	English	Spanish	French

Although the course participants are all proficient users of their declared L1 (i.e. English),¹¹⁸ their individual written skills and abilities in this language varied significantly. Martha, for example, showed considerable difficulty with the use of punctuation, especially with regard to the use of commas. The major challenge for Maria was the use of definite determiners and prepositions (perhaps due to interferences from her actual L1, i.e. Russian). The latter sometimes posed a problem for Anna as well, albeit to a lesser extent. Slightly more problematic for her, however, was the use of the indefinite article as opposed to the definite one, most likely due to the influence of Mandarin. Laura skillfully writes in English, showing a relatively high level of expository clarity. In addition, she has no grammar/language-related problems.

¹¹⁸ No grades in English language acquisition papers (or related papers) are available for the two non-native speakers of this study as said papers were never part of their BA or BA Honors degrees. In addition, non-native speakers of English who have an undergraduate degree from any New Zealand tertiary institution do not need to sit the IELTS (International English Language Testing System) test otherwise required to study at postgraduate level.

Finally, it is worth noting at this point that the course participants' levels of expertise concerning both translation and Web searching also varied from one another. In general, they all showed fairly low levels of expertise in both areas. The participants were first-semester students in translation, except for Anna who was a second-semester student in her translator training program. They had little or no experience in translation (neither didactic nor professional), thus showing low levels of translation expertise. The quality of the translations they produced was in fact relatively low as their final grades in the translation practice course show. Except for Anna, who obtained an average "A-" between parts A and B of the course, Martha averaged a "B+," and Laura and Maria a "B". The study's research data also shows that the participants' Web search expertise was rather low, with mostly broad and simple searches performed as opposed to specific and advanced searches. The participants are therefore considered novice/non-expert students of translation as well as novice/non-expert Web searchers (see Chapter 6 for more details).

5.7 Data Collection Tools

To elicit the study's research data I used various tools, including the source texts that formed the embedding tasks for the participants' translation and Web search behaviors; the screen recorder; the background questionnaire; the online search reports; and the one-to-one interviews. I will describe these data collection tools in detail in the following sections.

5.7.1 The Source Texts for the Embedding Tasks

All participants were asked to translate four different source texts in class as part of their coursework. These texts were specifically chosen for the screen-recorded sessions that provided the majority of the study's research data. For each session, I selected a different source text in Castilian Spanish—on average 200 words long—which formed the context for translation-embedded Web search behaviors. The choice of the source texts for both teaching and research purposes was based on a number of explicit criteria put forward by Kelly (2005; see also Nord 1991 and Hurtado Albir 1995). Kelly groups these criteria under two umbrella terms, or notions, namely "professional realism" (ibid: 19) and "pedagogical progression" (ibid: 122).

The criteria I considered with regard to the level of professional realism involve (a) the authenticity of the texts (ibid: 119), (b) the “realism of the translation situation” (ibid: 120), and (c) the “professional market” (ibid: 121). As for the use of authentic texts, Table 7 provides information on the original and complete texts I chose for the course—texts that were not manipulated for teaching and/or research purposes—and the respective excerpts that the participants had to translate as part of the coursework. Although only source texts one (ST1) and three (ST3) used for the first and second embedding tasks (see Appendices A and B) respectively are analyzed here for reasons already explained in 5.4, an overview of the main characteristic of all four texts is provided for the sake of research transparency.

Table 7. Source Texts for Translation

ST	Authorship	Text Title	Title of Excerpt
1	Greenpeace España (http://www.greenpeace.org/espana/campaigns/transgenicos/consumo/gua-roja-y-verde)	Guía roja y verde de alimentos transgénicos	¿Por qué Greenpeace se opone a la liberación de transgénicos al medio ambiente?
2	Telefónica de España, S.A.U. (http://www.telefonica.es/on/io/es/atencion/tutoriales_articulos/pdf/RecomendacionesUbicacionMRIV1_0.pdf)	Recomendaciones para la ubicación y configuración de un router inalámbrico	Introducción a redes y dispositivos inalámbricos
3	Consejo Superior de Investigaciones Científicas (The Spanish National Research Council or CSIC)	Un científico del CSIC descubre dos nuevas enzimas con posibles aplicaciones en el tratamiento del sida	No title (see Appendix B)
4	TEKA Industrial, S.A. (http://www.teka.com/html/es/downloads/installation/INS-0000001.pdf)	Manual del instalador	Instalación del horno

Concerning the level of “realism of the translation situation,” Kelly states that “[t]he texts selected should respond to the characteristics which give rise to at least one realistic situation” (ibid: 120), i.e. one in which there might be a real need for translation services within a specific translation market. She also argues that this criterion “implies realism in relation to the language combination, and the frequency of text types translated in different situations” (ibid.). I, for example, selected source texts that represent several key industries in Spain and for which there could be a realistic need for translation services from Spanish into English.

In addition, all four texts included a task description (i.e. a translation brief or commission) that provided information on the commissioner of the translation, the

purpose of the translation, the place of publication, and the addressee, as further outlined in Table 8.¹¹⁹ Furthermore, the selected source texts for translation may generally reflect “the real professional market trainees are heading for, whether it be local, regional, national or global” (ibid: 121). At a global scale, the world market in which we live nowadays and, by extension, the translation market, is dominated by scientific and technological advancements where English is the language for knowledge dissemination.

Table 8. Extra-linguistic Data for the Pragmatic Analysis of the Source Texts

Commissioner	Translation Purpose	Addressee (Specialization & Scale)
Greenpeace New Zealand	Translation for immediate publication of an information package on genetically-engineered food	English speakers across New Zealand without specialized knowledge (i.e. the national lay public)
Telefónica de España, S.A.U.	Translation for publication on the commissioner’s international Website	English speakers worldwide without specialized knowledge
Thompson Reuters	Translation for publication on the Science & Health News section of Reuters.com	English speakers worldwide with and without specialized knowledge
Teka Industrial, S.A.	Translation for publication on the commissioner’s online catalogue	English speakers worldwide with specialized knowledge

Although professional realism is commonly considered “an essential pillar for translator training,” I agree with Kelly that this “key element ... should [ideally] be carefully combined with progression of the learning process” (ibid: 119). For example, I took into account a number of criteria that guided the text selection process for didactic purposes. In particular, the criteria on pedagogical progression involved the type of source texts used (ibid: 122), their degree of “content accessibility” (ibid: 123), and their level of “feasibility” (ibid: 126). As for text types, the selected source texts represent the main categories of translation dealt with in the course, i.e. scientific and technical translation. Gouadec, for instance, refers to scientific and technical translation as “sub-categories of translation” (2007: 28) or, more specifically, of specialized translation, as for him the main categories are “general” and “specialised” translation (ibid: 27-28). However, as Kelly points out, “the concept of ‘general’ translation is particularly unhelpful, as it is essentially a non-category” (2005: 123). Hence, translations are classified here

¹¹⁹ Each task description also included a link for the participants to access the online search report that they had to complete along with their translating and Web searching activities.

according to criteria similar to that used by Gouadec to characterize specialized translation *only*, namely that of highly specialized fields, or domains, particular text types, audiences, and media (2007: 28). More specifically, I categorized the source texts that I had originally selected for the purpose of this study according to subject area/domain, sub-domain, topic, text type, and text function. These criteria represent some of the intra-linguistic factors that enable the type of source text-oriented analysis proposed by Nord (1991), as indicated in 5.5.3 and further illustrated in Table 9.

Table 9. Intra-linguistic Data for the Analysis of the Sources Texts

ST	Domain	Sub-domain(s)	Topic	Type	Function(s)
1	Scientific	Agriculture & biology	Genetically-modified food	Food guide	Informative & appellative
2	Technical	Information & communication technologies (ICT)	Wireless networks & routers	Installation guide	Informative & appellative
3	Scientific	Chemistry & biology	Enzymes and AIDS treatment	Press release	Informative
4	Technical	Kitchen appliances	Multifunctional ovens	Installation manual	Informative & appellative

Text type, in particular, refers to a particular document, or material, that displays prototypical discursive and textual features as well as conventions such as those of recipes, patents, installation and user manuals, tourist brochures, and legal contracts. By text function, I refer to the communicative purpose of a given text, what some authors otherwise refer to as “text types.” For example, Hatim and Mason (1997) distinguish between instructive, expositive, and argumentative text types. Nord (1991) talks about informative, expressive, appellative, and phatic texts. Like Nord, other authors (e.g. Reiss 1976) classify text types drawing on Bühler’s distinction between expressive, informative, and vocative texts (Kelly 2005: 122).

In addition to these textual factors, the degree of specialization for communication purposes was another criterion for choosing the source texts. As Austermühl writes, “[s]pecialized languages or specialized communication can be organized horizontally or vertically, and these orientations have a direct impact on the amount of terminology and the type of register used” (2008: 268). More specifically,

[h]orizontally, specialized communication can be organized according to different, usually not interconnected, domains such as medicine, computer science, or politics. The vertical organization, or segmentation, of specialized communication mirrors the linguistic and domain-specific

presuppositions of the communication partners and presents different levels of abstraction and different degrees of specialization. It is a reflection of the different degrees of knowledge existing among the participants of a communicative event (ibid.).

Building on this, Austermühl further differentiates between “internal specialized communication” (experts communicating with experts from the same discipline), “interdisciplinary communication” (experts in one domain talking to experts from a different domain), and “external specialized communication” (between experts and lay people) (ibid.). Kelly, drawing on Arntz (1988), establishes similar communicative levels involving “non-specialist (sender) to non-specialist (receiver); specialist (sender) to non-specialist (receiver); specialist (sender) to specialist (receiver)” (2005: 123). Kelly thus conceives of a fourth level involving “non-specialist (sender) to specialist (receiver)” communication (ibid: 124). Wright (2009) also distinguishes among several communicative scenarios that are subject to specific situational diversities and registers. In particular, she distinguishes among “[p]eer-to-peer scientific communication;” “[s]cientist to skilled practitioner;” “[s]killed practitioners addressing technicians;” “[s]pecialists to lay people;” “[s]cience writers addressing the educated, interested lay public;” “[s]pecialists addressing educated laity;” “[s]pecialists addressing educated laity who have issues involving education, dialect, ethnology, personal life experience;” and “[l]aity and end users discussing Sci-Tech topics” (ibid: 8-9).

Given the fairly introductory level of the course, the source texts used for teaching and research purposes progressively moved through different levels of specialized communication, namely from non-specialist to non-specialist, specialist to non-specialist and/or specialist, and specialist to specialist. The degree of communicative specialization is closely related to that of “feasibility” (Kelly 2005: 126). In this regard, “[t]exts and particular activities selected must be feasible for students ... [and] should be neither too difficult nor too easy (ibid: 127, building on Kussmaul 1995: 51). Furthermore, “feasibility is not only a question of the difficulty ‘inherent’ to the task at a particular stage of training but also the conditions in which the task is to be carried out: deadlines, technical questions such as different electronic formats for submission, and so on” (Kelly 2005: 127). Concerning the time conditions under which the participants carried out the screen-recorded translation and Web searching tasks, there were no explicit time restrictions for the completion of these tasks, except for the class time itself (three hours). Obviously, not all the class time would be allocated to complete said tasks. On average, the participants counted with in-between one hour and one hour and

a half for each screen-recorded translation and Web searching session. In all cases, the participants considered the end of class time (7 p.m.) an explicit time restriction, as the online search reports as well as some of the one-to-one interviews show. It is also important to underscore that the use of reference works and Web resources was not restricted in anyway whatsoever.

Finally, unlike experimental research, in which the choice of source texts may become crucial for the control of variables, the source texts used for the first and second embedding tasks (see Appendices A and B) form the basis for analyzing and comparing the performance of the research participants. While ST1 used for the first embedding task was translated by two groups of participants, i.e. those of the main study and the pilot study, ST3 used for the second embedding task was only translated by the participants of the main study.

5.7.2 *The Background Questionnaire*

The background questionnaire aimed at collecting the participants' demographic data as well as data on their translation and Web search expertise. However, the questionnaire only served to obtain information on two of the four qualities making up the notion of expertise in this study (see 5.2.1), namely *knowledge* and *experience*. The remaining two qualities—*awareness* and *skills*—were explored using the screen recordings, as further described in 5.7.4.

The background questionnaire was designed using SurveyMonkey and administered in class during the first day of the semester (March 2, 2009). This setting allowed the participants to complete the questionnaires online while at the same time having me available. To design the questionnaire, which consists of 31 questions (see Appendix C), I considered a number of parameters concerning the (a) relevancy of the content, (b) its accuracy, (c) the structure of the survey, and (d) the type of questions asked (SurveyMonkey 2008). As for content relevancy, I aimed to formulate questions based on my research objectives and the kind of information I wished to collect. In other words, the research objectives became “information requirements” (ibid: 4, building on Brace 2004: 11). With regard to content accuracy, I carefully evaluated a number of aspects to try and collect data in a reliable and valid way. These aspects relate to the wording of questions, their sequence, and the length of the survey (cf. Trochim 2001: 123-125 as well as Moser and Kalton 1971). Naturally, questions that are well understood by respondents will be likely to increase the accuracy of the data collected. I

therefore aimed to formulate “legible questions ... that read well” and “painless questions ... that require a small amount of effort to answer” (SurveyMonkey 2008: 5). I also tried to keep the questions brief (by addressing one issue at a time whenever possible), objective (by avoiding leading questions as well as questions loaded with emotions and/or assumptions), simple (by using direct and familiar wording as opposed to technical jargon), and concise (by asking precise and specific questions, thus avoiding complexity and/or ambiguity) (ibid: 7-8).

The sequence of survey questions was intended to help “stimulate recall [and] motivate the respondent to reply” (ibid: 14). The survey begins with opening questions aimed at establishing rapport with the respondents and continues with questions that follow a specific order of ideas or topics. More specifically, I divided the questionnaire into three different sections, each of them comprising its own set of questions. These sections aimed at gathering information on the participants’ demographic data, qualities of translation knowledge and experience, and qualities of Web search knowledge and experience, respectively. I describe the type of questions asked in each section in the following.

5.7.2.1 Demographic Data

This section (called “Background” in the questionnaire) includes questions on the participants’ first and last names (questions 1 and 2); age and gender (questions 3 and 4); countries of origin and residency (questions 5 and 6); e-mail address (question 7); spoken languages (question 8); and academic qualifications (9). All the questions in this section are open-ended questions that sought the participants’ free responses, except for question 4 (gender), which required a dichotomous answer. In addition, questions 8 and 9 include multiple textboxes to rank answers according to a given level of specification (from the highest level to the lowest one).

5.7.2.2 Translation Knowledge and Experience

In this section (called “Translation” in the questionnaire), questions 1 to 4 aimed at collecting data on the participants’ levels of knowledge and experience possibly gained through previous training in translation (through practice, theory and/or technology courses as well as workshops and/or seminars). Questions 5 to 7 (use of translation resources, previous translation jobs, and average hours worked per month) sought the same type of information from a professional point of view. With regard to the type of

questions asked, questions 1 to 5 include dichotomous answers as well as a single textbox that was used as a filter for participants to provide additional information. A “filter or contingency question” is used when “you have to ask the respondents one question to determine whether they are qualified or experienced enough to answer a subsequent one” (Trochim 2001: 116). Question 6 consists of a matrix of drop-down menus in which the participants had to choose an answer from and question 7 of a matrix of rating choices (ordered from low to high) from which only one answer per row could be chosen.

This section of the questionnaire also includes a set of questions (8 to 16) that aimed at exploring the participants’ knowledge about translation. These questions belong to Orozco Jutorán and Hurtado Albir’s “Translation Notions Instrument (TNI)” (2002: 380). The TNI is one out of the three instruments that Orozco Jutorán and Hurtado Albir designed to measure translation competence in their own study of competence acquisition. More specifically, the instruments include the “Translation Problems Instrument (TPI)” designed to measure “behaviour when faced with translation problems;” the “Translation Errors Instrument (TEI)” designed to measure “behaviour related to translation errors;” and the “Translation Notions Instrument (TNI)” designed “to measure knowledge about translation” (ibid.). The three instruments have been validated through several pilot studies that involve the English>Spanish language combination at first and then additional language pairs later on. The TNI, in particular, consists of 14 items that I adapted to suit the study participants’ translation directionality, i.e. Spanish into English, and that I clustered around questions 8 to 16 of the background questionnaire. Issues addressed by the TNI include

[n]otions about translation, elements that intervene in translation, notions about translation problems, the translation unit, translation equivalence, translation function, translation competence and its sub-competencies, and finally, strategies to solve comprehension [as well as formulation] problems (ibid. 381).

I grouped these TNI notions into open-ended questions (8 to 11); ranking questions (12 and 13); a multiple choice question (14) that requires one answer only; a multiple choice question (15) that allows for as many answers as appropriate; and a rating scale question (16) for rating several items according to a true/false dichotomous criterion.

5.7.2.3 Web Search Knowledge and Experience

This section (referred to as “Online activities” in the background questionnaire) includes a number of questions aimed at inquiring about the participants’ Web search experience and knowledge. More specifically, questions 1 and 3 include rating scales to determine the frequency of Internet usage. Question 4 also inquires about said frequency but according to different online activities (e.g. academic research, translation-related research, social networking, etc.) that have to be rated on a five-point Likert scale. Question 2 includes a dichotomous choice as well as a filter question (using a single textbox) to assess the degree of accessibility to the Internet. Questions 6 and 7 also include a dichotomous choice and a filter question to inquire about the participants’ previous Web training experiences. Questions 7, 8, and 9 use multiple ranked textboxes to inquire about the participants’ declarative knowledge of Web searching, in particular, of search operators, search engines, and online databases. Questions 10, 11, 12, and 13 include multiple textboxes to assess the participants’ abilities to formulate queries using both the Google’s Search box and its Advanced Search page. Questions 14 (dichotomous question with a filter question), 15 (matrix of questions with one answer only), and 16 (multiple choice question) deal with the re-accessibility of Web information and/or resources (e.g. through bookmarking), the rating of Web-related statements based on a true/false criterion, and the evaluation of search results according to different assessment criteria.¹²⁰

With regard to the structure of the survey, the three sections referred to above were preceded by an introductory page that informed the participants about the survey’s purpose and the estimated duration of completion, among others. Confidentiality of information was discussed verbally with a view to easing any potential concerns among the participants of the study. The survey ended with a dichotomous question (17) that sought the participants’ consent to use their answers for teaching and/or research purposes, a single textbox (18) for additional explanations and/or comments, and a descriptive text thanking the participants for their time.

As stated in 5.4, the background questionnaire was tested in the pilot study, which allowed me to identify and solve a number of problems concerning (a) the layout of the

¹²⁰ It should be pointed out that questions 10 to 13 as well as questions 15 and 16 were adapted from a University of Auckland Library publication (2008) on how to perform Google searches effectively, interpret search results, and evaluate search results.

survey (two questions appeared parallel to each other rather than one after the other); (b) the content and type of some of the questions asked (I had to add two categories in the drop-down menus used in question 6 of the Translation section and de-activate the forced ranking option in rating questions 4 and 15 of the Online activities section); and (c) the estimated completion time provided in the introductory page, which had to be changed from an average of 15 minutes to an average of 30 minutes. As explained in the relevant literature on survey design (see the references above), this constitutes a rather long survey. I nevertheless chose not to reduce the survey length to guarantee the comprehensiveness of the data collected.

5.7.3 The Online Search Report

The online search report (OSR) aimed at gathering information on the participants' level of source-text domain knowledge (i.e. one of the selected user attributes) and on their Web search tasks embedded in translation (the main object of research in this study). In total, I collected 24 OSRs resulting from both the pilot study and the main study. For reasons already explained in 5.4, however, only the OSRs belonging to the ten screen recordings forming part of the study's research data are analyzed here.

The OSR presented the course participants with a systematic retrospective method for reporting on their Web searches performed for translation problem solving. It adopted a form similar to that of existing written reports (see 4.1.3 for details) used in translation studies to elicit introspective data on students' translation problems, their translation strategies, the sources/aids consulted, the final solutions adopted, and the rationale for adopting said solutions. In designing the OSR for this study, I drew on Gile's (2004) IPDR method as well as González Davies and Scott-Tennent's (2005) written protocol (WP). The main reason for so doing is that, as these authors point out, problem-solving reporting is a useful method to collect readily available information on students' translation problems and the strategies they use to solve said problems. This method is also "significantly useful in indicating problems with source consultation methodology" (Gile 2004: 3). As Gile states, "[o]ne aspect of the translation process which is particularly well covered by IDPR is ad hoc information acquisition (the information specifically sought to translate a given source text)" (ibid: 10). Furthermore, and of particular importance for this study, Gile specifically refers to the Internet as a source of information, mainly because "[e]vidence shows not only that ... the Internet has virtually replaced hard-copy texts as a resource for student translators ..., but also that

reliance on web sites is often too excessive, in particular with the search for specific collocations” (ibid.).

Yet, as Gile admits and as discussed in 4.1.3, one of the drawbacks of IDPR is that students generally need some time “before compliance [with the method] is achieved” and that “some ignore the reporting requirement” despite the instructions received (ibid: 7). This might have to do with the fact that IDPR requires no particular reporting format. The OSR used in this study (see Appendix D), for example, has a specific set of questions that guide the reporting process. My research data suggests that having a specific reporting format along with initial instructions and on-site guidance seems to help counterbalance students’ initial reactions “as to what exactly they should write” in the reports (Gile 2004: 3).¹²¹ In the case of the OSR, the reporting format consists of two main parts dealing with source-text domain knowledge and Web search tasks, respectively.

5.7.3.1 Domain Knowledge

The first part of the OSR comprises five questions aiming at gathering information on the participants’ level of source-text domain knowledge. More specifically, the first three include dichotomous answers as well as filter questions (using a single textbox) for respondents to provide information on their source-text domain knowledge and potential experience gained through previous training (through courses, workshops, seminars and/or self-learning opportunities). The fourth question includes a dichotomous answer with a filter question for participants to list all the ST terminology, expressions and/or ideas they were already familiar with before translating the ST. Finally, the fifth question is a multiple-choice question requiring participants to choose one answer for assessing their overall, perceived level of source-text domain knowledge.

5.7.3.2 Web Search Tasks

The second part of the OSR required participants to report on their Web search tasks carried out for translation problem solving. For each Web search task performed, respondents had to answer a total of five questions. Question 1 addresses cognitive aspects of translation-embedded Web searching. More specifically, it includes six

¹²¹ See, however, sections 4.1.3 and 5.7.3.2 for a discussion of the potential impact that a specific reporting format may have on the type of data collected as well as for an overview of the main disadvantages of using problem-solving reports for research purposes.

multiple open-ended textboxes that asked the participants to specify the ST item or element that was perceived as a translation problem and that prompted a specific search need; the rationale for the search need (i.e. the reason or reasons why said item/element prompted the search); the type of information required to tentatively satisfy the search need as motivated by translation problem solving (i.e. the search goal or goals); the selected search result (i.e. the final solution adopted to potentially satisfy the search need and eventually solve a translation problem); the rationale for the selected search result (i.e. the reason or reasons for the final solution adopted); and the source and context in which the final solution was found.

Questions 2, 3, and 4 address affective aspects of translation-embedded Web searching. In particular, question 2 is a multiple-choice question that required the participants to choose one answer to assess their overall level of search success (successful, partially successful or unsuccessful). It also includes a single textbox for participants to elaborate on the rationale for their perceived level of search success. Questions 3 and 4 use a five-point Likert scale for respondents to rate their perceived levels of search satisfaction and search difficulty, respectively. Finally, open-ended question 5 sought additional comments that the participants may have had on the specific search task at hand. Like the background questionnaire, the online search report was tested in the pilot study, which allowed me to identify and solve two specific problems. These involved the need to (a) include a textbox for respondents to specify the rationale for their search needs, which might have been motivated by a perceived translation problem; and (b) reverse the order of the rating choices in question 5 to make them consistent with the order of the rating choices in question 4 (from low to high).

As discussed in 4.1.3, despite the apparent usefulness of having a specific reporting format available, it would be naïve to ignore the potential impact that the OSR's format may have had on students' introspective data as opposed to, say, a more open-ended format like Gile's IDPR or, eventually, González Davies and Scott-Tennent's WP. Although the OSR section on cognitive aspects of Web searching elicits open-ended answers, these are guided through questions that may prevent students' more spontaneous and/or elaborated comments on the topics being explored. Further, dedicated research would be required to assess how different written (and/or verbal) reporting formats may influence the type of introspective data collected. As mentioned earlier, Hansen (2006), for example, set out to compare IDPR with two different

retrospection methods, Retrospection with Replay (R+Rp) using Translog and R+Rp with immediate dialogue (R+Rp+ID), in her study of sources of translation problems. She found that “with R+Rp, the number of problems reported [was] larger than with IDPR” concerning both L1 and L2 translation (ibid: 8). However, her study does not show much difference between IDPR and R+Rp concerning “the use of dictionaries and the internet” for both translation directionalities. Only in the case of L2 translation was the number of “comments on dictionary use and internet searches” with IDPR slightly higher than with R+Rp, albeit by only one problem (ibid: 9). Hansen attributes the difference in results to the data-collection tools themselves. With IDPR subjects tend to complete the reports in a rather non-comprehensive manner (Gile 2004: 8, cf. Hansen 2006: 9). The students using IDPR in Hansen’s experiments, for example, failed to report all their translation-related problems in spite of the instructions received (2006: 10). Similarly, the screen recordings of this study show that the research participants did not report all their translation-embedded Web searches either. This data discrepancy applies mostly to Web searches performed to check word spellings or confirm tentative translation solutions. Interestingly, Hansen reports very similar results concerning spelling problems. She explains that these “emerge with R+Rp, when the subjects see their orthographic revisions during the replay – in both [translation] directions. Spelling difficulties are not mentioned at all with IDPR” (ibid.). These findings seem to support Gile’s claim that “students report any problem they consider significant” (2004: 5, cf. Hansen 2006: 10). In other words, translations problems may not necessarily involve serious or difficult processing as some of the literature discussed in 3.1.2 suggests.

Finally, one should not ignore the potential impact that the order in which students complete the reports may have on their translation processes (cf. Hansen 2006: 6). As mentioned in 4.1.3 and 5.4, the participants of this study chose when to complete their OSRs, i.e. *before*, *parallel to*, *after* translation, or any combination of these. Subsequently, the order of progression through different tasks (in particular translating, Web searching, problem reporting, and switching) also became an object of analysis in this study (see 6.3.2 for details).

5.7.4 The Screen Recorder

To record the research participants’ processes of translation, Web searching, and problem reporting with OSR, I used Blueberry's BB FlashBack software. Like the key-logger Translog, BB FlashBack records all the keystrokes, including the changes,

deletions, additions, keyboard shortcuts (such as cut and paste), cursor movements, and mouse clicks made by a person during the process of typing text. Translog, however, only records writing operations carried out in its own text editor (called TranslogUser), while BB FlashBack captures any PC screen activity, including searches performed on the Web.¹²²

In this study, I used screen recording to explore not only processes of translation, Web searching, and problem reporting with OSR but also the two remaining qualities that make up the notion of expertise, i.e. *awareness* and *skills*. These two cognitive qualities are assumed to be highly interdependent and therefore any attempt at a neat separation for theoretical purposes may be futile. I nevertheless take the quality of *awareness* to refer to the participants' self-monitoring abilities to detect a given problem, be it a translation problem or an information-seeking one. Conversely, by *skills* I refer to the participants' abilities to solve a specific translation and/or information-search problem. As González Davies and Scott-Tennent point out, one of the main differences between novice and expert translators is that the latter are generally able to detect a problem and solve it as efficiently and quickly as possible—"the period between spotting a problem and solving it may go from a split second to whole days or weeks" (González Davies and Scott-Tennent 2005: 162, building on Gil 2003). Self-monitoring abilities to spot a problem and solve it more or less successfully may manifest themselves and/or develop in a more or less conscious way in both processes and products of translation. As shown in Chapter 2, conscious vs. unconscious processing is one of the central discussions in translation process research. The latter type of processing is typically associated with the "smooth" rendering of target language and the former with deviations from such smooth rendering. Pauses and revisions are thus considered the most obvious signals of conscious processing (Tirkkonen-Condit 2002: 6, building on Séguinot 1989).

Let us assume, for example, that we set out to find out whether or to what extent routine professional translation takes place in terms of chunks that are organised pair-wise in the

¹²² It should nevertheless be pointed out that "[f]or research where it is important, e.g. to track information retrieval procedures from the Internet or from other electronic resources, Translog can be combined with screen capture programs such as ScreenCam and Camtasia" (Jakobsen 2006: 103). Yet, for reasons of ecological validity and technical simplicity, I preferred to have translation-embedded Web searches recorded in individual movies using one single program. Translog would have been extremely useful (if not absolutely required) if this study were to investigate in detail temporal aspects of text production—such as time delays which allow for the study of distributional patterns of pauses—using keystroke logging research (see 4.2.3 for details). In contrast, this study focuses on Web searches embedded in the context of translation problem solving.

translator's mental bilingual dictionary. Smooth unmarked rendering would then constitute an operation in which the translator replaces source text chunks with automated default equivalents, such that the equivalents are triggered off automatically without conscious decision making. Professional translators have been observed to carry out routine tasks in a way which suggests that this might be the nature of the translation process, although different hypotheses have also been proposed. In automatic rendering of the kind suggested above there is a risk that the equivalents may be false friends, contextually incompatible, pragmatically slightly deviant etc. It is a well-known fact that novices' performance tends to manifest traces of unmonitored equivalent generation, with the consequence that the translated text has a taste of translationese. This feature should gradually disappear as the novice aspires towards expertise. In an expert's performance translationese tends to be less frequent (Tirkkonen-Condit 2002: 12).

Following Tirkkonen-Condit's argument above, I have, for the purpose of this study, assumed that novice and expert processes "are similar in kind and differ only in quantity, and that the expert has means of preventing the access of the unwanted 'equivalents'" (ibid.). Furthermore, as stated in 3.2.1, conscious and unconscious processing is not assumed to represent a dichotomy. Kiraly, for instance, found no "sufficient evidence that processes are either completely controlled or completely automatic" in his cognitive study of translation processes (1995: 86). Hence, he prefers to speak of "relatively controlled or automatic" processes (ibid: 86) vs. "relatively uncontrolled (intuitive) processes" (ibid: 87).

Just like verbal and written reports, screen recordings do not give direct access to information on uncontrolled processes either (nor do they provide a comprehensive picture of controlled translation processes). As a result, the participants' relatively uncontrolled processes could only be *inferred* from their spontaneous rendering of target language, which may have required the intervention of problem-solving skills or not. Indicators of relatively controlled processes are the ST units that required the participants' cognitive attention to make a problematic decision, an unproblematic one, or a mix of both to translate said units into the target language. Relatively controlled processes of translation could be traced in the screen recordings as well as in the online search reports.

Although I used BB FlashBack only to collect translation-embedded Web search data, screen recorders seem to have additional research potential. For instance, if used with a microphone and a webcam connected to a PC, screen recording software could be useful for research into collaborative translation processes, where written, verbal, and non-verbal data could be collected at the same time through a single PC. Furthermore,

although screen recorders may introduce a foreign element in the translation process, they are considered highly unobtrusive (see 4.2.3 for more details). BB Flashback, in particular, can record movies of PC screen activity while running as a tray icon (which displays the recorder as an icon in the system tray), in the desktop taskbar (it displays the recorder as small toolbar in the taskbar), or as a floating toolbar above the desktop. For the purpose of this study, I run the screen recorder in the taskbar as this seemed a rather non-invasive option, while still having the main set of controls (start, play, and stop recording) immediately available. This proved quite useful given that the intervention of the researcher is required to start recording a new movie and save it to a specific location afterwards. To minimize said intervention, BB FlashBack can be set to create movies that are limited by file size (i.e. movie files that never exceed a specific size) and/or time (movies that only record a set number of minutes). Nevertheless, the researcher would still have to start recording a new movie, which could of course be done before users carry out any PC screen activities. For ethical reasons, however, I did not consider this option in my investigation.

Movies recorded in BB FlashBack have a FBR (FlashBack Recording) file extension and can either be displayed in BB FlashBack’s proprietary player or published in popular formats by exporting them to Flash, QuickTime, Windows Media Video (WMV), Audio Video Interleave (AVI), MS PowerPoint, and executable (EXE) files. I exported the study’s movies to WMV files (these are available upon request), which, like any of the previous formats, facilitates their viewing in virtually any PC. Before exporting the movies to WMV, however, I edited the original FBR video files to remove the research participants’ first and last names typed in the online search reports, thus preserving the participants’ anonymity. Table 10 shows the time length (h:mm:ss) of the original, i.e. the unedited FBR files.

Table 10. Length of Screen Recordings

	Participant	Embedding Task 1	Embedding Task 2	AVERAGE
Pilot Study	Daniel	0:39:56	n.a*	n.a
	Bob	1:00:37	n.a	n.a
AVERAGE		0:50:16	n.a.	n.a
Main Study	Martha	1:25:18	1:33:15	1:29:17
	Anna	1:16:16	1:37:39	1:26:78
	Maria	1:10:59	1:40:27	1:25:43
	Laura	1:01:36	1:38:02	1:19:45
AVERAGE		1:13:32	1:37:21	1:25:31

*n.a: not applicable

As described in 5.4, a total of ten movies resulting from Tasks 1 and 2 provide part of the study's research data. Let us remember at this point that Task 1 (see Appendix A) was carried out by the participants of both the pilot study and the main study, while Task 2 (see Appendix B) was only carried out by the participants of the main study. I will return to the time spent for completing each embedding task in sections 6.3.1.1 and 6.3.1.2, respectively.

5.7.5 Audio Digital Equipment

I used audio digital equipment to record the four individual interviews that I conducted as part of the main study. The interviews, which lasted for an average of 47 min. 34 sec., were conducted in my office during the last three weeks of the semester. All interviews were later transcribed and, like the original movie files, edited to remove the participants' personal details as well as other sensitive data that may have involved their private lives, feedback on their performance in the course and/or advice on their future studies. Like the movie files, the edited interview transcripts are also available upon request.

Table 11. Length of Audio Recordings

Participant	Interview Length (mm:ss)
Martha	48:32
Anna	60:03
Maria	34:01
Laura	43:43
AVERAGE	46:34

The purpose of the interviews was to gain knowledge about (a) any potential influence that the screen recorder and the OSR may have had on translation and/or Web searching processes; (b) the (dis-)advantages of using such tools for teaching and learning about translation; (c) the type of Web search and navigation actions carried out by the participants as well as the translation resources they consulted; and (d) their strategies for evaluating information and/or resources on the Web. To explore these topics, I prepared a set of questions based on the preliminary data analyses that I had conducted in previous research stages. Following the principles and techniques of semi-structured interviewing, I used a similar set of questions for each interview, albeit tailored to the needs of each interviewee.

Interviewing techniques require, among others, attentive listening and other verbal as well as non-verbal attention signs to keep respondents talking freely. Mastering

interviewing techniques, however, requires time and effort. I, for example, do not consider myself a particularly good interviewer, mainly due to my lack of experience with this type of research method. Although I aimed to follow the main principles underlying interviewing techniques, I found this was not always feasible. For instance, as Trochim (2001: 120) suggests, I tried to ask the interview questions exactly as they were written in my interview protocol. However, interview data shows that I have a tendency to paraphrase the original questions to try and make things simpler and/or friendlier for the respondents. I also found it hard to respect silences sometimes. These are, however, considered one of the “most effective ways to encourage someone to elaborate” on a particular aspect (ibid: 131). I nevertheless managed to follow other recommended interview techniques such as using repetition for follow-up purposes, keeping the same order of questions across all interviews, and requesting clarification to elicit additional data on particular topics. The use of (in-)adequate interviewing techniques may of course have affected the validity and reliability of the study’s interview data. It is also important to underscore that the interviews involve discussions relating to the four source texts that I originally selected and used for research purposes. Yet, for reasons already explained in 5.4, I will only discuss the interview data concerning Tasks 1 and 2.

5.8 Data Processing Methods and Tools

5.8.1 Evaluation of Translations for Research Purposes

As indicated previously, translation quality assessment (TQA) for research, didactic or professional purposes, among others, has become a field of inquiry in its own right.¹²³ The special issues of *The Translator* entitled *Evaluation and Translation* (Maier 2000b) and *Meta*, entitled *Evaluation: Parameters, Methods, Pedagogical Aspects* (Lee-Jahnke 2001), among others (e.g. House 1977/1997; Al-Qinai 2000; Rothe-Neves 2002; Williams 2004; and Colina 2008 in addition to the references provided in 5.5.4), testify to the growing interest in TQA. Despite “the amount of space that has been devoted to prescriptive translation theory” in which TQA is usually dealt with, “there is as yet no broad body of research providing a basis for suitable evaluation procedures” (McAlister

¹²³ For an overview of the different purposes that judging the quality of translations may fulfil see, for example, Lauscher (2000) and Brunette (2000).

2000: 231). Moreover, as Pavlović points out, “[n]o universally applicable or ‘objective’ method of evaluating translations has been designed yet and it is doubtful if this will ever be possible (or even desirable)” (2007: 77). Nevertheless, “if we are to take translation quality into consideration as one of the variables, some system of evaluation, however imperfect and liable to criticism, has to be applied” (ibid.).

Research into translation processes shows that a myriad of criteria has been used to assess “translations produced in the course of experimental studies” for the purpose of correlating translation quality products and “the strategies that led to their production” (ibid: 60). Studies that make assessment criteria explicit include, for instance, Scott-Tennent, González Davies, and Rodríguez Torras’ (2000) empirical study of students’ application of strategies to solve certain translation problems. In said study, the translations produced by two groups (experimental and control) of students were assessed by “external markers,” who used band scales to quantify four qualitative criteria: “intelligibility of TT,” “adequacy of TT to TL norms,” “transfer of ST style and register,” and “transfer of ST contents” (ibid: 112). The overall mark assigned to each translation “was the sum of the marks for each criterion, [which] had previously been statistically tested for inter-marker reliability” using a Pearson-product moment correlation test (ibid: 111). In Kiraly’s study, “assessment information came from the researcher’s evaluation of the functional adequacy of elements translated and the global evaluation completed by two independent raters” (1995: 88). More specifically, Kiraly determined the number of acceptable translation solutions at a micro-textual level, while the independent raters used a five-point scale for assessing the functional acceptability of translations at a global/macro-textual level.

A Pearson-product moment correlation coefficient was also used “to test the inter-rater reliability of the global assessments” (ibid.). Similarly, Scott-Tennent, González Davies, and Rodríguez Torras (2001) combined a numerical marking system with a holistic one, albeit using different qualitative criteria, to assess translations produced by students in an experimental course on the application of translation strategies. In their study, the teacher used the numerical system (based on Hatim and Mason 1990 as well as Hurtado Albir 1994) to mark four qualitative criteria: transmission of ST message, ST comprehension, transfer skills, and TT legibility. Plus or minus points could be awarded to judge the overall impression of the translations being assessed (ibid: 738-739). This numerical marking system was combined with a holistic method whereby translations

were globally judged as either acceptable, acceptable but with required improvements, or unacceptable (ibid: 739).

In Jääskeläinen's study of subjects' reactions to the translation assignment and their "use of dictionaries and other reference material" (1989: 89), the translations produced by the subjects "were evaluated by an evaluation team which consisted of two teachers from the Savonlinna School of Translation Studies and a students' panel (three fifth year students of English)" (ibid: 90). Although the evaluators are identified in Jääskeläinen's experimental study, the criteria used to assess the subjects' translations are not made explicit. She does so, however, in another study (1990: 97-105) conducted as part of her licentiate thesis on features of successful translation processes (see also Jääskeläinen 1999). In this study, the translations produced by the subjects were evaluated by "four lecturers at Savonlinna who were not informed as to the translators' professional ability. In addition, the translations were sent to the co-editor of the national newspaper for which the text was supposed to be translated," and whose comments were found very similar to those of the lecturers (Jääskeläinen 1996: 63). With regard to the assessment criteria used, "the raters were asked to give an overall rating with some comments ... [as well as] to pay special attention to how well the translations fulfilled the requirements set by the task description" (ibid: 63-64).¹²⁴ "Semantic accuracy and linguistic fluency were also used as criteria" (ibid: 64). Similarly, in Gerloff's (1988: 135-144) study of successful process features, the translations produced by the subjects were evaluated by three independent raters of whom one was the experimenter. The raters were asked to pay attention to two key factors:

accuracy, or faithfulness of meaning to the French text, and readability of the final English product. Taking both factors into account in one rating, a quick overall holistic rating was given to each translation, assigning each product to one of four groups, thought of as "best"; "very good", "good" (or "reasonably good"), and "weak" (ibid: 135).

In Hansen's (2006) study, translation errors made by students were marked anonymously by three different raters, namely "two potential recipients of the target texts," and Hansen herself (ibid: 8). Only the errors that all evaluators "spontaneously

¹²⁴ The task description required the subjects to edit the source text which, in turn, involved some re-writing. Jääskeläinen therefore points out that "[f]or the more puristic this makes the task 'a rewriting task' instead of a translation task" (1996: 64).

agreed on were registered,” while all other TT elements were considered “good” translation solutions (ibid; cf. Pavlović 2007: 60). Similarly, drawing on Jonassen (1992: 143), Pavlović applied a “multiple-perspectives” (2007: 60) method in which three different evaluators assessed the target texts produced by students in her experiments on directionality features of collaborative translation processes. By having three evaluators—“two professional translators with more than 15 years of translation experience in both directions, and a translation teacher, also with more than 15 years of practical experience in both translation and teaching”—Pavlović aimed at achieving “intersubjectivity (in the sense of agreement or consensus) [regarding] the evaluation of the target texts obtained in the experiments” (ibid: 77). In Pavlović’s study, all three evaluators had to reach consensus collaboratively as to “what should count as unpublishable ..., publishable but could be improved ..., and publishable ‘as is’” in the translations to be assessed (ibid.). These revision categories would seem to correspond to other similar categories used to rate the degree of translation acceptability such as those proposed by Scott-Tennent, González Davies, and Rodríguez Torras, and Kiraly mentioned above. Nevertheless, Pavlović uses different qualitative criteria to describe her first two categories of revision, which “would correspond to the real-world notions of ‘must revise’ and ‘revise if there’s enough time’ respectively” (ibid.). On the one hand, unpublishable TT elements in Pavlović’s study referred to

parts of the target text that were considered unacceptable. These would be the parts of text that, [in the evaluators’ opinion], could not be published as they were, either because they distort what the evaluators’ perceive to be the plausible interpretation of the source text, or because they contain an unambiguous target language error (of whatever kind) (ibid: 78).

On the other hand, publishable TT elements that could benefit from improvements corresponded to “parts of text which, although perhaps passable – in the sense that they were ‘good enough’ – were nevertheless ‘revisable.’ In other words, the evaluators could think of a ‘better’ version, perhaps more idiomatic, more readable, more conforming to target usage norms, and so on” (ibid.). Finally, to allow for inter-group and intra-group quantitative comparisons, unpublishable TT elements “were counted as one negative point” and publishable elements that could benefit from improvements “as half a point.” The sum of the negative points represented the “revisability score” later assigned to each translation (ibid.).

Intersubjectivity, or else, a less biased perspective, was also aimed for in this study by having a fellow translation teacher co-assess and co-evaluate the translations produced by the students in the translation practice course. As discussed in 5.5.4, these translations were evaluated by combining a numerical marking system (based on Hurtado Albir 1995 and ITR's "BlackJack") with Waddington's (2001) holistic method for didactic purposes. These systems were also used to assess, from a product-oriented perspective, the quality of the translations produced by the individual members of the two groups (i.e. those of the pilot study and those of the main study) regarding the first and second embedding tasks (see 6.2 for details). Yet, with the aim of conducting research into Web searching for translation problem solving, the study's co-evaluator and I used a slightly different system to assess, from a process-oriented perspective, the participants' problem-solving performance (see 7.1.4.2 and 7.2.4.2). We developed, like some of the researchers mentioned above, a fixed number of categories to assess the participants' translation solutions according to their degree of successfulness. Translation solutions were thus classified as (a) unsuccessful, (b) partially successful, (c) successful, or (d) highly successful.¹²⁵

Based on the assessment results that had been previously obtained by applying the numerical marking system described in 5.5.4 (in which translation errors were classified as major or minor, and certain translation renditions as good or exceptionally good) and similar to Pavlović's proposed system of "revisability scores," we considered unsuccessful solutions parts of the target text that contained clear misinterpretations of the source text, content inaccuracies, terminological mistakes and/or inconsistencies, and major grammatical or other linguistic errors. We considered partially successful solutions parts of the target texts that were rendered in a more or less satisfactory manner but which nevertheless required improvement of some kind, in particular concerning aspects of style, punctuation, language variety, and formatting. Unlike Pavlović's system, however, but similar to other evaluations methods described above, we considered all other target text elements as either successful or highly successful

¹²⁵ This evaluation system was primarily used to assess the translation solutions that the participants explicitly identified in the OSRs. It was also used, albeit to a lesser extent, to give an overview of those solutions adopted to translate parts of the text that were not identified as problematic in said reports but that nevertheless seemed to be the result of unresolved problems. While the former type of solutions requires the ability to spot self-constructed translation problems, the latter may not necessarily involve said ability. These categories of assessment also allowed me to compare the participants' perceived levels of success regarding their Web searching performance for translation problem-solving with the perceptions of the evaluators.

solutions. Successful solutions were *correct* solutions in the sense that they did neither represent any of the problems that characterize solutions as unsuccessful nor did they require any improvements, although we could still think of *better* solutions. Highly successful solutions involved those parts of the target text that did not qualify for any of the previous categories and thus completely fulfilled the requirements set by the translation brief in terms of addressee, text function, style, register, and linguistic variety. We also considered highly successful solutions parts of the target text that read very fluently—mainly as a result of the detachment from the source language syntax (i.e. Spanish) and the adherence to the syntactic norms of the target language (i.e. English)—as well as those TT elements that were creative and/or sounded highly idiomatic. For this type of solutions, we could not necessarily think of *other* highly successful solutions.

5.8.2 Coding of Questionnaire and Online Search Report Data

All completed background questionnaires and online search reports were first downloaded from SurveyMonkey.com, processed in MS Word (see below), and then coded in NVivo, a qualitative data analysis software developed by QSR International to conduct research using any qualitative methodology. More specifically, NVivo allows for the exploration of qualitative data sources—such as field notes, video and audio recordings, and video and audio transcripts—using a variety of functions that aid the researcher in coding and analyzing data.

Coding, in particular, allows researchers to gather all the material related to a topic, concept, or theme in so-called “nodes.” These are points of information that can be arranged in “free nodes” (stand-alone nodes with no clear connection with other nodes), “tree nodes” (classified in a hierarchical structure), “cases” (nodes used to collect data about sites or people that have attributes such as gender or age) and/or “matrices” (a collection of nodes that results from a matrix coding query run to ask a wide range of questions about patterns in the data). It is possible to code data at new nodes, at existing ones and/or code “in vivo,” i.e. create a new free node based on selected content where the selected text becomes the node name. In addition to coding, NVivo facilitates capturing ideas and linking material through “annotations” (used to comment on selected content), “memos” (to be attached to any given source and/or node of information), “links” (to place pointers between the content of sources, nodes, etc.) and “sets” (to group different types of project items). Besides coding and linking, you may

also classify data using “cases” (in this case, the research participants) to set up attributes (e.g. domain knowledge, translation expertise, and Web search expertise) and their values (e.g. low vs. high), and “relationships” to describe connections between project items such as cases (e.g. Gema and Janet process STs sequentially) and nodes (domain knowledge impacts Web searching). Finally, information can be explored and visualized using “queries” to question data, find patterns, and pursue ideas (e.g. to find memos that were coded at the node for *domain knowledge*); “models” that help visualize initial ideas or identify emerging patterns and connections (similar to concept maps); “reports” for tracking the overall progress of your research project; and “charts” to present your research findings (QSR International 2009).

Coding, linking, classifying, and visualizing aids can be used to explore unstructured, semi-structured and/or structured qualitative data. For the first type of data, nodes have to be created manually. For the two latter types of data, nodes can be created automatically using the “autocoding” function in NVivo.¹²⁶ Autocoding is a fast way to create nodes for each question in an interview or questionnaire, or for each participant in a focus group, and then code the answers. To use the autocode function, paragraph styles have to be applied consistently in the documents that are to be coded and analyzed. This can be done in a word processor or in NVivo directly. For this study, I processed the background questionnaires (structured data), the online search reports (structured data), and the interviews (semi-structured data) in MS Word by applying paragraph styles to main questions and related sub-questions. These were then coded in NVivo at nodes that represent the topics explored in each type of survey.

5.8.3 Transcription and Coding of Screen-recorded Data

By far, the most arduous, labor-intensive, and time-consuming phase in my research into translation-embedded Web searching was transcribing the ten screen recordings of the study. This transcription phase involved creating a script “resembling ‘stage directions’” (Pavlović 2007: 76) of every online task and related actions carried out by the participants on the computers they worked with. I distinguish among three main types of online tasks in this study, namely translating, Web searching, and problem-solving reporting with OSR (see 6.3.1 for details on a fourth category called “switching”). Online actions represent different events within each type of online task.

¹²⁶ For semi-structured interview data, only questions that are asked across all respondents can be coded automatically.

For example, translation task-related actions may involve typing, adding, deleting and/or modifying text rendered in the target language. Web searching-related actions may include typing a search query, modifying a query, clicking a link or a button, typing an URL, etc. Reporting on Web searches performed for translation problem solving include specifying and/or justifying search needs, search goals, search results, and sources of consultation as well as clicking buttons for selecting rating options (see Table 12 for a typology of actions classified under different categories).

The participants' online actions were recorded on individual spreadsheets (one per participant and embedding task) in which each online action "is designated by a separate line of code" (Hargittai 2004: 213) (see the data sheet example provided in Table 14 below). The video transcription process is based on Hargittai's "method for coding and classifying users' online information-seeking behavior," a method that "makes it possible to understand many details about users' sequence of actions simply by looking at the spreadsheet that contains the information" (ibid: 210). Hargittai developed her proposed method for coding data on how users find information on the Web or, more specifically, how a user may arrive at a Web page through different online actions (e.g. by typing the Web address directly in the browser's address bar, clicking a link, using a browser button, etc.). For Hargittai, an online action is "the mode of moving from one web page to the next" (ibid: 211). In this study, however, online actions do not only refer to such information-seeking movements but also to any other IS-related events as well as translating and problem-solving reporting ones. This extended concept of online action allowed for a contextualized analysis of translation-embedded Web searching behaviors from a *multitasking* perspective. According to Spink et al., multitasking refers to "the ability of humans to simultaneously handle the demands of multiple tasks through task switching" (2006: 264-265, drawing on Just et al. 2001 and Rubinstein, Meyer, and Evans 2001). Hence, "Web search can also include information multitasking behaviors that occur when users juggle the challenge of searching on multiple topics" (ibid.). More specifically,

Web search engine users may information multitask in two ways. First, a user may begin their Web search with multiple topics, or second begin with a single topic and then develop additional topics during the search process. Both processes include information task switching, or switching back and forth between different topics during a search session. For example, a user may switch between seeking health information and new car information as they think and work on multiple information problems concurrently (Spink et al. 2006: 265).

The research participants of this study switched back and forth not only between different Web search tasks but also among these and the remaining online tasks, i.e. translating and problem-solving reporting. Switches among Web searching, translating, and problem-reporting were recorded under a category I came to name “Window/Tab” in the spreadsheets. This category refers to the different working environments or windows in which said online tasks were performed. Task environments in this study include the “Translation” window (where translation-related actions were carried out), the “OSR” window (where reporting on Web searches for translation problem solving took place), and the browser window, or tab, in which Web searches were performed.¹²⁷ The browser window/tab adopted the name of the Web browser that was used by each participant (either Internet Explorer, which is referred to as “IE” in the spreadsheets, or FireFox, named as such in said spreadsheets). The distinction between Web browsing *windows* and *tabs* was made to accommodate the participants’ different navigation styles—some preferred to work with windows only, others used tabs within windows, and yet others used a combination of both methods to surf the Internet.

Online actions occurring in each of the windows described above were coded in the spreadsheets under a dedicated category named “Actions.” Contextual information relating to these actions was classified and coded under other dedicated data categories. Table 12 lists these categories along with the type of contextual information they provide and the online actions they refer to. Verbs in italics indicate the online actions themselves (such as *access*, *re-access*, *click*, *open*, *close*, *type*, *copy*, *paste*, *delete*, *add*, *specify*, *select*, *highlight*, etc.), while words or expressions in quotation marks refer to the different objects/elements the online actions were performed on.

Table 12. Categories for Coding Online Task-related Actions

Category	Type of Information and Online Actions
Time	The exact time at which a given online task-related action was performed.
URL	Web pages <i>accessed</i> and/or <i>re-accessed</i> for information-seeking purposes. Web pages resulting from search queries are referred to as “search results pages” in the spreadsheets. All other Web pages are simply referred to as “pages.”
Query	Queries <i>typed</i> in a search engine (such as Google) or an internal site engine (such as the

¹²⁷ The participants of the pilot study also had to switch to a fourth window referred to as “Links to questionnaires” in the spreadsheets to access the links to the online background questionnaire and the online search report.

	ones found in online dictionaries or newspaper archives), including words, prepositions, punctuation symbols (e.g. commas, brackets, and hyphens), Boolean operators and/or any other advanced search operators (e.g. quotation marks). Search queries performed in search engines are simply referred to as “queries,” while those performed in internal site engines are coded as “site queries” in the spreadsheets.
Link/Tab Text	The exact text of either a <i>clicked</i> text link or browser tab. Links are classified into three main types: “search results links,” “site links,” and “off-site links.” The first type refers to page links resulting from a search query performed in either a search engine or an internal site engine. The second type refers to within-site links (i.e. links to Web pages within the same site), and the third type to links to pages outside a given Web site. A distinction is also made between “textual,” “graphical/image,” and “pop-up window” links where appropriate.
Button Text	The exact text of a <i>clicked</i> text button, including the “option buttons” of the online search report, browser buttons and/or Web page buttons.
Select/Highlight	<i>Select</i> refers to “pull-down menus,” “menu commands,” “menu options,” and/or “context menu options” used to perform specific operations such as setting the language in MS Word. <i>Highlight</i> refers to “letters,” “characters,” “punctuation,” “words” and/or text strings (the latter simply referred to as “text” in the spreadsheets) selected to perform different text-related actions such as <i>cutting</i> , <i>copying</i> , <i>pasting</i> , <i>deleting</i> , <i>replacing</i> , <i>applying</i> formatting information (e.g. font type, size, and colour), etc.
OSR	Textual input of the OSR window. Online actions in this window include <i>specifying</i> “search needs,” “search goals,” the rationale for a given search need (“search need rationale”) “search results,” the rationale for a selected search result (“search result rationale”), the rationale for the overall perceived degree of search success (“success rationale”) as well as <i>clicking</i> “option buttons” to rate perceived levels of “search success,” “search satisfaction,” and “search difficulty.” Text-related actions include <i>cutting</i> , <i>copying</i> , <i>pasting</i> , <i>deleting</i> , <i>adding</i> , <i>replacing</i> , and <i>applying</i> format.
Translation	TL textual input of the Translation window. In addition to the text-related actions described above, two additional online actions are distinguished under this category: <i>translate</i> and <i>re-translate</i> . The first refers to any given ST unit of whatever length that was translated without any interruption. This type of action was taken to represent relatively uncontrolled/automatic processing. The latter refers to any modifications done to existing translation units as a consequence of translation revisions. Revisions, pauses, and Web search tasks performed for translation problem solving, among others, were taken to indicate relatively controlled/non-automatic processing (see Chapter 3 for details on indicators of problem solving).
Error	Web pages neither found nor loaded correctly.
Autocomplete	Words, text strings and/or URLs that the participants wanted to type, but which were predicted and completed by a Web browser, search engine (or any other query tool), word processor, etc., based on text elements previously typed.
Comments	Additional contextual information aiming at facilitating a better understanding of an online action or series of actions.

The participants' online actions were categorized and coded in the spreadsheets by viewing each movie in the BB FlashBack Player window and using the Playback controls. These controls can be used to playback movies at different speeds, which I found particularly useful to navigate through different movie frames. Navigation is thus facilitated through the Timeline and Frame bar. The Timeline "shows the entire length of the movie, from the first frame ... to the final one ... [where] you can jump to any point in the movie by clicking on the Timeline" (Blueberry Software 2009). One can also position "the mouse over the Timeline to display a thumbnail image of the movie at that point" (ibid.). The Frame bar works in conjunction with the Timeline to show "a graphical display of each individual frame in the movie" (ibid.). More specifically, it shows "a magnified portion of the timeline. Because each frame lasts only a short period of time (1/25th second by default) the Frame bar will typically only show a small portion of your movie. Clicking on the Timeline selects a point in time and the frame at that point" (ibid.).

The Player window, the Playback controls as well as the Timeline and Frame bar allowed for the transcription and coding of the participants' online actions using the coding scheme described above. Some of these actions were coded using a second scheme, one that accounts for the use of virtual keys such as arrow keys, modifier keys (e.g. Ctrl and Alt), and function keys. These are highlighted in blue in the spreadsheets. Virtual keys pressed by the participants were captured by BB FlashBack's keystroke logging function, which registers keystrokes at record-time and saves them in a key log. Table 13 shows the list of virtual keys recorded in the spreadsheets in the same way that BB FlashBack represents these keys in its Key bar, a section of the Frame bar that shows all the keys pressed in any given movie frame.

Table 13. List of Virtual Keys Displayed in BB FlashBack's Key Bar (Blueberry Software 2009)

^	Space
⌘	Left tab
⇧	Right tab
↵	Return
L⇧	Left shift
R⇧	Right shift
←	Left arrow
→	Right arrow
↑	Up arrow
↓	Down arrow
⌘	Windows key

Del	Delete
Ins	Insert
Esc	Escape
BkSp	Backspace
Ctrl	Ctrl
Alt	Alt
CpLk	Caps lock
NmLk	Num lock
ScrLk	Scroll lock
PgUp	Page up
PgDwn	Page down
Home	Home
End	End
Pause	Pause
Brk	Break

Key presses captured in BB FlashBack can be viewed both in the Key bar and in the so-called “Key logging window.” This window “shows a display of all keys pressed while the movie was being recorded” (ibid.).¹²⁸ Key press data can be displayed in the Key logging window in two different ways: “‘Raw’, which shows all key presses in a sequence and ‘Sentence’ which groups together presses into words and lines, and is more easily readable” (ibid.). For the purpose of this study, I exported each participant’s key log (i.e. a register of key press data) in sentence format to individual Rich Text Format (RTF) files in which each key press or sentence is displayed with a *timestamp*—i.e. “the time, relative to the start of the movie, that the [key press or sentence] was typed” (ibid.). Key press data in sentence format “attempts to simplify the display by showing ... the results of edits and corrections. For example, if a user mistyped ‘Treasure’ as ‘Treasire,’” the corrected word would be displayed in the key logging window (ibid.). However, BB FlashBack “can only do this for simple cases, where the backspace, arrow and delete keys are used” (ibid.). In general, online actions involving the correction of typos were not recorded in the spreadsheets (only the results of said corrections appear in said spreadsheets). Yet, online actions involving the replacement or modification of words, text strings, etc., that may have resulted from translation revision processes were registered in the spreadsheets for later data analysis.

¹²⁸ It should be pointed out that BB FlashBack represents the arrow keys listed in Table 13 differently, depending on whether these are displayed in the Key Bar or in the Key logging window. In the latter, arrow keys are represented by name abbreviations (such as “ArwLft” to refer to the left arrow), while in the former they are represented by symbols (e.g. “←” to represent the left arrow). Given that BB FlashBack uses name abbreviations for arrow keys in its exported key press data, such abbreviations are also used in the spreadsheets of this study where appropriate (see below).

Once the participants' key press data was exported to the RTF files, I used the information in these files as a basis for creating the scripts in the spreadsheets that would be complemented in detail with other online actions such as mouse clicks (indicated by red dots in BB FlashBack's Frame bar), access to Web pages (the loading of a Web page is indicated by yellow exclamation marks in the Frame bar), switches, etc. As far as switching is concerned, there are different ways to switch from one working environment (or element) to the other in MS Windows. For example, whenever a program, folder, or document is open in MS Windows, a button corresponding to that item is created on the taskbar. If one clicks on the taskbar button corresponding to an active program, document, etc., the active element will be minimized and the element sitting immediately to the left of the taskbar will be displayed. This way of switching from one element to the other is indicated as "click [name of the active element] icon (taskbar)" in the spreadsheets. If, however, a participant clicked on the taskbar button corresponding to a non-active element to switch from one element to the other, this online action is referred to as "switch to [name of the element]" in the spreadsheets. In addition, switching between windows or tabs using the ALT + Tab key combination is represented by said key combination (highlighted in blue) in the spreadsheets. It should also be noted that switching from one tab to the other within an active browser window is coded as "click [name of browser] tab" in the spreadsheets. As indicated earlier, all switches are recorded under the Window/Tab category.

Another important aspect of the transcription process relates to how the spelling mistakes that the participants might have made were recorded in the spreadsheets. In such cases, I followed Hargittai, who recommends noting mistakes "with '[sic]' to flag that they are deliberately included as such on the coding sheet[s] and are not spelling mistakes introduced by the coder" (2004: 216). However, missing accents in Spanish words that were entered as part of a search query were not indicated with "[sic]," as it was impossible to know for sure whether the accents had been omitted unintentionally or not (most search engines are accent-insensitive anyway). Table 14 provides an example of what a spreadsheet looks like using the coding schemes described above.

Table 14. Example of Spreadsheet with Information on a Participant's Online Actions

Comments	Time	Window/Tab	Actions	URL	Query	Link/Tab Text	Button Text	Select/Highlight	OSR	Translation	Error	Autocomplete
	00:00:00	Translation window	Read source text									
	00:06:36	Click IE icon (taskbar)										
University of Auckland	00:06:37	IE window	Access Home page	http://www.auckland.ac.nz/uoa								
	00:06:39		Highlight URL	http://www.auckland.ac.nz/uoa								
	00:06:40		Replace URL	goo								
To select a Web page in the drop-down menu of the Address bar	00:06:43		ArwDwn									
	00:06:43		ArwDwn									
	00:06:43		Ret									√
	00:06:44		Access page	http://www.google.co.nz/								
	00:06:48		Type query		OMG site:es							
	00:06:54		Ret									
	00:06:55		Access search results page	http://www.google.co.nz/search? ...								
	00:07:03		ArwLft									
	00:07:04		Add word		Transgenic o							
	00:07:06		ArwLft									
transgenico	00:07:06		Add letter		s							
	00:07:10		Ret									
	00:07:11		Access search results page	http://www.google.co.nz/search? ...	OMG transgenico s site:es							

	00:07:34		Right-click results link	http://www.moonlanding.es/?p=80		<u>OMG: Alimentos transgénicos</u>						
	00:07:36		Select command (context menu)	-				Open in New Tab				
	00:07:43	Click IE tab	Access page	http://www.moonlanding.es/?p=80		<u>OMG: Alimentos transgénicos</u>						
	00:08:08		Highlight text					<i>Genetically Modified Organism</i>				
	00:08:11		Ctrl + C									
	00:08:21	Click IE tab	Re-access search results page	http://www.google.co.nz/search? ...	OMG transgenicos site:es							
	00:08:23		Highlight query					OMG transgenicos site:es				
	00:08:23		Ctrl + V		Genetically Modified Organism							
	00:08:25		Add closing quotation mark		"							
	00:08:25		Home									
	00:08:26		Add opening quotation mark		"							
	00:08:27		Ret									
	00:08:28		Access search results page	http://www.google.co.nz/search? ...	"Genetically Modified Organism"							

Finally, it should be pointed out that video and audio recordings can be coded directly in NVivo without any transcription being required. In spite of this possibility, I decided to transcribe the study's video and audio files, and use these files along with the transcripts in my NVivo project. This enabled me to extend the data coding and facilitate the data analysis of said video/audio material in relation to other project items. The video and audio files of the study were thus transcribed for reasons other than the immediate purpose of this thesis, namely to provide the data for future projects addressing different research questions. The spreadsheets containing the wealth of information based on the coded online actions are available upon request. So are the interview transcripts that I describe in the following section.

5.8.4 Transcription and Coding of Interview Data

The one-to-one interviews were first transcribed and then formatted in MS Word to be later coded and analyzed in NVivo. All four interviews were transcribed by a company specializing in professional transcription services, among other research-related services, called Academic Consulting (<http://www.academicconsulting.co.nz/>). Academic Consulting provides two types of transcription methods they refer to as "Intelligent Verbatim" and "Complete Verbatim." The first method, used to transcribe the one-to-one interviews I conducted, provides "a full and accurate transcript without repeated and unnecessary words ... that often add little value and can make the text more difficult to analyse as they are distracting and require extra reading" (Academic Consulting 2009a). Such words, referred to as "fillers" (e.g. "ums," "ahs," and "ers"), are excluded from intelligent verbatim transcripts "unless they are at the beginning of a sentence and followed by a long pause" (ibid.).

Other elements excluded from intelligent verbatim transcripts are: "'Meaningless' statements such as 'I mean', 'you know' (unless related to the context);" "[w]ords that are started but not completed;" "[w]ord repetitions e.g. 'So I said, I said, I said to him ...' or other stutters/stammers;" and "[a]ny initial comments made on the recording that are not relevant to the content e.g., 'I'll just put that recorder there and hopefully it will pick everything up ...'" (ibid.). Intelligent verbatim retains, however, "[a]ll other words stated, even if not grammatically correct e.g. sentences that are started but not finished or changes of tack within a sentence;" "[s]lang, abbreviated words, and contractions;" and the "overall style and meaning of what is said" (ibid., emphasis in the original).

The differences between complete verbatim and intelligent verbatim can perhaps be best illustrated by the following example:

Complete Verbatim

Um, well, I dunno really, know what I mean? I mean, you know, when I asked them what Mary's, er, um, condish, condit-, condition was, they said like um "I'm afraid we can't, um, tell you that Mrs Smith, 'cause you ain't a relative".

Intelligent Verbatim

Well, I dunno really, you know what I mean? When I asked them what Mary's condition was they said "I'm afraid we can't tell you that Mrs Smith, 'cause you ain't a relative" (ibid.).

After I received all four interview transcripts, I read over them one by one several times comparing them with their respective original audio recordings to ensure maximum accuracy and quality. This was particularly useful and necessary given the use of some Spanish terms, the occurrence of overlapping speech (although this was seldom the case), and the presence of strong foreign accents, my own in particular. Although this process of quality assurance was relatively time-consuming, it turned out to be easier than I initially thought due to a number of conventions used by Academic Consulting in the transcripts. Table 15 lists these conventions, which aim to improve accuracy by providing the exact time at which unintelligible or unknown words occur in the recordings for researchers to "fill in the blanks" in the transcripts.

Table 15. Interview Transcript Conventions for the Identification of Unintelligible or Unknown Words (Academic Consulting 2009b)

(unintelligible, time)	Words that cannot be heard or understood
(unknown terminology, time)	Names of drugs, medical conditions, business systems, educational techniques etc. that we can hear but do not know how to spell
(non English term, time)	Words spoken in a language other than English
<i>unsure word (time)</i>	If we are unsure of the spelling of a word e.g. have spelt phonetically then the word will appear in italics followed by the time

By following the process of quality assurance referred to above, I solved problems of "unknown terminology," "non-English terms," and "unsure words" found in the interview transcripts. However, passages that I could not hear or understand were left as "unintelligible" as per the original transcripts provided by Academic Consulting. Additional conventions were used to signal long pauses (indicated as "pause"), short pauses (indicated with a comma), and laughter indicated as such in the interview transcripts (ibid.). It is also worth noting that the original interview transcripts were

formatted using a “header at the top of each transcript indicating the recording length and filename, the name of the Transcriber and Quality Control Assistant, and also any relevant comments regarding the recording or transcript that might be useful to the Researcher” (Academic Consulting 2009a; cf. Göpferich 2008: 72). For reasons of confidentiality, however, I removed this information along with any potential references to the participants’ personal details and/or additional sensitive information from the edited interview files (see 5.7.5 for details). Moreover, a confidentiality agreement was signed on my request between Academic Consulting and myself to keep all information confidential, and inaccessible to other persons.

Finally, I formatted the post-edited transcripts by applying paragraph styles to each interview question, so that questions common to all four interviews could be automatically coded in NVivo. Questions specifically tailored to the needs and/or situation of each participant were manually coded at either existing or new nodes in my NVivo research project. The results of this coding process will be used to support the data analyses provided in Chapters 6 and 7.

5.9 Data Analysis Methods and Tools

5.9.1 Qualitative Methods

As indicated in 5.5.1, the qualitative research approach adopted in this study is based on Glaser and Strauss’ grounded theory. In grounded theory, there are three main analytic strategies for analyzing qualitative data. These analytic strategies are *coding*, *memoing*, and *concept mapping*. Trochim defines these strategies as:

- **Coding** is a process for both categorizing qualitative data and for describing the implications and details of these categories. Initially you use **open coding**, considering the data in minute detail while developing some initial categories. Later, you move to more **selective coding** where you systematically code with respect to a core concept.
- **Memoing** is a process for recording your thoughts and ideas as they evolve throughout the study. You might think of memoing as extensive marginal notes and comments. Again, early in the process these memos tend to be open; whereas later on they tend to increasingly focus in on the core concept.
- **Integrative diagrams and sessions** are used to pull all of the detail together to help make sense of the data with respect to the emerging theory. The diagrams can be any form of graphic that is useful at that point in theory development. They might be concept maps,

directed graphs, or even simple cartoons that can act as summarizing devices (2001: 160, emphasis in the original).

For purposes of qualitative data analysis, I used these three analytic strategies in NVivo, using the program's data coding, linking, classifying, and visualizing aids described in 5.8.2. Chapter 7 presents the categories and concepts generated through processes of data coding such as those generated for describing the type of search needs (individual vs. common needs, reported vs. unreported needs, etc.), search goals (comprehension, production, or both), initial search actions (direct address searches, navigational searches, search engine queries, etc.), and information sources (dictionaries, databases, newspapers, journal articles, etc.), among others.

5.9.2 Quantitative Methods

In this study, qualitative analyses were supported by descriptive statistics (namely counts, percentages, and mean values) to process part of the data and provide a multi-faceted overview of the participants' Web search behaviors with regard to their search needs, search goals, search processes, and search outcomes. More specifically, I counted the participants' search needs based on the number of reported vs. unreported information needs as well as the number of individual vs. common needs. I also determined the frequency and distribution of common needs per participant. With regard to the participants' search goals, I counted these based on the number of comprehension goals, production goals, and goals of a dual nature, and determined their distribution per participant and common information need. The distribution of initial search actions was also determined per common information need, participant, and information goal.

To account for the participants' search processes, I adopted, from the Web searching literature, a number of evaluation metrics that I later adapted to suit the needs of this study. These metrics apply to two main levels of data analysis, namely the search session and the search query. The analysis of the search sessions involved their length, which was measured in minutes and seconds, and which was complemented by the number of online actions taken by the participants to (potentially) satisfy their information needs. The total number of search sessions and online actions, as well as the search session lengths, are provided per common information need and participant. At the level of the search query, three different metrics were adopted. These include query complexity (determined here by the number of simple vs. advanced queries),

query length (measured by the number of terms in a query, excluding articles, prepositions, and punctuation), and query types (classified here into initial queries and subsequent queries, with the latter being further classified into modified queries, repeat queries, and unique queries). Data on query complexity, length, and types is provided per common information need and participant. Also in relation to the participants' search processes, the number of direct address searches and browse searches was counted per common information need and participant. The same applies to the total number of pages accessed and their distribution per participant and common information need.

Finally, the quantitative analyses of the search outcomes concern the distribution of adopted sources of information per participant and reported information need as well as the degrees of search success, satisfaction, and difficulty per participant and reported information need.

6. Profiling Participants' Attributes and Working Styles

In this chapter, I will report the results from the analysis of the participants' demographic characteristics and attributes concerning two of the four qualities that make up the notion of expertise in this study, namely knowledge and experience.¹²⁹ Given that translation expertise is considered to lead to translation processes that result in good quality products, I will also examine the translations produced by the research participants from a product-oriented perspective, relating it to the participants' level of source-text domain knowledge (i.e. the remaining user attribute). Furthermore, I will discuss the findings of the participants' working styles, conceptualized here in terms of time usage and task progression. In so doing, I will analyze all the relevant data against the background of existing translation and Web searching theories, and introduce some of the key concepts that I developed to account for the search query behaviors of the participants.

Major findings suggest that the participants' translation experience correlates with their knowledge about and notions of translation, with Bob being the most experienced and knowledgeable participant of all, followed by Daniel and the four translation students. The quality of the translations they produced supports this finding, showing significant differences not only between Bob and Daniel but also among the translation students themselves. With regard to Web searching, the findings suggest that only Bob's and Daniel's Web search experience correlates with their Web search knowledge. In contrast, the search experience of the translation students does not seem to correlate with their knowledge about Web searching.

Concerning the participants' working styles, their use-of-time profiles indicate that the source text chosen for the second embedding task was far more challenging than the one selected for the first embedding task, despite the fact that the second text was shorter than the first one. In addition, the participants' task progression profiles show that in most cases translation quality correlates with the number of changes among the four online tasks of the study (i.e. translating, researching, reporting, and switching): the higher the number of online task changes, the lower the degree of translation quality.

¹²⁹ The remaining two qualities, i.e. the participants' awareness of translation and Web searching problems (problem spotting) as well as their skills to resolve said problems (problem solving), will be examined in Chapter 7.

The number of online task changes, in turn, seems to be influenced by the participants' number of information needs.

Finally, the participants' task progression profiles also suggest that the online search report interfered with the translation processes of some of the participants, which seemed to have an impact on their translation performance, understood both from a process and product point of view. In general, those who produced high-quality translations seemed to progress through the various online tasks in a more controlled and focused manner, thus spending more prolonged and stable periods of time in each online task than those who produced medium- and low-quality translations. Longer periods of uninterrupted translation, in turn, seem to correlate with the processing of larger units of information—i.e. at the sentence and paragraph level—at a time. They also seem to reflect a lower cognitive load than in cases with frequent interruptions and changes among all four online tasks, and where no progression phases can be clearly identified. Here, an increase in cognitive load would appear to be related not only to the number of information needs but also to the interference that the OSR may have had on some of the participants' translation and/or research processes.

6.1 Findings from the Background Questionnaires and the Interviews

6.1.1 Demographic Characteristics

The demographic data collected via the background questionnaire includes the participants' age, gender, countries of origin and residency, languages spoken, and academic qualifications. As indicated in 5.6, the participants of the main study are all female translation students who were in their early to mid-twenties at the time of the study, except for Martha, who was in her mid-thirties. She and Laura are originally from New Zealand, while Anna and Maria are from Taiwan and Russia, respectively. These two participants are nevertheless New Zealand residents who had been living in the country for the last 13 years and four years, respectively.

As far as their qualifications are concerned, all four translation students had completed a three-year BA in Spanish (major) at the University of Auckland. Maria, Laura, and Anna minored in French, and Martha in Latin American Studies. In addition to their BA degrees, Martha and Laura obtained the DELE, while Anna completed a fourth year of study, namely a BA Honors in Spanish. Maria was completing this very same degree at

the time of the study and thus took the introductory course on scientific and technical translation as an elective paper within said degree. For Martha and Laura, however, the translation practice course was an obligatory paper within their Postgraduate Diploma in Translation Studies. Similarly, Anna enrolled in the translation practice course as part of her Master of Professional Studies in Translation. Given that the course only offered translation from Spanish into English,¹³⁰ L1 translation was the working directionality for Martha and Laura, and L3 translation the one for Anna. For Maria, however, translation involved working from her L3 into her L2 (cf. 5.6).

In contrast to the participants of the main study, the two participants of the pilot study considered in my data analysis are a translation teacher (Bob) and a PhD student of translation (Daniel) who were 41 and 32 years old, respectively, at the time of the study. Bob is originally from Germany and had been lived in New Zealand for the past five years before the pilot study took place. He considers German his L1, English his L2 (he has nevertheless near-native, if not native skills in said language), and Spanish his L3. Daniel is originally from New Zealand and considers English his L1 and Spanish his L2. Unlike all the other participants, Daniel did not specify an L3 in the background questionnaire. He is currently completing a PhD in Translation at the University of Auckland, where he also obtained a Master of Professional Studies in Translation (completed in 2007) and a Postgraduate Diploma in Translation (completed in 2006). In addition, he completed a three-year BA in Spanish and Psychology at Victoria University (Wellington) in 2005. Bob obtained a PhD and a four-year BA in Translation from the University of Heidelberg in 1998 and 1995, respectively.

As it can be seen, all six participants had or were completing a degree in translation at the time of the study, except for Maria. She is also the youngest of all participants, whose ages range from the early-twenties to the early-forties. Both Maria and Bob are from countries other than New Zealand, and consider Spanish their L3 and English their L2. Anna is also from another country (Taiwan) but declared English her L1.¹³¹ Given that she had spent the same number of years (eleven in total) in Taiwan as in New Zealand, in my interview with her I asked her to elaborate on the reason(s) why she considers English her L1. She referred to the significant effort she had to make to learn

¹³⁰ As discussed in 5.6, all four participants declared English their L1 and Spanish their L2 for translation purposes.

¹³¹ As noted earlier, however, Anna's written skills in English showed a number of grammatical difficulties, particularly with regard to the use of articles and prepositions.

English during the first year of her stay in New Zealand. This, in turn, made her struggle to keep up with Mandarin, a language she had thus ceased to read and write in. As Anna herself explains,

I got here and the first thing I do was to catch up English. And 'cause I had zero English when I got here, I didn't even know ABCs, so I had to pick it up really, really quickly and then within that year I had fully English environment, like 'cause my mum just said, "Okay, you only need to talk to me in Mandarin because I don't want to say in English," So that's why I had to, "But the rest of the time I prefer you to get in contact with English as much as possible." So within that year I had a full sort of English, nothing else. And yeah so after that year I tried to come back to Mandarin and I realized I was struggling and then because I didn't read anything in Mandarin, I didn't write it and anything like that. So I just lost it completely ... I understand what's being said to me, I can talk, I can read, but I can't write. I can't write characters, so I lost it ...

Finally, Daniel, Martha, and Laura are originally from New Zealand, and consider English their L1 and Spanish their L2. In the following section, I will examine the participants' experience with translation from a training and professional point of view.

6.1.2 Translation Experience

6.1.2.1 Previous Training Experience

This section analyzes the type and level of translation experience that the research participants had gathered (before the study took place) through previous courses on translation theory, translation practice, and translation technology as well as any translation-related workshops and/or seminars.

As far as translation practice courses are concerned, all the participants, with the exception of Maria, had taken one or more courses at the time of the study. Bob's formal training, in particular, includes a wide variety of translation practice courses taken across several semesters at the University of Heidelberg. More specifically, he completed eight semesters of general translation from English into German and vice versa; eight semesters of general translation from Spanish into German; five semesters of general translation from German into Spanish; three semesters of specialized translation from English into German and vice versa; and three semesters of specialized translation from Spanish into German.

Daniel and Anna had taken the Spanish translation practice course offered by the University of Auckland's Spanish Department in the second semester of 2006 and 2008, respectively. At that time, this one-semester course was offered three hours per week

over the course of twelve weeks and focused on the translation of a wide variety of texts, such as academic transcripts and diplomas; police and birth certificates; instruction manuals; and business as well as correspondence documents. Similar to Daniel and Anna, Laura completed the French translation practice paper offered by the University of Auckland's French Department in 2005. This course also covered a variety of subject areas (including literary translation) and spread across twelve weeks for a total of 36 contact hours. As with any translation practice course at the University of Auckland, students taking the one-semester translation course are expected to work at home for an additional 20 hours per week.

Martha, too, was exposed to translation practice at the University of Auckland, albeit through a different course offered by the Centre for Translation and Interpreting Studies requiring the completion of a practical translation project (approximately 10,000 words long). Unlike the translation practice papers, this course does not require on-campus time (except for meetings with supervisors) and can focus on the translation of a chapter from a book, a manual, or even the localization of a Website. Although Martha did not specify the nature of her translation project in the background questionnaire, she explained that she had translated in both directions (i.e. from Spanish into English and vice versa) and completed the project in the second semester of 2008. She also stated that she had sat the NAATI (the Australian National Accreditation Authority for Translators and Interpreters) exam back in 1996 but had not passed.¹³² In addition, her academic transcript shows that she took a course entitled "Introduction to Professional Translation" at the University of Auckland during the second semester of 1996 (at that time, the course did not involve any translation practice).

With regard to translation theory courses, only Daniel had completed two such courses (entitled "Theory and Methodology of Translation" and "Issues in Translation") offered by the UoA's Centre of Translation and Interpreting Studies. The main topics in the first course include the translation process, translation (sub-)competences, professional issues, as well as linguistic, equivalence, and functionalist-based approaches to translation. Topics in the second course include descriptive translation studies (DTS), polysystem theory, postcolonial approaches to translation, and localization, among others. Although Laura and Martha had not been exposed to translation theory before

¹³² For more information on this accreditation system, see <http://www.naati.com.au/>.

the study took place, they completed the course on Theory and Methodology of Translation parallel to the introductory course on scientific and technical translation in the first semester of 2009.

Unlike Daniel, Martha, and Laura, Bob has no formal training in translation theory. One can nevertheless assume that he has naturally gathered both experience with and knowledge of theoretical issues in translation through his extensive academic career in the discipline. In fact, in the background questionnaire he stated that he had taught courses on and seminars in translation theory, specialized translation practice, and translation technology. With regard to the latter, he has formal training on the use of electronic dictionaries and terminology databases. Daniel is the only other participant with previous training in translation technology. He completed the three technology-related courses that are offered by the Centre for Translation and Interpreting Studies, namely “Research Tools and Professional Issues,” “Translation Memories,” and “Localization.”

Finally, it should be noted that, with the exception of Bob, none of the research participants had taken any workshops or seminars in translation before the study took place. Based on the results above, one may conclude that Bob has the most comprehensive formal training in translation of all participants. Furthermore, he has over 15 years of experience as a teacher of translation theory, practice, and technology, among others. Daniel seems to have gathered significant translation experience over the past four years through previous courses on translation theory, practice, and technology. Thus, he teaches a number of translation-related courses—more specifically, translation theory and electronic editing and revising for translators—on a casual basis. This has most likely contributed to the experience gathered through his formal training as a translator and, more recently, as a translation researcher. Unlike Bob and Daniel, the remaining four participants had no experience with either translation theory or translation technology at the time of the study. Moreover, they had little formal training (Anna, Laura, and Martha) or no training at all (Maria) in the practice of translation.

6.1.2.2 Previous Professional Experience

This section of the background questionnaire sought to elicit data on (a) the professional experience that the participants had gathered through previous translation jobs as well as on (b) their use of various translation resources. The questionnaire data shows that only

Bob and Daniel had professional translation experience at the time of the study. Bob had primarily translated technical documents into his L1 as a paid service for both private clients and translation agencies. He had also translated correspondence documents as well as other (unspecified) types of documents into his L2 as a favor to family members and friends. Daniel had translated financial, educational, correspondence, and tourism-related texts, all of them into his L1 and as a paid service, working mostly for translation agencies. He also indicated that he had translated for a private client once. Yet, neither Bob nor Daniel had done any translation work for more than an average of ten hours per month over the previous year, which indicates that neither of them was making a living out of translating at the time of the study.

Concerning the use of translation resources, Bob specified the most comprehensive list of these, including both online and electronic resources such as encyclopedias (Wikipedia.com); monolingual dictionaries (Merriam-Webster Online); bilingual dictionaries (PC Bibliothek, which is a collection of general and specialized dictionaries, in Bob's case, in English and German, in electronic format); multilingual dictionaries (Leo.org); translation memories (SDL Trados Workbench); terminology management tools (SDL Trados MultiTerm); electronic archives; as well as search and replace and concordance software (name unspecified). Daniel referred to the online translation dictionaries available in various language combinations at WordReference.com as well as to print dictionaries (unspecified), the ProZ glossary of translations (which contains terms and definitions in various language pairs and fields), and parallel texts found on the Internet.

Although the participants of the main study, i.e. the translation students, did not have any professional translation experience, some of them specified a number of resources they had used in an academic context. Laura and Anna, for example, referred to WordReference.com as a resource for consultation. Anna further specified two monolingual dictionaries, namely the Oxford Online Dictionary and the Collins Dictionary. Maria did not list any translation resources, while Martha stated that she had used both offline and online dictionaries for her translation project but did not specify any type or name in particular. She nevertheless indicated that she had consulted "many people" for completing said project. This information is in fact consistent with the data obtained in her interview. She explained, for example, that in her translation project she "had a couple of texts that were specific to Mexico and so [she] had to verify some

words to explain [her] case.” When I asked her about the dictionaries and/or resources she had used for this project, she said she could not remember the name of *the* dictionary she had used. In Martha’s own words, “I have the link saved on my computer. I don’t actually remember what it is. But it’s one that is specific with Mexican Spanish but it is, basically it’s just a Mexican dictionary.” She was nevertheless familiar with the Spanish monolingual dictionary known as “RAE” (Real Academia Española), a resource that indeed shows in her screen recordings. These recordings also show that Martha (like the rest of the participants, except for Bob) frequently used WordReference.com in her translation tasks—a resource she came to know about through her classmates in the translation practice course.

Similarly, Anna confirmed in my interview with her that she had not known any translation resources before the translation practice course took place, except for WordReference.com. When I followed up on her use of this resource, Anna explained that

I didn’t use it much, that was the first thing, but I started using it sort of more when I was doing [the 2008 translation] course because everybody was using it and we had the test. So I had to get access to the word in the translation quick so I used WordReference.

Anna had thus mentioned in class that in the translation course she refers to above she had used a dictionary that was accessible through the University of Auckland Library Catalogue known as “Voyager.” Yet, when I asked her about said dictionary, Anna’s response was: “that was one thing as well but it was so slow. I clicked in to that and I had to wait for another sort of half a minute or so for it to load and everything like, so it was really slow. And then I saw WordReference and I’m like, ‘Okay, I’m just gonna use that’.” For Anna, then, easy and quick access to translation resources seems to be a factor that determines her choice of sources of consultation. In fact, she refers to this aspect in the background questionnaire concerning the question on useful instruments for translation (see 6.1.3.2 below). Similar to Anna, Laura asserted in my interview with her that she had also known WordReference.com from when she “used to study French.” She further indicated that she uses this resource quite frequently. However, she does so only for general purposes and not for translation-specific ones. She also stated that she was used to consulting an English dictionary available online at Dictionary.com. Finally, Maria confirmed that she had not known any translation resources before the translation practice course took place, mainly “because [she] didn’t do anything related

to translation before at all.” When I asked her about online dictionaries she might have used in her language acquisition courses, she said that she had not used any online dictionaries but that “I must have used Oxford, the one that I had, ‘cause that was more than enough. And I had some physiology dictionary, and I have this, my dictionary on my computer. Yeah, but it’s not an online dictionary.” The electronic dictionary she refers to is in fact the multilingual dictionary that was installed on her laptop, which she had decided to bring once to one of our translation practice classes (cf. 5.4). In short, only Bob and Daniel had professional translation experience and had used multiple translation resources before the study took place.

6.1.3 Knowledge about Translation

This section of the questionnaire includes questions taken from Orozco Jutorán and Hurtado Albir’s “Translation Notions Instrument (TNI)” designed to measure translation knowledge (2002: 380). As indicated in 5.7.2.2, the 14 questions that make up the TNI address a wide variety of translation aspects, including the concept of translation; its (sub-)competences; strategies used to solve comprehension and formulation problems; the notion of translation unit; the elements and/or agents involved in translation; and notions about translation problems and translation function (ibid: 381). Orozco Jutorán and Hurtado Albir classify these aspects “in two main sections: (a) notions about translation and (b) notions about translation competence, with six items in each section” (ibid: 381). Although the authors do not specify which questions of the TNI are grouped under which section, most questions can be easily classified into one of the two sections. There are, however, a number of items that, in my mind, could belong to either section. I therefore created a third section or category, in which I grouped questions related to aspects of translation problem solving (see 6.1.3.3 for details). These are questions 5, 6, 9, and 14 of the TNI, which correspond to questions 12, 13, and 16 of the background questionnaire.¹³³

Regardless of the different categories that one may create for analytic and heuristic purposes, I agree with Orozco Jutorán and Hurtado Albir that

¹³³ It should be noted that Orozco Jutorán and Hurtado Albir exclude questions 5 and 6 of the TNI from their two sections “because they ask for qualitative information and these questions are not graded” (2002: 391). It should also be noted that questions 9 and 14 of the TNI represent two items in question 16 of the background questionnaire. As indicated in 5.7.2.2, said question requires respondents to rate several items according to a true/false criterion. Each of these items represents a single question in Orozco Jutorán and Hurtado Albir’s TNI.

general knowledge of translation or notions of translation, determine the students' whole process of translation, since, depending on the students' ideas about translation, they will have a particular purpose for a particular translation task,¹³⁴ and this will determine their solution of translation problems throughout the process of translation. Thus, students who find a problem in the source text can either ignore it or try to solve it. Should they decide to solve it, it is because they want the target readers to understand or receive the target text in a certain way, and this is only possible if they have a particular concept of translation in the back of their minds. If this concept did not exist, then there would not be an objective to achieve. In this case, errors (and/or unsolved problems) can be caused by this "lack of knowledge" of general translation concepts (ibid: 380).

In the following, I will discuss the various TNI questions that, in my view, deal with notions of translation. These are questions 1, 4, 7, 8, 10, and 13 of the TNI, which correspond to questions 8, 11, 14, and 16 of the background questionnaire.

6.1.3.1 Notions of Translation

This section analyzes the participants' notions of translation with regard to their definitions and specified units of translations; their perceptions on the different kinds of translations a professional translator may be asked to do; the various elements they think may intervene in translation; and their notions of translation function.

Definitions and Units of Translation

The participants' definitions of translation (see Table 16) suggest that they mostly view this activity in terms of the central concept in the history of translation, that of equivalence. This concept refers to the degree of *sameness* that exists at one level or another (e.g. textual, stylistic, formal, functional, etc.) between an original text and its translation. Chesterman (1997), for instance, states that equivalence is one of the five ideas or "supermemes" most argued about in translation. Adapting the concept of "meme" from sociobiology, he defines supermemes as "ideas of such pervasive influence that they come up again and again in the history of the subject, albeit sometimes in slightly different guises" (ibid: 7-8).

The first translation supermeme that Chesterman identifies is what he refers to as the "source-target supermeme," which views translation as "directional, going *from* somewhere *to* somewhere" (ibid: 8, emphasis in the original). Translations are considered "containers" for something to be carried across from one place to the other

¹³⁴ The authors define translation task as "a text given to a subject which s/he must translate according to a brief" (ibid: 379).

(ibid.) and, consequently, translation is seen as *transferring* or *carrying* out (the very word “translate,” which derives from Latin *translatus*, means transferred, carried across, brought over). Maria, for example, subscribes to this view of translation. For her, “ideas” are *transferred* from one language to the other. Yet, as Chesterman points out, this view of translation misses a very important aspect: although translations are directional, they do not move from one place to the other as for objects moving from A to B cease to be at A when they arrive at B. Translation, however, “does not eliminate the presence of the source text at A” (ibid.). It is true that some original texts “may never have a source readership apart from the translator ... [b]ut this is not to say that texts automatically cease to exist at their point of departure after being translated” (ibid.).

Table 16. The Concept of Translation¹³⁵

Bob	<i>Production of text based on information</i>
Daniel	<i>Rendering meaning in different language and culture</i>
Laura	<i>La belle infidele, making information available to everyone, cultural exchange</i>
Maria	<i>To transfer ideas from one language to another and to be as accurate as possible</i>
Anna	<i>Creating a text in a new target language from an original text, solve problems in terms of deciding expressions in the target text that best suit the original, breaks the language barrier</i>
Martha	<i>Communicating a specific message across cultures</i>

Quite on the contrary, translations, according to Chesterman, “add value” to their source texts by spreading their ideas and interpretations among a wider spectrum of readers in other cultures. That is, translations enrich the lives of their sources. From this perspective, translation is more about *spreading* or *replicating* than transferring or carrying out. Chesterman therefore suggests replacing the movement metaphor with “one of propagation, diffusion, extension, even evolution: a genetic metaphor” (ibid.). Daniel and Martha, for example, seem to understand translation from the point of view of replication/reproduction. For them, “meaning” or “a specific message” is *rendered in*, or *communicated across* different languages and cultures. For Laura, translation seems to involve a spreading/diffusion process in which “information” is *made available* to a wide audience and where there is “cultural exchange.” Bob and Anna appear to take this view a step further and understand translation not so much as propagating but as

¹³⁵ Information provided by the participants in the background questionnaires is reproduced verbatim in all the tables, including typos, misspellings or any other linguistic errors. In these cases, I did not use “[sic]” to signal said errors. I only used this convention in running text.

producing or *creating* “text” (see, however, a more detailed elaboration of Anna’s and Laura’s concepts of translation below).

Unlike the notion of translation as carrying across (and, eventually, as propagating), in which the translator’s role may be seen as passive or even mechanical—at least, from the perspective of *faithfulness* (see below)—the view of translation as production/creation would appear to confer translators a high level of autonomy or freedom.¹³⁶ One could thus argue that the extent to which different people understand translation autonomy/freedom is closely linked to notions of equivalence. Obviously, the criteria for judging the equivalent relation between two texts vary according to subjects, text types, text functions, communicative situations, etc. Equivalence nonetheless promotes the idea that translation must be the *same* as the source in some way or another. According to Pym, theories of “natural equivalence” assume that this thing of equal value “exist[s] *prior* to the act of translation. This means that it makes no difference whether you translate from language A to B or vice versa” (2010: 6, emphasis in the original). More specifically, theories of natural equivalence presume “that there is a piece of reality or thought (a referent, a function, a message) that stands outside all languages and to which two languages can refer” (ibid: 18). Translators would thus go “from the source text to this thing” (commonly referred to as “*tertium comparationis*” or third element of comparison), and “then from the thing to the corresponding target text” (ibid.). This view of translation is perhaps not so surprising. As Pym points out, (natural) equivalence “stands at the base of a strong and robust sub-paradigm closely allied with Applied Linguistics. It is also what many translators, clients, and translation users believe about translation” (ibid: 6). Daniel and Martha, for example, seem to conceive of translation in terms of natural equivalence. For them, a “message” or “meaning” would be the *tertium comparationis*, or the thing of equal value that exists prior to and beyond language, and which one can resort to for translation purposes.¹³⁷

¹³⁶ Metaphors of translation and subsequent interpretations of the translator’s role are not only a means for understanding existing notions of translation but, as González Davies suggests, also make an excellent pedagogical activity for “creat[ing] an awareness of the different approaches to translation” (2004: 45-46, building on Chesterman 2000: 81; cf. Pavlović 2004).

¹³⁷ This view of translation, in which meaning is conceptualized as something that exists *out there* in some sort of vacuum or objective reality, stands in clear opposition to hermeneutic approaches to translation that view meaning as created or negotiated during the translation process.

Chesterman encapsulates the idea of sameness in translation in what he refers to as the “equivalence supermeme” (1997: 9). Yet, for him the idea of equivalence is, just as the source-target idea, based on the movement metaphor. Accordingly, if translation is believed to carry something across, then this something will be expected to remain the same in the target side. That is, the thing that is carried across will not change its identity in the movement process (ibid.). Pym regards this movement process as “profoundly directional: translation goes from one side to the other but not back again” (2010: 28). Hence, he uses “the term ‘directional equivalence’ to refer to all those cases where an equivalent is located on one side more than the other, at least to the extent that they forget to tell us about movement that could go either way” (ibid.). If one considers the participants’ definitions of translation in terms of directionality, then one may conclude that Laura and Anna, like Maria, actually view translation as a one-way transfer process rather than a diffusion or creation process, as speculated earlier. This is perhaps most evident in Laura’s case when she asserts that the text is the unit of translation that must be seen as a whole for it to “bring across the maximum amount of meaning” (see Table 17).

Anna’s notion of equivalence also seems to be directional as for her “expressions in the target text” must be equivalent to those in the source text. One could nevertheless argue that since Anna uses a metaphor other than that based on movement along a path, her notion of equivalence is perhaps not at all that directional. She states that translation involves “breaking the language barrier,” a metaphor frequently used to refer to translation in terms of difficulties that are compared to physical elements, e.g. barriers and gaps. The role of the translator is therefore conceptualized as that of a mediator, an intermediary, a bridge, a link (Pavlović 2004: n.p., drawing on Roy 2002). Such metaphors are, however, closely related to the transfer metaphor to the extent that translators are viewed as the conduits, channels, or pipes through which “ideas,” “expressions,” or “meaning” are transferred from one language/text/culture to the other. Furthermore, as Pym points out, this type of mono-directional transfer “tends to have only two opposed poles, for two opposed ways of translating (usually ‘free’ as opposed to ‘literal’ ...)” (2010: 25). That is, directional equivalence, like binary theories of equivalence, tends to oppose form to function (e.g. Levý 1969; Toury 1995; Nord 1997; Venuti 1995).

One of the best known theorists of this kind of opposition is Eugene Nida (1964), who argued that texts can be translated to achieve “formal equivalence” (focusing on the message, thus aiming at the same form and meaning) or “dynamic equivalence” (aiming at producing the same effect on the target readership). These two types of equivalence are “closely bound up with” what Chesterman refers to as the “free-vs.-literal supermeme” (1997: 13).¹³⁸ For him, formal and dynamic equivalence “are not mutually exclusive, however; formal equivalence may exist (in theory) at the lower grammatical levels of morpheme, word, phrase, perhaps up to sentence breaks, while dynamic equivalence more naturally has to do primarily with the text as a whole” (ibid: 9). Furthermore, “[a]n advocacy of literal translation goes hand in hand with an adherence to formal equivalence, while free translation tends to prioritize functional equivalence (or rejects equivalence altogether) (ibid: 13).

To further illustrate the polarity found in the “free-vs.-literal supermeme,” Chesterman refers to Barkhudarov (1993), who “correlates the literal/free parameter with the translator’s choice of unit of translation: the smaller the unit of translation, the more literal the result, and the larger the unit, the freer the result (where the units are morpheme, word, phrase, clause, sentence)” (ibid.). Interestingly, Maria and Anna view the “phrase” and the “sentence,” respectively, as the basic unit of translation (see Table 17). One could therefore argue that these two participants seem to favor formal equivalence over dynamic equivalence. Thus, if one examines their definitions of translation in terms of *fidelity* or *faithfulness*—two alternative terms used to refer to equivalence as the degree of accuracy with which a translation renders the meaning of the source text without deviation—, one may conclude that Maria holds a strong notion of faithfulness. For her, translation must be as “accurate” as possible. Similarly, Anna views translation as “deciding” which target language expressions “best suit” those of the original text. Furthermore, Maria’s and Anna’s concept of translation correlate with their translation performance, which, as further discussed in 7.1.3, shows a strong tendency to remain close to the syntactic form of the original texts (see also 6.1.3.3 for more details on Maria’s and Anna’s notion of translation unit).

¹³⁸ For Chesterman, the term “literal” is quite “unfortunate” given that “for some it means word-for-word, and therefore ungrammatical” translation, and for others the “closest possible grammatical translation” (1997: 13). It is in both cases a term that “stresses closeness to the original form” (ibid.).

Table 17. The Unit of Translation

Bob	<i>The text, but implemented on a paragraph level</i>
Daniel	<i>Units of meaning, which may be unrelated to grammatical units</i>
Laura	<i>The text as a whole is what you are translating, it is necessary to see it as a whole for it to be coherent and to bring across the maximum amount of meaning. To do so, of course, it is first necessary to treat the word and then the sentence as wholes and then they become the sum of the target text as a whole</i>
Maria	<i>Phrase</i>
Anna	<i>The sentence</i>
Martha	<i>The concept, sometimes this can be done with just words or sentences but for me the objective is to make the message equally clear in the TL as in the SL even if that means rewriting the sentence or using slightly different terminology</i>

Martha's translation performance also indicates a preference for closeness to the original form. Yet, for her, like for Daniel, the translation unit is not necessarily a linguistic one but a cognitive one. She views the "concept" as the unit of translation by means of which the "message" must be made "equally clear in the TL as in the SL," even if this requires using "slightly different" words or rewriting sentences. Similarly, Daniel views "meaning" as the basic unit at which translators operate, i.e. the thing that must remain the same in the source and target text. Although his translation performance also shows a preference for closeness to the original form, his translation style is more idiomatic than that of Maria, Anna, and Martha.

Unlike the participants mentioned above, Laura treats the whole text as the unit of translation. Furthermore, she conceptualizes texts as having different linguistic layers and translation as proceeding in a build-up fashion in which smaller units (words) are gradually processed within larger units (sentences)—the sum of which thus forms "the target text as a whole." As indicated previously, considering the entire text as the translation unit would indicate a preference for dynamic equivalence. Yet, Laura describes translations as "*les belles infidèles*," the 17th-century and rather pessimistic French expression which suggests that translations, like women, "can be either plain and faithful, or beautiful and treacherous" (Hanne 2006: 218) but not both. Nevertheless, Laura's translation style is freer than that of Maria, Anna, and Martha.

Like Laura, Bob also considers the entire text the unit of translation. Yet, for him the text is implemented at the level of the paragraph, i.e. a larger unit than those specified by Maria, Anna, and Laura (and, eventually, Martha). This, according to Barkhudarov (1993, cf. 3.1.1 for additional references), correlates with freer translation results. Bob in fact displays the most idiomatic and free translation style of all participants.

Furthermore, he seems to be the only one who does not assume any relation of equivalence between an original text and its translation. He regards translation as the “production of text” that draws on existing information, a view somewhat akin to that of post-structuralists, who also conceive of translation as creation. Deconstructionists, for example, argue that “original texts are constantly being rewritten in the present and each reading/translation reconstructs the source text” (Gentzler 2001: 149). That is, translators create the originals, a stand that “serves to undermine the notion of authorship and with it the authority which to base a comparison of subsequent translated versions of a text” (ibid.).

The idea that translation is “no more than a form of writing that happens to be rewriting” is captured in what Chesterman refers to as the “all-writing-is-translating supermeme” (1997: 13). Unlike the “untranslatability supermeme,” the idea that all writing is translating “stresses not the impossibility of translation but its possibility” (ibid.). It is a notion that, according to Chesterman, “emerges strongly in postmodern approaches to intertextuality,” in which texts are not conceptualized as original but rather as “derivative from other texts parasitical upon them; writers do not create their own texts but borrow and combine elements from others, linking up in the global textual web” (ibid: 13-14). Obviously, Bob’s definition of translation alone does not provide any real basis upon which to speculate whether he actually subscribes or not to post-structuralists views of translation. One can nevertheless observe that, similar to deconstructionists, Bob’s definition of translation “resists systems of categorization that separate ‘source’ text from ‘target’ text or ‘language’ from ‘meaning’” (Gentzler 2001: 147). Furthermore, as indicated earlier, said definition does not presume a relation of equivalence, a notion that post-structuralism rejects altogether.¹³⁹

Kinds of Translations

When inquired about the different kinds of translations that a professional translator may be asked to do, the participants referred to a variety of ways in which translation can be classified. One of the most common ways for categorizing translation is, as Gouadec points out, “by subject matter or ‘domain’” (2007: 11). This criterion is used

¹³⁹ Unlike other translation theories that have traditionally involved an essentialist notion of meaning (i.e. as objective, determinable, and thus transferable from one language system to the other), post-structuralism views meaning as context-bound (i.e. as being created during as well as shaped by the communication process itself) as opposed to ‘given for all times’ (cf. Chesterman 1997: 13).

by Maria, Anna, and Martha, who gave examples of various kinds of domain-specific translation such as scientific, technical, literary, academic, judicial, medical, commercial, and legal translation.¹⁴⁰ Daniel also referred to this criterion but, instead of providing examples, he stated that “any subject field is potentially up for translation.”

Table 18. Kinds of Translations

Bob	<i>Different text types and media; different modes (sight translation, interpreting); different topics (not sure I understood the question correctly)</i>
Daniel	<i>Anything in any subject field is potentially up for translation</i>
Laura	<i>Translating official documents, press releases, manuals, reports, contracts, correspondence etc.</i>
Maria	<i>scientific, technical, related to literature etc.</i>
Anna	<i>Academic translation (such as literary, scientific journals), judicial translation, medical translation, commercial translation</i>
Martha	<i>Technical, scientific, legal, general, medical</i>

Another criterion for categorizing translation is by type of document. Laura, for example, classified translations according to a variety of documents that belong to several subject areas. In contrast to Laura, Maria, Anna, Martha, and Daniel, who referred to one criterion only, Bob indicated various possible ways in which translations can be classified, thus reflecting a more thorough understanding of the discipline and practice of translation. In addition to subject area and text type, he classified translations according to different types of media (as in multimedia or audio-visual translation) and modes of translation, e.g. “sight translation” and “interpreting.” He did so, however, out of a concern for not having “understood the question correctly.” Admittedly, this particular TNI question is open to different interpretations, reason why I thought it would be interesting to maintain the original wording of the question.

In addition to the classification criteria specified by the participants, translations can “also be categorized according to their end purpose or function (or end-use) with regard to a particular environment or activity” (Gouadec 2007: 12). Gouadec, for instance, refers to judicial translations that are done “for use in, or in relation to, court proceedings;” medical translations that are used “by physicians and healthcare professionals;” commercial translations “for use in a sales or marketing context,” and so on and so forth (ibid.). Translations can also be classified by type of “platform,

¹⁴⁰ Martha thus distinguished between general and domain-specific translation, a distinction that, as indicated in 5.7.1, is rather problematic given that the concept of “general” translation is “essentially a non-category” (Kelly 2005: 123).

equipment, software and procedures required or used” (ibid.). Here, Gouadec distinguishes among “all-through human translation,” translation-memory-assisted translation,” “computer-assisted human translation,” and “part or full automatic translation or machine translation” (ibid.). As it can be seen, various criteria can be used for classifying translations. In this regard, Mata Pastor observes that

[a] lo largo de la historia, se han propuesto incontables clasificaciones —muchas de ellas dicotómicas— de los tipos, variantes o modalidades de traducción, que atienden a distintos criterios (oralidad, sistemas implicados, direccionalidad, literalidad, fidelidad, género, temática, medio y modo, metodología empleada, nivel de subordinación, grado de mecanización, soporte, etc.) y que se enmarcan en diversas ópticas (lingüística, cultural, histórica, social, filosófica, profesional, comercial, etc.) (2008: 76).

Notwithstanding the value of existing typologies for analytical purposes, it is important to underscore, as Gouadec himself does, that in actual translation work the above categories do “intersect” and “overlap” (2007: 12). As a point in case, Gouadec refers to the translation of a Website “describing contagious diseases and including a self-diagnosis test management system,” which could be classified “as **multimedia (and maybe even multimodal) medical translation** – or most probably, as ‘localisation’” (ibid., emphasis in the original).

Elements of Translation and Notions of Translation Function

Another important aspect of the practice of translation is the nature of the process in which translators engage. As shown in Chapters 2 and 3, this process typically involves three main phases, namely the reading/comprehension phase, the actual translating or production phase, and the editing and/or revising phase. As far as the reading phase is concerned, the participants of this study were asked whether they thought a translator reads a text before translating it in the same way as any other reader of the text. Surprisingly, Anna and Laura felt this is the case, whereas the rest of the participants did not agree with such a statement. Indeed, translators’ reading processes are different from those of any other reader as translators typically use the reading phase to scan texts for potential problems, decide on certain options, adopt an overall approach to translation, etc. Translators’ initial approach to translation, for example, tends to favor either source-orientedness or target-orientedness. Toury (1995: 56-57) refers to this initial decision as the “initial norm,” which refers to the fact that translators may adhere either to the norms of the original text (determining adequacy) or the norms active in the

target culture (determining acceptability). In practical terms, however, this is not an either/or choice but a question of more or less. As Toury points out, translators' initial norm (closely connected to the macro-structure of a text) will determine further translation decisions (linked to the micro-level of a text). Yet, these decisions "will necessarily involve some ad hoc combination of, or compromise between the two extremes implied by the initial norm" (ibid: 57).

Toury further claims that in its socio-cultural dimension translation is subject to constraints of different types and degrees that influence the adoption of varying strategies, decision-making processes, and resulting products. Some translational decisions may be obligatory (due to linguistic, textual, and grammar differences between the source and target languages), while others may be adopted on a random basis. It is the random decisions that Toury sees as governed by socio-cultural factors (ibid.). These factors, in particular the socio-cultural environment of the original text and that of the translated text, are key intervening elements in translation for all the participants of this study (see Table 19). Furthermore, Bob and Laura considered all other elements in Table 19 as factors that need to be taken into account for translation. They are also the only two participants who specified two additional factors, namely the quality of the source text and the use of parallel texts in both languages, respectively. That is, Bob referred to an element of translation that may in all likelihood affect a number of translation decisions, while Laura turned her attention to a specific source of consultation that is also likely to influence certain translation choices.

Table 19. Elements of Translation

	Bob	Daniel	Laura	Maria	Anna	Martha
Client	✓	✓	✓	✗	✓	✓
Date of the original text	✓	✓	✓	✗	✓	✓
Function of the original text	✓	✓	✓	✗	✓	✓
Function of the translation	✓	✓	✓	✓	✓	✓
Original authors	✓	✓	✓	✗	✓	✗
Deadline of the translation	✓	✓	✓	✗	✗	✓
Original reader	✓	✗	✓	✗	✗	✗
Socio-cultural environment of the original text	✓	✓	✓	✓	✓	✓
Socio-cultural environment of the translated text	✓	✓	✓	✓	✓	✓
Final reader	✓	✓	✓	✓	✓	✓

Like Bob and Laura, Daniel viewed all the items listed in Table 19, with the exception of the original reader, as elements intervening in translation. This is also the case with Maria, Anna, and Martha. Not considering the original reader (and, in Martha's case, the original author) as intervening elements of translation seems to be consistent with these participants' notions of equivalence. As indicated above, Daniel, Maria, Anna, and Martha show a preference towards formal equivalence (in terms of both their notions and translation performance), thus aiming at achieving the same form and meaning as opposed to the same function. Accordingly, the effect of the original text on the original readership may not be an important factor in translation. In contrast, aiming at dynamic equivalence, i.e. at producing the same effect on the target readership, may indeed involve taking the original author and readership into consideration. Although Laura's conception of translation seems to indicate adherence to formal equivalence, her translation style and specified unit of translation (i.e. the text) appear to be slightly more representative of dynamic equivalence. This may eventually be the case with Bob as well. Although his definition of translation does not assume a relation of equivalence between two texts, his specified unit of translation (the text) correlates, according to the theoretical positions described above, with dynamic equivalence as well as a free translation style.

It is also interesting to note that for Maria professional-related factors—in particular, the client and the deadline of the translation—are not elements intervening in translation. Anna does not consider translation deadlines an important factor either. Yet, unlike Maria, who does not regard the function of the original text as an intervening element in translation, Anna and the rest of the participants consider the function of both the original text and the translated text important elements in translation.¹⁴¹ However, when asked whether they thought a translation for a specific client and end use would be different than that for a different client and end purpose, only Bob and Martha stated that this is true. With the exception of Martha, who further refers to the importance of the “target audience” in a different question (see below), these answers seem to be consistent with the notion of translation held by the participants who show a preference for formal equivalence.

¹⁴¹ In fact, although it may be reasonable to say that translators “operate first and foremost in the interest of the culture into which they are translating” (Toury 1995: 12), the relationship between the source text/culture and the target text/culture needs not to be neglected.

6.1.3.2 Translation (Sub-)competences

This section of the questionnaire asked the participants about the type of knowledge and skills translators *should* possess, the instruments they consider useful for translation, and expectations placed upon translators with regard to translation directionality and text types for translation.¹⁴² Concerning the type of knowledge and skills translators should have, PACTE's (2005) componential model of translation competence provides a useful frame to analyze and classify the participants' answers. As briefly discussed in 5.2.1, PACTE identifies five translation sub-competences in addition to a number of psycho-physiological components that are of a cognitive, behavioral, and psychomotor nature. PACTE's sub-competences are the "bi-lingual sub-competence," the "extra-linguistic sub-competence," the "translation knowledge sub-competence," the "instrumental sub-competence," and the "strategic sub-competence" (ibid: 610).

The bilingual sub-competence is made up of pragmatic, socio-linguistic, textual and lexical-grammatical knowledge in each language. The extra-linguistic sub-competence is made up of encyclopaedic, thematic and bicultural knowledge. The translation knowledge sub-competence is knowledge of the principles that guide translation (processes, methods and procedures, etc.) and the profession (types of translation briefs, users, etc.). The instrumental sub-competence is made up of knowledge related to the use of documentation sources and information technologies applied to translation. The strategic sub-competence is the most important, as it is responsible for solving problems and the efficiency of the process. It intervenes by planning the process in relation to the translation project, evaluating the process and partial results obtained, activating the different sub-competencies and compensating for deficiencies, identifying translation problems and applying procedures to solve them (ibid.).

As Table 20 shows, all six participants considered that some aspects of PACTE's bi-lingual (sub-)competence should be part of the translator's repertoire of knowledge and skills. Laura and Anna, for example, explicitly referred to the translator's need to know the source and target language(s). In addition, Laura agreed with Daniel that socio-linguistic knowledge, in particular, knowledge about "language usage," is an important pre-requisite for translation. Martha also seemed to regard socio-linguistic knowledge (expressed in terms of "appropriate register") a key aspect of the translator's bi-lingual competence. Maria, like Daniel, viewed lexical-grammatical knowledge as a central

¹⁴² These aspects are addressed in questions 2, 3, 11, and 12 of the TNI and correspond to questions 9, 10, and two items of question 16 of the background questionnaire.

element of said competence. Bob specifically referred to “excellent writing skills” in the source and target language, an aspect that was also mentioned by Daniel and Laura.

Table 20. Translation Knowledge and Skills

Bob	<i>General and subject-area knowledge, excellent writing skills in source and target language, research skills</i>
Daniel	<i>Language usage, culture, grammar, good writing</i>
Laura	<i>A good translator should know their mother tongue well and be well read and up to date with current usages etc. They should also dominate the other languages they work with and understand the source cultures. They should be a good writer and enjoy language and the written word</i>
Maria	<i>Grammar, terminology, format, where to look for information</i>
Anna	<i>Know the target and original language they are translating into, the socio- cultural backgrounds of their client, resources that they can use and can be easily accessed to them</i>
Martha	<i>Context, Target audience, appropriate register</i>

The different types of knowledge that makes up PACTE’s extra-linguistic sub-competence can also be identified in some of the participants’ answers. Nevertheless, Bob is the only one who thought translators should possess world and subject-area knowledge. All the other participants, except for Martha, referred to cultural knowledge instead. For Martha, the “target audience” is an important factor in translation, one that along with Anna’s concern for the client’s “socio-cultural background” are some of the aspects representing PACTE’s knowledge about translation sub-competence.

Interestingly, none of the participants referred to knowledge/skills that make up PACTE’s strategic sub-competence. Perhaps the only reference of this type is found in Anna’s definition of translation, in which she mentioned problem solving and decision making, albeit at the level of *textual expressions* only. Some of the participants nevertheless referred to knowledge and skills found in PACTE’s instrumental sub-competence. In particular, Bob and Maria mentioned research skills, while Anna referred to the availability of and access to information resources.

When specifically inquired about the type of instruments they consider useful for translation, all six participants recognized the importance of using various sources of information. These include offline and online resources as well as experts in the field for most of the participants. Daniel and Anna, however, did not refer to experts as useful translation resources. (I suspect that for these participants the use of the term “instrument” in the questionnaire might have been justifiably misleading.) Furthermore, Daniel and Anna, like Maria, did not explicitly acknowledge the usefulness of parallel

texts for translation, whereas Bob, Laura, and Martha did. This suggests that subject-area knowledge is an important aspect not only for Bob but also for Laura and Martha.

Table 21. Useful Instruments for Translation

Bob	<i>Parallel texts, dictionaries, databases, experts, TM systems, L10N tools</i>
Daniel	<i>TMs, online and offline resources, good post-editing process</i>
Laura	<i>Dictionaries (bilingual and single-language), the internet, other texts that may be related, consulting with other translators, speakers of the two languages (both who speak one language and both)</i>
Maria	<i>Internet, dictionaries, translation Websites, experts</i>
Anna	<i>Printed dictionary, translation softwares, online sources</i>
Martha	<i>Internet for documents on the field, consultation with people or specific authorities</i>

It is also interesting to observe that the participants with the least translation experience, except for Anna, referred globally to the Internet as yet another source of information. Anna, like Daniel, distinguished between online and offline resources instead but did not specify any of these in particular. Bob, however, neither made such a distinction nor explicitly referred to the Internet (perhaps his reliance on and/or use of this resource is more restricted than that of the other participants). Instead, he referred to computer-aided translation tools, in particular, translation memories and localization tools. Except for the latter, this is consistent with the list of resources he claimed to use for translation (cf. 6.1.1.3). Daniel, Like Bob, also referred to translation memories and thus acknowledged the importance of having “good post-editing.”¹⁴³ Anna also referred to translation “softwares” [sic] as a useful instrument for translation but did not specify any, which suggests that she is aware of the existence of translation tools but does not know any in particular.

Finally, when specifically inquired about translators’ abilities to work both into and out of their first language, only Laura and Maria considered that a good translator should be able to translate with the same degree of efficiency in both directions. This is not the case, however, with the degree of efficiency they expected from a good translator concerning the types of texts he or she works with. Except for Martha, who believed that translators should be able to translate all kinds of text types with the same degree of efficiency, all the other participants felt this is not the case.

¹⁴³ As mentioned earlier, Daniel teaches a course on editing and revising for translators on a casual basis. He also works occasionally as a freelance proof-reader for a local translation agency.

6.1.3.3 Translation Problem Solving

As indicated in 6.1.3, there are two questions in Orozco Jutorán and Hurtado Albir's TNI that, at least in my opinion, could belong to both their categories of analysis, i.e. notions of translation and translation (sub-)competences. These are questions 9 and 14 of the TNI (corresponding to two items in question 16 of my background questionnaire), which ask respondents whether they think the main problems in translation are lexical ones and if a bilingual dictionary is the main resource to find equivalents. In addition to these questions, this section analyzes questions 5 and 6 of the TNI, which Orozco Jutorán and Hurtado Albir exclude from the two categories mentioned above for eliciting qualitative data and not being gradable. These two questions deal with strategies for solving comprehension and formulation problems and thus correspond to questions 12 and 13 of my background questionnaire.

As far as the solving of comprehension problems is concerned, the participants were asked to rank the three strategies listed in Table 22 (i.e. consulting a bilingual dictionary, trying to infer the meaning from the context, and consulting a monolingual dictionary) according to the order in which they would choose them (i.e. from the first to the last strategy). In addition to these strategies, the participants could specify any other strategies they considered useful for trying to understand a certain expression in the source text.

Table 22. Strategies for Solving Comprehension Problems

	Bilingual dictionary	Contextual meaning	Monolingual dictionary	Other
Bob	3	1	2	<i>Search for expression in context (parallel texts)</i>
Daniel	1	3	2	
Laura	2	1	3	
Maria	3	1	2	
Anna	1	3	2	<i>Look on the internet and try to see other usage of the expression to better understand the expression</i>
Martha	2	1	3	<i>I have a lot of hispanohablante [Spanish-speaking] friends and I often consult with them to try and understand a phrase or term or double check I understood it in the first place</i>

As Table 22 shows, all the participants, with the exception of Daniel and Anna, would first try to infer the meaning of a given expression from the immediate context. For Daniel and Anna, this strategy would be the last one they would try. They would rather

consult a bilingual dictionary first and then a monolingual dictionary. Interestingly, the Web search performance of these two participants shows that Daniel only used *one* bilingual dictionary to solve all his comprehension and/or formulation problems concerning the first translation task (i.e. the only task the participants of the pilot study were asked to carry out). Anna also drew heavily on a single bilingual dictionary but combined this resource with a number of search engine queries for the same task.¹⁴⁴ This is consistent with the additional strategy that Anna specified in the questionnaire, i.e. to search the Internet for parallel texts, and somewhat in line with her answers provided in the interview.

Vanessa: ... What do you usually do when you want to look for online information on a particular term or expression in Spanish?

Anna: ... I either try to decipher the meaning of that expression, from the blogs that I'm reading. So you know at least I sort of read the paragraph that they are on and then try and get a gist of what's going on. And if not I will start going through different web pages and see if I can find at least like an English equivalent or something like that. Or more parallel texts, more sort of information as to what that expression is trying to say and then trying to decipher and get an equivalent in English.

Bob's preferred order of strategies, like Maria's, is to infer the contextual meaning of a particular term or expression first and then to consult a monolingual dictionary, followed by a bilingual one. This choice of strategies is indeed consistent with his Web search performance. He did not consult any bilingual dictionaries to solve any of the problems (of whichever nature) he encountered during translation. Instead, he drew on parallel texts, which, as he explained in the questionnaire, he uses to "search for expression[s] in context." Furthermore, he only consulted a monolingual dictionary once to confirm the meaning of a specific collocation that he had previously researched in documents retrieved by Google.

Maria would also try to infer the meaning of a particular term or expression from the context first. It is interesting to note that, although the OSRs only required information about the participants' use of external resources for problem solving, Maria reported a problem once for which she had not carried out any research on the Web but had drawn

¹⁴⁴ It should be noted, though, that Daniel encountered far less problems than Anna, and that all of his problems were of a lexical kind. As the findings of this study suggest, different types of translation problems seem to have an impact on the types of resources used for translation problem solving (see 7.1.3 and 7.2.3 for more details).

on her “personal knowledge” instead. Should her personal knowledge be insufficient, she would then consult a monolingual dictionary followed by a bilingual one. When I asked her what she would do to find information online on a particular term or expression in Spanish, she said she would “go to Wikipedia. Ah go to probably Spanish Google, or Mexican Google, and look for glossaries of some kind, definition dictionaries.” Yet, although her screen recordings show that she did use Wikipedia on number of occasions, she only used a monolingual dictionary once. In contrast, she drew heavily on a bilingual dictionary (her third choice of strategy) to solve most of her comprehension as well as production problems (see below).

Like Bob and Maria, Martha and Laura would also try to understand the meaning of a particular item from the immediate context first. However, they would then consult a bilingual dictionary followed by a monolingual one. This is consistent with Laura’s Web search performance—and that of Daniel, Anna, and Maria—which shows that she primarily used a bilingual dictionary to try and solve most of her comprehension (and formulation) problems. Furthermore, when I asked her about the first thing she would do to look for information on the Web on a given term or expression in Spanish, she replied: “I might look it up in WordReference if it’s like a particular word that I’ve never heard before. And if that doesn’t really work I might search for it in Google and see what kind of stuff it’s linked to, or if someone’s given a definition of it.” In Martha’s case, however, her screen recordings show that, instead of resorting to a bilingual dictionary first, she tends to consult a monolingual dictionary to solve her comprehension problems. Thus, in my interview with her, she explained that “[i]f I’m at home I normally go to my dictionary, my physical dictionary. But if I’m not then I will go to the RAE site.” She further explained in the questionnaire that she frequently consults with her “friends” who are native speakers of Spanish to find or confirm her own solutions to certain comprehension problems.

In addition to the strategies used for solving comprehension problems, the participants were asked to rank three main strategies for solving formulation problems. These are consulting a bilingual dictionary, trying to express the same idea in as many ways as possible in the target language, and consulting a monolingual dictionary in said language (see Table 23). The participants could thus specify any other strategies they (would) use for solving formulation problems.

Table 23. Strategies for Solving Formulation Problems

	Bilingual dictionary	Own renditions	Monolingual dictionary	Other
Bob	1	2	3	<i>Choice I would be to confirm my tentative solutions on the Internet (e.g. in newspaper texts etc.)</i>
Daniel	3	1	3	<i>Use a tool like the synonym list in MS Word (which can be accessed by right-clicking on the words involved in the phrase; for me, this process can sometimes lead to an inspiration</i>
Laura	2	3	1	
Maria	2	1	3	
Anna	1	2	3	
Martha	2	3	1	<i>I am a big fan of dichos [sayings] so I would try to find something equivalent in English even if it meant digressing from the original ie to retain the sentiment rather than a word for word translation</i>

In line with her answer above, Maria would try various renditions first. She would then consult a bilingual dictionary followed by a monolingual one. When I specifically asked her about the use of dictionaries, in particular whether she found these useful for translation and if so for which specific purposes, she lamented her excessive reliance on said resources to try and find equivalents in English (i.e. her second language):

Vanessa: ... Now in your view what are dictionaries useful for, in terms of translation? Do you find them useful and if so what for?

Maria: I do find them useful but maybe I overestimate the value of the dictionary 'cause I rely on it too much. 'Cause I guess I cannot come up with a translation in English straight up because it's not my first language so I have to rely on ... dictionaries more than I would like to.

Maria's lack of confidence in her skills to translate from Spanish into English also surfaced later during the interview, when I asked her about the steps she would take online to look for equivalent terms or expressions in English. She replied she would first use her electronic multilingual dictionary (which she brought to class once) to go from Spanish into Russian, and then from Russian into English:

Maria: Oh first of all I'd enter it in my dictionary to find an equivalent in Russian, and then from Russian translate in to English.

Vanessa: And if you didn't have your dictionary, for example in class when you were translating in class and you needed to find an English equivalent for a given expression?

Maria: Oh yeah, I suppose a dictionary or WordReference or RAE.

Vanessa: Okay and how would you know that you actually found the right term in English?

Maria: Well I wouldn't.

Vanessa: You wouldn't?

Maria: No, that's why like, I sometimes I say it's difficult, because I don't actually know if that's the right term. 'Cause I cannot associate it with the, it's not my mother tongue, so I don't know if it sounds right or not. I would have to ask a native, but I wouldn't go there.

Vanessa: Okay, but at some point you have to make a decision whether to use this or that, or...

Maria: Yeah, pretty random. Sometimes I know, but when I don't actually know it's very random. I probably would enter the phrase in Google and see if it comes up, but then they will all come up (laughter) so yeah.

Maria's elaboration of the difficulties she encounters, in her case, in L3-L2 translation highlights the importance of documentary research skills for aiding translation into a second language.

Concerning the strategies that Bob selected, he would first consult a bilingual dictionary but only "to confirm" his own tentative solutions found on the Internet. That is, his first choice would actually be to consult parallel texts, which is, as indicated above, consistent with his Web search performance. He would then try various renditions and finally consult a monolingual dictionary in the target language, a choice of strategies that Anna would also follow in the same order (unlike Bob, however, Anna did not specify any another strategy that she would use for trying to solve formulation problems). In fact, during my interview with her, Anna explained that a bilingual dictionary (in this case, Wordreference.com) would be her first choice to try and find equivalents in the target language. She also referred once again to speed as a crucial factor determining the use of translation resources:

Vanessa: So ... in the course ... you learned about Merriam Webster or RAE, for example?

Anna: Oh, RAE is only for sort of, it's a monolingual thing...

Vanessa: Yes, it's a monolingual dictionary.

Anna: ...so if I had to translate something, if I want to know what the word was, like its original meaning and try to guess what the equivalent would be in English I would use that. But if I need to just get the translation of that word fast, then I just use WordReference.

As with their choice of strategies for solving comprehension problems, Martha and Laura also concurred with their ranking of strategies for solving formulation problems. They would first consult a monolingual dictionary and then resort to a bilingual

dictionary, followed by various renditions of their own. This is more or less consistent with Martha's Web search behavior. Furthermore, she explained in my interview with her that she considers monolingual dictionaries in the SL a useful source of inspiration for translation variants. When I asked her about the types of dictionaries and/or resources she knew before taking the translation practice course, she stated that she was familiar with RAE and that she had come to know about WordReference.com through her classmates. She then praised the usefulness of the bilingual dictionary but nevertheless emphasized the use of the monolingual dictionary as a source both for confirming her understanding of an expression in the SL and finding equivalents in the TL.

Martha: ... You tend to stick with the things that you know, but WordReference is good 'cause it goes back and forth from different languages, it's not...

Vanessa: ... just monolingual.

Martha: Yeah, but I like RAE as well because it's a monolingual and usually like I'm familiar with the word, but I just can't quite pinpoint exactly what it means, so... But then it depends also where the text is from, so whether that's gonna be relevant or not, or so relevant.

Vanessa: Yeah, so it kind of helps you verify your thoughts, for example, if you have an idea...

Martha: Yeah, if I'm like 80% or I understand it in the context but I'm trying to think of what the equivalent would be in English if I can look at what the meaning is in Spanish and then I can go, "Oh, yeah right." So then it...

Vanessa: ...then it clicks.

Martha: Yeah.

Martha further explained in the questionnaire that she would try to find equivalents for sayings "even if it meant" providing a sense-for-sense translation rather than a word-for-word translation—a statement that appears to reinforce previous speculations about Martha's notion of faithfulness and adherence to formal equivalence. Laura, in contrast to her choice of strategies in the questionnaire, stated in the interview that to find translation equivalents, she would "find the context first and then search for a similar context ... I would search for it in Google and see what content it appeared in." Her screen recordings show, however, that WordReference was also one of the first ports of call for this participant when it came to finding translation equivalents.

Daniel, like Maria, would first try to express the same idea in as many ways as possible in the target language. Yet, he ranked both the use of a bilingual dictionary and a

monolingual dictionary as his third choice of strategy. I am not sure whether he did so by mistake or to indicate that the use of synonyms would be his second choice of strategy before consulting either a bilingual or monolingual dictionary. It seems, though, that he mistakenly ranked both types of dictionaries as the third option (a problem that I should have spotted after the questionnaire was piloted) as he would have otherwise explicitly indicated that his second choice of strategy would be to use synonyms as a source of inspiration for translation variants.

Finally, it is interesting to note that Maria and Anna are the only two participants who considered that the main problems encountered in translation are vocabulary problems and that a bilingual dictionary is the main instrument used to find adequate equivalents in the target language. This is perhaps not so surprising taking into account that Maria and Anna consider the phrase and the sentence, respectively, the main unit of translation. Thus, references to the word level can be found in their interview transcripts.¹⁴⁵ Anna, for example, referred to her change of attitude towards translation throughout the semester when I asked her about the way she had translated the title of the Greenpeace text, which is the name of the Greenpeace guide to genetically engineered (GE) food. The name of this guide in Spanish uses a color metaphor to refer to food brands and products that are rated as green (GE free) and red (may contain GE ingredients). Anna's answers below confirm previous statements not only about her notion of translation unit but also about that of equivalence:

Vanessa: ... concerning the food guide title I noticed that you, you know you searched for solutions for a while and then you ended up finding the food guide that Greenpeace New Zealand uses, the title of that food guide. However in your search report you explained that you weren't totally satisfied with that title, why so? Do you remember?

Anna: I think at that time I was quite, actually I think my translation attitude has changed throughout this semester actually. 'Cause before I always strived for word for word, I want things like a complete equivalent and one is one, two is two, three is three. I didn't really go for sense for sense, I just go for word for word. And then that's why I wasn't entirely satisfied, because it wasn't word for word.

¹⁴⁵ Their focus on vocabulary problems, the word level, and the use of a bilingual dictionary for finding translation equivalents is most likely also related to the fact that both are non-native speakers of English and hence show less confidence in their language abilities. The high number of individual problems (as opposed to problems common to some or all of the participants) that Anna and Maria faced at a lexical level in their translation tasks would seem to reinforce this assumption (see 7.1.1 and 7.2.1 for more details).

Vanessa: Oh, you were trying to keep the color metaphor probably ...

Anna: I was trying to keep the color metaphor, but I realized I couldn't and I was just like, (noise made). (laughter) Yeah so at the end I just went for sense because I think that was what, I think it was like, "Is this really important? Is this really important, so much so that you have to get that idea across straight away?" And I was just like, "Nah, not really." So I just went for sense instead, yeah.

Vanessa: And you also referred to the brief, to the clients which was what the brief asked you do to, to satisfy the New Zealand audience needs.

Anna: Audience, yeah, so I was just like, "Ah, oh well I'll just go for that." (laughter)

Vanessa: Very good, so yeah, I had the impression that the notion of equivalence for you was quite important...

Anna: Yeah, it was quite, actually I get really annoyed when I read Mandarin translations of an English text that I start picking up the things that they didn't really have that idea across straight away. And I just get really annoyed 'cause I'm like, "That's not the thing, why didn't you translate that bit?" but then I think I'm slowly starting to realize the fact that sometimes some things are just not translatable. So, you know, give the poor translator a break. (laughter).

In Maria's case, I specifically followed up on her view of the translation unit, a concept that seemed rather fuzzy to her even towards the end of the translation practice course:

Vanessa: There was another section [in the background questionnaire] that asked you, I dunno if you remember this, asked you what in your view is the translation unit, or what is the thing that you focus on when you translate? And there were like three options 'word,' 'sentence,' and 'text.' And you chose 'other: phrase'.

Maria: Yeah, I thought, 'collocation' more, yeah 'cause I didn't know that word before. (laughter)

Vanessa: ... I was wondering what was the difference for you, I dunno, if you actually made a difference between phrase and sentence or it was...

Maria: Oh no, I thought it was like two words together, I thought. But now I probably I'd rather say it was 'word'.

6.1.4 Internet Experience

6.1.4.1 Internet Usage and Access

This section of the background questionnaire includes questions aimed at inquiring about the participants' frequency of Internet usage, the distribution and frequency of their online activities, and their access to the Internet. The translation students, i.e. the course participants, were also asked in the interviews to estimate for how many years they had been using the Internet. Martha, for example, stated that "[she] must have

used” the Internet since she was an undergraduate student in 1994 or possibly “even earlier than that,” i.e. for at least 15 years. Both Maria and Anna believed they had been using the Internet for about ten years, while Laura estimated a period of nine years. Considering that the Internet has been available to the wider public since the early 1990s and taking Bob’s and Daniel’s ages into account, one could assume that Bob has been an Internet user for the past 20 years and Daniel for ten to 15 years.

The impact and penetration of the Internet has dramatically increased over time. In the United States alone, 79% of adults were Internet users in May 2010 (as opposed to 14% of the adult population who were Internet users in May-June 1995) (Pew Internet & American Life Project 2010: n. p.). Of those adults, 78% accessed the Internet daily (ibid.). In the UK, 77% of the adult population had accessed the Internet within the three months prior to the interviews conducted by the National Statistics Omnibus Survey in 2010 (Office for National Statistics 2010: 2). Of those adults, 60% had “accessed the Internet every day or almost every day” (almost double the percentage of users estimated in 2006), 13% weekly, 8% monthly or less, and 18% had never accessed the Internet (ibid: 1-2). In accordance with this trend data, the participants of this study stated that they use the Internet every day, except for Daniel, who claimed to use the Internet “frequently.” When further inquired about the average number of hours per week that they spend online, all the participants rated an average of ten to 20 hours a week, except for Martha, who claimed to spend between five and ten hours a week.

The growth of the network society, especially in Western countries, has led to an increase not only in Internet usage among users from all sorts of demographic backgrounds but also in the type of activities conducted online, including social, leisure, work, and educational activities. According to the 2010 Pew Internet & American Life Project survey, the most popular online activities for American adults include sending and/or receiving e-mails (94% of the Internet users); using a search engine to find information (87%); checking the weather (81%); looking for information on a service or product (78%); reading news (75%); buying a product (72%); visiting a government Website (69%); booking travel accommodation (66%); visiting a video-sharing site like YouTube (66%); using an online social networking site like MySpace or Facebook (61%); and performing banking operations (58%), among others. Similarly, the most popular online activities of the adults in the UK study involve sending and/or receiving e-mails (90% of the Internet users); looking for information on goods and services

(75%); using travel and accommodation services (63%); Internet banking (54%); reading news (51%); listening to the radio or watching television on the Web (45%); using chat sites, social networking sites, and blogs (43%); playing or downloading music, films, games or images (40%); and searching for health/medical information (39%), among other online activities (Office for National Statistics 2010: 13).

The above figures clearly show that searching for information is the second most popular Internet activity following e-mail. To find out more about the participants' Web searching habits, I asked them to rate, on a scale from one to five, the frequency with which they carry out the online activities specified in Table 24. Their responses show that conducting academic research and reading news online are the two most frequent activities with an average rating of 3.67. These are followed by translation research and social networking (3.17), entertainment (2.83), learning (2.67), checking the weather (2.50), and other types of activities (1.17). In particular, Bob and Maria seem to carry out academic research very often, Daniel and Anna often, and Martha and Laura rarely—these two participants are in fact the only ones who had not been studying in the semesters prior to the study.¹⁴⁶ Reading news is also a very frequent activity for Bob and Maria, a frequent one for Anna, an occasional one for Daniel and Laura, and a rare activity for Martha. Translation research is often conducted by Bob and Anna, sometimes by Daniel, Martha, and Maria,¹⁴⁷ and rarely by Laura.

Table 24. Frequency of Online Activities

	Never	Rarely	Sometimes	Often	Very often	Average
Academic research	0	2	0	2	2	3.67
Translation research	0	1	3	2	0	3.17
Learning	1	1	3	1	0	2.67
Social networking	1	2	0	1	2	3.17
News	0	1	2	1	2	3.67
Weather	2	0	3	1	0	2.50
Entertainment	1	2	1	1	1	2.83
Other	0	0	1	1	0	1.17

As far as social networking is concerned, Martha, Bob, and Daniel appear to rarely or never use the Internet for such a purpose. In contrast, Laura, Maria, and Anna claimed

¹⁴⁶ Although Martha had carried out a translation project the semester before the study took place, she had not taken any courses requiring the completion of assignments that may have required online research.
¹⁴⁷ Note, however, that Maria asserted she did not have any translation practice experience nor was she familiar with any online translation resources before the study took place.

to engage in social networking often or very often. Entertainment activities are most frequently conducted by Laura followed by Bob (often), Anna (sometimes), Daniel and Maria (rarely), and Martha (never).

Some of the participants also seem to use the Internet for learning purposes, an online activity that, according to the Office for National Statistics (2010: 13), is carried out by 35% of the adults in the UK. This is often done by Maria and sometimes by Bob, Daniel, and Anna. Laura and Martha, however, in line with their rating of academic research, rated the use of the Internet for learning as an activity they rarely or never carry out.

To sum up, Bob, Daniel, Maria, and Anna use the Internet for academic and translation research as well as learning purposes, i.e. for *informational searching* (as shown above, the second most popular online activity for American and UK adults). As Jansen, Booth, and Spink point out, “[t]he aim of informational searching is to locate content concerning a particular topic in order to address an information need of the searcher. ... The need can be along a spectrum from very precise to very vague” (2008: 1256, drawing on Rose and Levinson 2004). Laura, however, rarely uses the Internet for informational searching. This also seems to be the case with Martha, although she occasionally conducts research on translation as well as on work-related topics. Furthermore, unlike Laura, Maria, and Anna, who frequently use the Internet for social networking, Bob, Daniel, and Martha rarely or never do so.

It should also be pointed out that only Bob explicitly referred to the use of the Internet for *transactional searching*, namely in the form of online banking. The intent of transactional searching is, according to Jansen, Booth, and Spink, to “locate a Website with the goal to obtain some other product, which may require executing some Web service on that Website. Examples include purchase of a product, execution of an online application, or downloading multimedia” (ibid.). Transactional searching may nevertheless be part of the entertainment activities that Laura and Anna, like Bob, carry out online. Finally, it should be noted that all six participants claimed to have regular access to the Internet either from home and University (Daniel, Laura, Maria, and Anna), or from home and work (Bob and Martha).

6.1.4.2 Previous Training

As far as previous training in online searching is concerned, none of the research participants had ever taking an online search-related course. Laura had taken a course

run by the University of Auckland Library on how to use Voyager (the library's online catalogue) in her first year of studies. All six participants specified that they learned by themselves how to perform Web searches and/or use certain Web resources. Bob, for example, referred to "learning by doing" and using the online "help features of search engines," as well as reading literature on how search engines work. Similarly, Daniel and Martha explained they learned to perform Web searches by reading search engine instructions and/or tips. Yet, Martha limited the use of search engines to Google and did not specify any other self-learning techniques, while Daniel referred to the use of search engines in general and specified that the evaluation of search results (in particular how these relate to search queries) is a key aspect in Web searching. Maria also referred to the assessment of information found on the Web, albeit in terms of "trust" or reliability of said information. She did, however, not specify any particular means by which she may have learned how to perform Web searches. Laura, finally, explained that she learned how to search the Web by "trial and error" and "spending time" browsing the Web.

6.1.5 Web Search Knowledge

This section of the questionnaire includes questions aimed at addressing the participants' knowledge about the process of Web searching. This process includes three main stages: (a) seeking and retrieving information, (b) assessing information, and (c) saving information for the purpose of re-accessibility. As Sales Salvador points out, translation is very much about knowledge dissemination. She reminds us that "en un entorno plurilingüístico y pluricultural como el que nos rodea, cada vez más quienes traducen e interpretan se convierten en 'el eslabón de la trasmisión del conocimiento'" (2005: 4). The translator's role as "an information user, processor, and producer" (ibid: drawing on Pinto Molina 1999, 2000, 2001) therefore highlights the need for (online) documentary research skills in processes of decision making and problem solving. Pinto Molina skillfully describes the value of documentary research for translators in today's knowledge society in the following passage:

En resumen, el apoyo documental al traductor, como analista (*intérprete pragmático*) y sintetizador (*enunciador estratégico*) en el contexto de un enfoque funcional de la traducción, resulta especialmente útil en una doble vertiente: en primer lugar, potenciando su faceta de *usuario* documental (formación declarativa), suministrándole más y mejores herramientas documentales., desde los documentos originales pasando por ras enciclopedias hasta los sofisticados bancos terminológicos y bases de datos hipertextuales; en segundo, favoreciendo su formación

procedimental como *procesador y productor* de documentos. En definitiva, la Documentación aporta al Traductor un método de trabajo sistemático de documentos, unos criterios de selección de información y unas técnicas para su organización, almacenamiento y recuperación (2000: 14, emphasis in the original) (cf. Pinto Molina 2001: 294-297) .

With regard to searching and retrieving information on the Web, the background questionnaire asked the participants to report about their use of search engines, search operators, and online databases (questions 7, 8, and 9); the formulation of search queries in Google using both its Search box and Advanced Search page (questions 10, 11, 12, and 13); and their understanding of how search engine work as well as their interpretation of search results (question 15). Questions 14 and 16 aimed at addressing the participants' procedures and assessment criteria for evaluating and saving information found on the Web.¹⁴⁸

6.1.5.1 Using Search Engines, Search Operators, and Online Databases

As Austermühl (2001: 52) points out, there are three main approaches to searching (translation-related) information on the Web. These are institutional searches (carried out via URLs), thematic searches (via subject trees), and keyword searches (via search engines) (see 7.1.3 and 7.2.3 for other approaches to information searching). Institutional searches involve the finding of expert sites and valuable Web resources like newspaper archives, international organizations' sites, commercial sites, terminological databases, etc. These searches are generally performed by guessing URLs "using the standard URL structure" (e.g. www – name of site – type of site – country of site) (ibid: 53). Although this type of searches tends to provide generic information at first, detailed information can be retrieved by carrying out specific searches using the expert site's own resources such as internal search features, databases, specialized documents, press releases, glossaries, etc. (ibid: 55). A thematic approach to information search and retrieval involves directory-based searches that allow the user to browse data through subject trees or thematic categories of information. Although this might be the least common approach to information searching nowadays, information services like those provided by libraries through their own Online Public Access Catalogue (OPAC) systems can be very useful in combining thematic searches with keyword searches. The

148 As indicated in 5.7.2.3, questions 10 to 13 as well as questions 15 and 16 of the background questionnaire were adapted from a University of Auckland Library publication (2008) on how to get the most from Internet searching using Google.

latter involve the typing of keywords in a search engine box to find information on a particular topic, “or to locate something to buy, or to simply find the shortest route to a site we already know exists (the practice of typing in a word you know so as to yield a site you wish to visit, also called a navigational query)” (Battelle 2006: 31). The purpose of a navigational query is therefore different from that of a regular keyword query. While a user would perform a navigational query to find that *which is known*, he or she would perform a keyword query to find that *which is not known*. The latter would thus appear to cause what Battelle refers to as “Web blindness: a sense that we know there’s stuff we want to find, but have no idea how to find it” (ibid: 32).

Although the institutional and thematic approaches to information searching are efficient methods for identifying key information as well as finding reliable sources on the Web—e.g. glossaries, definitions, images, parallel texts, reference works, online databases, etc.—the keyword search approach is generally considered the most powerful and comprehensive method to finding information online (Austermühl 2001: 59; cf. Alcina Caudet, Soler Puertes, and Estellés Palanca 2005: 224). This is mainly due to search engines’ capability of scanning the entire contents of hundreds of millions of Web pages at a time. Both navigational and keyword queries are typically performed in popular search engines such as Google, Yahoo!, Bin, AOL.com, and Ask.com. The participants of this study, for example, all ranked Google as the search engine they most frequently use (see Table 25). Daniel, Anna, and Maria further ranked Yahoo! as the second search engine they most frequently use, while Bob referred to A9.com as a search engine (powering product searches on Amazon and other commercial sites) he uses very rarely. Martha either mistakenly ranked Firefox Mozilla as a search engine or referred to this Web browser as a way of indicating that its address bar can be used to type in terms and find possible matching sites from the browsing history and bookmarked sites.

Table 25. Ranking of Search Engine Use

Rank	Bob	Daniel	Laura	Maria	Anna	Martha
1	<i>Google</i>	<i>Google</i>	<i>Google</i>	<i>Google.com</i> <i>.com.mx .cl .it</i> <i>(regional)</i>	<i>Google</i>	<i>Google</i>
2	<i>A9 (very rarely)</i>	<i>Yahoo!</i>		<i>Yahoo</i>	<i>Yahoo</i>	<i>firefox mozilla</i>
3		<i>Baidu</i>		<i>Yandex</i>		
4		<i>Metacrawler</i>		<i>Rambler</i>		
5		<i>Dogpile</i>				

Daniel and Maria listed other search engines that they use less frequently than Google and Yahoo! In particular, Daniel specified Baidu (a Chinese search engine for Websites, images, and audio files), Metacrawler (a metasearch engine that retrieves results from Google, Yahoo!, Bin, and Ask.com), and Dogpile.com (another metasearch engine that also displays search results from Google, Yahoo!, Bin, and Ask.com), while Maria referred to two popular Russian search engines (Yandex and Rambler).

As indicated earlier, the keyword search approach to information seeking and retrieval is considered the most powerful method to finding information online. The search process behind this method is, however, neither as straightforward nor as sequential as it would seem at first. As far as straightforwardness is concerned (I will briefly refer to the non-sequential nature of the search process in 6.1.5.4), search engines tend to be very powerful regarding the *retrieval of data* that is essentially factual and unambiguous (e.g. proper names, numbers, and addresses), and that provides an answer to closed questions such as “what is the population of Spain?” As Abadal Falgueras (2004: 410, drawing on Blair 1990) explains, said powerful performance is possible due to the “highly structured” and “deterministic” nature of data retrieval (DR):

La recuperación de datos [RD] ... tiene un carácter muy estructurado. En este caso se puede establecer una comparación exacta entre el contenido de un campo y una petición de información. Por ejemplo: «¿cuál es el sueldo de X?» «¿en qué calle está situada la agencia Y?» o «¿cuántos profesores hay en la Universidad de Valladolid?». Las preguntas están muy formalizadas y la respuesta acostumbra a ser directamente la información solicitada. Por otro lado, en un entorno RD se produce una necesaria relación entre una pregunta formalmente bien construida, es decir, que respeta e incluye los requisitos del programa que gestiona la información, y la respuesta correcta a la pregunta. ... El hecho de que se dé esta relación directa quiere decir que los sistemas de RD son, desde un punto de vista lógico, *determinísticos*. Es decir, que la pregunta ya determina, en cierta forma, la respuesta. Una misma pregunta formulada a dos sistemas de RD diferentes, pero con las mismas bases de datos, obtendrá el mismo conjunto de datos, y no podrá ser de otra manera. Esto explica por qué en RD no existe una excesiva dificultad para representar los datos (ibid., emphasis in the original).

In contrast to DR, however, search engines have a much poorer performance concerning the *retrieval of information* that is less factual and that may provide answers to open-ended questions such as “which factors led to the economic crisis in Spain?” The poor performance of search engines for information retrieval (IR) is mainly due to the nature of artificial intelligence and the complexity of natural language processing, which make

the relationship between questions and answers in IR systems a non-deterministic one.

In this regard, Abadal Falgueras states that

[l]as características de un entorno RI [recuperación de información] son bastante diferentes. De entrada, hay que subrayar que se trata de un sistema indirecto, es decir, que no responde directamente a la pregunta, sino que proporciona documentos en los que puede ser que el usuario encuentre lo que busca aunque, seguramente, los tendrá que separar de un conjunto notable de documentos no relevantes. ... A diferencia de lo que acostumbra a pasar en un entorno RD, la respuesta tan sólo probablemente contendrá lo que se busca. Esto es lo que se denomina factor de indeterminación. Por otro lado, en un entorno RI existe una relación no determinística, *probabilística*, entre la pregunta –difícil de trasladar a un lenguaje formalizado– y la posibilidad de que la pregunta sea satisfecha –hay un cierto grado de incertidumbre presente en la respuesta. Si se formula una misma pregunta a dos sistemas de RI diferentes, pero con las mismas colecciones de documentos, no se obtendrá necesariamente el mismo conjunto de documentos (ibid: 411, emphasis in the original).

Similarly, to illustrate the main differences between DR and IR as well as the limitations of the latter, Torres del Rey refers to Dreyfus (2001), who

señala la incapacidad de la «inteligencia artificial» y de los motores de búsqueda más avanzados para proporcionarnos contenido que sea relevante a nuestras necesidades de cognición y esté determinado por nuestras motivaciones, intereses y conocimiento previo. Para poner de manifiesto dichas limitaciones, hace uso de la diferenciación que David Blair (*apud* Dreyfus 2001: 13) establece entre «recuperación de datos» (DR, data retrieval), esto es, lo que tiene que ver con entidades exentas de ambigüedad como nombres, direcciones o números telefónicos; y «recuperación de la información» o «búsqueda documental» (IR, information retrieval). ... Dreyfus resume las diferencias entre DR e IR por medio de cuatro coordenadas aplicadas de forma respectiva: 1. Procedimiento directo («quiero saber X») / indirecto («quiero saber de qué trata X»); 2. Para recibir una respuesta satisfactoria, la búsqueda ha de estar necesariamente relacionada con los términos de aquella / La relación entre los términos de la búsqueda y la información requerida sólo es probabilística; 3. Criterio que determina el éxito de la búsqueda: corrección y exactitud / utilidad; 4. Ampliación de la búsqueda a un ámbito mayor: no supone un gran problema / es muy complicada (2005: 202).

For Abadal Falgueras, the main problem of IR systems—i.e. their inability to directly link users' questions to documents that may contain satisfactory answers—results from “la falta de concordancia entre los términos que utilizan los usuarios para consultar un sistema RI y aquellos que han sido empleados en el sistema RI, lo que constituye uno de los principales problemas que condicionan la recuperación de la información” (ibid: 409-410). Abadal Falgueras therefore suggests keeping strict control of the terms used in IR systems for indexing the Web so as to bridge the gap between those terms and the

ones employed by users for retrieving information. Similarly, Spink and Jansen claim that “[t]he issue of correctly matching the Web query with Web content is one of the key elements in providing quality services for users of Web search engines;” hence, the study of Web queries is critical for developing “better Web search engines” and understanding how people use these IR systems (2004: 78).

In addition to Boolean logic (i.e. the use of the Boolean operators AND, OR, and NOT along with other search operators such as double quotes), search engines use other techniques such as anchor text (text surrounding a link) and link analysis, among others, to better match queries to Web content. From a user’s vantage point, overcoming some of the limitations of IR involves constructing effective search expressions that are directly related to and relevant for our search queries. It also requires knowledge about the Web search engine(s) we use, their capabilities, limitations, etc. Most of today’s commercial search engines provide their own advanced search features and operators, which offer numerous options to expand and/or narrow down users’ search queries according to their information needs. Google’s Advanced Search, for example, lets the user search for all query terms, an exact query phrase, at least one of the query terms, and/or none of the specified query terms—the latter typically used to remove ambiguity, e.g. in the case of polysemous words. In addition, users can search for words written in a given language; created in a specific file format; updated within a certain period of time; and contained within a specific range, domain, country or site, among others.

Alternatively, users can improve their searches by employing the above mentioned search operators in combination with keywords typed in a search engine box. As mentioned earlier, both advanced search features and operators typically modify the search in one way or another, i.e. by expanding and/or restricting it. For example, the synonym (“~”) and OR search operators are used to broaden a search, whereas the minus (“-” or NOT), plus (“+” or AND), and quote (“”) operators are used to narrow it down. As Table 26 shows, most participants, except for Anna (see below), were familiar with the functionality of the quote operator as well as that of the search operators AND, OR, and NOT before the study took place. Bob also specified the proximity operators NEAR (to find documents where the query terms are in a short range of words) and ADJ (to find documents where the query terms are next to each other), and Daniel named the alternative query type “define:” (to search for term definitions). Other query types include “cache:,” “link:,” “related:,” “info:,” “site:,” “allintitle:,” “intitle:,”

“allinurl:,” and “inurl:,” which can be used by themselves or in combination with the search operators mentioned above. In addition to combining query types with search operators or modifiers (e.g. the plus and minus signs), some search engines allow users to construct more complex queries by grouping search operator statements using parentheses. This produces a “nested search,” i.e. a type of query that uses parentheses to embed or *nest* a search statement within another. As nested searches can get really complex—e.g. (y OR (NOT x) AND z)—and hence become error-prone, parentheses should perhaps be used sparingly and only when really needed.

Table 26. Search Operators and Functions

	Operator	Function
Bob	- And or +	- to force the keyword following the operator to appear in the found document or to ensure a specific spelling
	- " ..."	- to search for phrases
	- NOT or –	- to exclude keyword following from search
	- NEAR	- to search for keywords that appear close to each other in document
	- ADJ	- to search for keywords that appear directly next to each other in document
Daniel	- AND	- searches for both words
	- NOT	- removes term from search
	- "XX"	- searches for exact phrase
	- Define:	- finds definitions of term
Laura	- [No response]	- [no response]
Maria	- AND	- to show results that contain both words
	- OR	- to show results that contain either of the words
	- AND/OR	- [no explanation]
	- " "	- to show results that contain the phrase
Anna	- " "	- used when you want the particular expression to appear in the text as a whole expression
	- ,	- used when you want to search for something and adding something specific
Martha	- or	- to search for various topics with diff. possible words
	- +	- to combine words or phrases in a search
	- -	- to not include specific words or phrases

Unlike the other participants of the study, Laura did not specify any search operators in the background questionnaire. However, when I asked her about the use of said operators during my interview with her, she explained that she sometimes uses quotation marks to “get the exact phrase.” She added that she also knew that “there’s one where you can like write the address and then put a colon and then it will just find things from that website.” Laura was in fact trying to describe the functionality of the

“site:” query type, which only Bob used to limit search results to specific Websites in his Web search performance.¹⁴⁹ In addition to specifying different domains (e.g. .gov, .ac, and .org), the “site:” query can also be used to specify country sites.

Interestingly, Anna specified the comma as an operator to “search for something and adding something specific.” Given that, to my knowledge, the comma does not function as a search engine operator, I asked Anna to elaborate on its functionality (as well as that of the phrase search) during my interview with her.

Vanessa: ... You mentioned in the background questionnaire that you actually know two types [of operators], quotation marks and the comma. So, what do you use the quotation marks for?

Anna: When I want the words that I typed in to have like an exact match to the searches that’s gonna pop up in Google ... but sometimes it’s probably not so useful ‘cause sometimes I’ll be typing that quotation mark and it will be like, I have one that does not have the quotation marks but with the quotation marks I don’t have anything. (laughter).

Vanessa: Yeah, I know what you mean, sometimes it [the phrase search] does not retrieve any results. What about the comma, what do you use it for?

Anna: I think I use it when it comes to, so like if I want to search for something, let’s say [pause], I don’t really quite use commas a lot. But say if I had do like a linguistic aspect of translation studies I would probably go “linguistic aspect, translation studies” and then hopefully something will pop up. They usually pop up but I have to sort of troll through a whole lot of unrelated information like, “No, no, nope.” (laughter)

Vanessa: So you use it like in a way to, mm ... search for something general but then you add the comma to make it more specific.

Anna: More specific, yeah.

As it can be seen, Anna is aware of the restrictive effect that the use of quotation marks can have on search results, a constraining feature that she also seems to associate with the use of the comma. When I asked her where she had learned to use the comma (as well as the parentheses, which she also used in a restrictive manner concerning a different translation task) as a search operator, she referred to her visit to one of the subject librarians at the University of Auckland Library, who had taught her how to use the library resources for information searching.

Vanessa: ... are there any other search operators that you normally use?

¹⁴⁹ See 7.1.3.3 and 7.2.3.3 for details on the participants’ use of search operators for constructing search queries.

Anna: No, that's about it, because I actually started using parentheses after I went to see [the librarian] in the library. 'Cause he was teaching me how to search for different resources online.

Vanessa: Where? In the online catalogue ...?

Anna: Yeah, the online catalogue and like the online journals and everything like that. And one of the things that he taught me was that, "Oh, maybe you could use the brackets just to specify what you are looking for really."

Vanessa: Oh, interesting...

Anna: Yeah, something like, and so I started using sort of more little things that you have to do when you are searching for stuff in the search box, like you know plus signs or whatever.

Vanessa: So you actually went to see [the librarian] for...?

Anna: Yeah, 'cause for my dissertation I have to start researching, so I was just like... (laughter)

Vanessa: So he taught you some search operators?

Anna: Some search operators...

Vanessa: Do you remember which ones in particular? The parentheses...

Anna: There was a star, so instead of translation you just say "transla" and then asterisk.

Vanessa: Yeah, like ...

Anna: Yeah, and it was just like politics, there was a comma as well...

Vanessa: Oh that's why probably you use the comma with Google as well, do you think so?

Anna: Mm yeah.

Vanessa: It could have come from there, from that conversation with [the librarian]...

Anna: No, from the initial survey that I did, I haven't gone to see him at that time. I went to see him sort of further, about two weeks down the track and I, 'cause I had to start researching so I told him that I had to research and he was like, "Okay, come over and I'll teach you how to do it."

It seems, then, that Anna has extrapolated some of the operators used for searching the library's online catalogue (i.e. Voyager) to seek and retrieve information using search engines like Google.¹⁵⁰ As Table 27 shows, Voyager is indeed the online database that Anna, like Daniel and Laura, ranked as the one she uses most frequently. Martha also listed the Voyager catalogue but explained that she "never used it," while Maria did not

¹⁵⁰ Anna's screen recordings in fact show that she (mis-)used the comma and the parentheses to express search queries in Google on several occasions. None of her search queries, however, involved the wildcard, which, as Anna explained in the interview, is used for text truncation, i.e. to replace characters at the end, beginning, or within a word to retrieve variant forms (such as singular and plural forms as well as different spellings) of a word.

rank any online databases at all. In contrast to these participants, Bob ranked Wikipedia as the online database he uses most frequently, which suggests that his notion of database is broader than that of the other participants. Bob nevertheless ranked Voyager and ProQuest as his second and third most frequently used databases.

Table 27. Ranking of Online Database Use

Rank	Bob	Daniel	Laura	Maria	Anna	Martha
1	<i>Wikipedia</i>	<i>Voyager</i>	<i>Voyager</i>	<i>[No response]</i>	<i>Voyager</i>	<i>voyager but never used it</i>
2	<i>Voyager</i>	<i>PsychInfo</i>			<i>database & articles in LEARN</i>	
3	<i>Proquest</i>	<i>OVID</i>				
4		<i>JStor</i>				

Like Bob, Daniel also specified databases that provide access to scholarly work—in particular, PsychInfo, OVID, and JStor—while Anna referred to the databases and articles that are accessible via LEARN, the name of the University of Auckland Library’s Website from which you can link to library resources and tools such as the Voyager catalogue, library news, databases and articles, dictionaries, etc. Somehow, given their professional experience, Bob and Daniel did not specify any terminology databases such as IATE (InterActive Terminology for Europe).

To sum up, all six participants ranked Google as their preferred search engine (which is consistent with their Web search performance) and were familiar with the functionality of the basic search operators AND, OR, and NOT as well as that of the double quotes, except for Anna, who was only familiar with the latter and (according to the interview data) the plus modifier. Bob further specified two proximity search operators (ADJ and NEAR) and Daniel one alternative query type (“define:”). Furthermore, Bob and Daniel, who claimed to conduct online academic research on a frequent basis, specified various databases (all of them accessible via the University of Auckland Library) used to search scholarly work like journal articles, books, abstracts, etc. Similarly, Anna referred (both in the questionnaire and the interview) to the library’s online resources to indicate that she had used several databases for academic research before the study took place. Only Maria, who claimed to conduct academic research very often, did not specify any online databases. In contrast, Laura and Martha, who said they rarely carry out academic research online, ranked the Voyager catalogue as a frequently used database. Martha, however, explained that she had never used this database, i.e. she knew about its existence but had never used it before the study took place.

6.1.5.2 Formulating Search Queries in Google

Queries are an integral part of Web searching. They are the “expression of a searcher’s information problem” (Spink and Jansen 2004: 77) or, as Battelle points out, “the loadstone of search, the runes we toss in our ongoing pursuit of the perfect result” (2006: 26-27). Given the importance of users’ abilities to express information problems in a form that is understandable by Web search engines, I asked the research the participants to formulate queries to address two different search questions/topics—the migration of grey whales in the Pacific Ocean and maternity care in New Zealand—and modes of searching—via the Goggle’s Search box and via its Advanced Search page. In the following, I will analyze the participants’ query syntax (i.e. the statements or expressions they used to transform the search questions into search queries) in connection with their *query complexity* (simple vs. advanced queries), *query length* (number of terms in a query), and *query effectiveness* (the effect that certain queries may have for potentially obtaining relevant search results).

First Search Topic

Concerning the complexity of the search queries that the research participants would have typed in Google’s Search box in order to address the first search question (see Table 28), only Bob and Daniel constructed an advanced search query—here taken to involve one or more keywords combined with one or more search operators, including query types such as “site:,” “define:,” etc. Laura formulated both an advanced query (a phrase search) and a simple query, i.e. one that excludes search operators. Martha used the plus modifier to search for all the keywords included in her query. Yet, this is not considered an advanced query given that the plus (“+” or AND) sign is the default in Google and is therefore not needed. That is, Google considers all the words in a search query, except for articles, prepositions, punctuation, special characters, etc., which are called “stop words” (i.e. terms that occur so frequently that they provide very little content value) and are usually ignored in Google’s default search behavior.¹⁵¹

¹⁵¹ There are, however, exceptions to this rule. See Google Web Search help (Google 2010) for more details).

Table 28. Search Topic 1 - Queries Typed in Google's Search Box

	Search Query
Bob	<i>+migration + "gray whales" +Pacific -Atlantic -Indian</i>
Daniel	<i>"gray whale" migration pacific</i>
Laura	<i>Migration grey whales pacific ocean, "migration of grey whales in the pacific ocean"</i>
Maria	<i>whales migration Pacific</i>
Anna	<i>migration of gray whales, pacific ocean</i>
Martha	<i>Migration + gray whales + Pacific Ocean</i>

With regard to query length, the participants' simple queries consist on average of 4.5 terms.¹⁵² In this study, the length of a simple query is measured by the number of individual terms or words that make up the query, excluding articles, prepositions, and punctuation. The length of an advanced search query is also measured by the number of individual terms (and also excluding articles, prepositions, and punctuation), except for those included in phrase searches. The latter are counted as one term only, i.e. regardless of any multi-word expressions they might contain. The reason for this is to account for the matching criteria used by Web search engines, according to which only documents matching a specific query are retrieved. For example, Google would interpret Bob's advanced query as consisting of five keywords, thus retrieving documents that would include the terms "migration," "gray whales," and "Pacific," and exclude the terms "Atlantic" and "Indian." Similarly, Daniel's advanced query would be interpreted as consisting of three keywords and Laura's of one keyword. Furthermore, in this study search operators are not counted towards the length of advanced queries. Instead, search operators are examined in relation to the structure of the advanced search queries formulated by the participants of the study (see 7.1.3.3 and 7.2.3.3 for more details).

It is, however, important to note that, as Battelle points out, "focusing on the number of words in a search query misses the point: it's not the complexity of the search that matters [so much]; it's the complexity of our language" (2006: 25). Hence, the notion of

¹⁵² For this particular search task, the mean query length is higher than that of most users' queries, which tend to include just one, two or three words per query. Battelle, drawing on a 2004 Majestic Research report, states that "[n]early 50 percent of all searches use two or three words, and 20 percent use just one. Just 5 percent of all searches use more than six words" (2006: 27). According to KeywordDiscovery.com (2010), although single keyword searches are becoming less common, users predominantly use single keyword searches followed by two- and three-word searches, except for American users, who primarily use two-word searches followed by single- and three-word searches. For Battelle, the use of short queries can be explained by searchers' "poorly structured intentions" (2006: 273). In this case, however, the already formulated search questions provided the participants with the basis not only to determine the terms used in their queries but also to structure their search intent.

term selection for processes of Web searching becomes significant. The underlying implication is that not all terms in a query weight the same or are of equal importance. According to Spink and Jansen, “[t]he idea behind term weighting is that the terms with the most importance should have more effect on the retrieval process” (2004: 56). Similarly, “[t]he idea behind the term co-occurrence approach is that the search engine or searcher can use ... similar terms [to those specified by other users] to augment the current query and improve retrieval performance” (ibid.). The authors nevertheless warn us that term co-occurrence “is a tricky area ... because frequently occurring terms tend to discriminate poorly between relevant and non-relevant documents. If the identified terms occur too frequently they do little and often nothing to improve the effectiveness of the query” (ibid., drawing on Peat and Willett 1991).

If one examines the participants’ selection of terms for their queries, one can observe that all six participants chose terms that are relevant for the search topic, namely those included in and determined by the search question. The level of term co-occurrence is therefore high. Yet, differences in query length and query complexity/structure—in particular how the participants combined search operators or modifiers with keywords in order to expand and/or constrain their searches—mean that some queries are more effective than others in obtaining relevant results. The relevance of the documents that search engines match to a specific query does, however, not only depend on the query terms and query structure used but also on the capabilities of the search engine software itself. Most consumer search engines nowadays comprise four main modules: the Web crawler (which combs through the pages found on the Web to gather information on a particular query), the index (a database containing the pages gathered by the crawler), the search and matching algorithm (which connects a user’s query to the index), and the ranking algorithm (which ranks the results of the query).

One of the main rules that a ranking algorithm uses to determine a document’s relevance to a query (i.e. to rank matches) involves the location and frequency of keywords on a given Web page. Other document features that allow matching a relevant document to a query include the analysis of links, the date of publication, the length, the proximity of the query terms, etc. Yet, not all search engines retrieve and rank results in the same way. The findings of a study conducted by Spink et al. on the overlap in results returned by four top Web search engines—MSN Search (now called “Bin”), Google, Yahoo!, and Ask Jeeves (now Ask.com)—show that these search tools “have

built and developed proprietary methods for indexing the Web and their ranking of query driven search results differs greatly” (2006: 1389). According to Spink et al.,

[t]he key finding of our large-scale study is that first results returned by the four major Web search engines included in this study differ from one another. Leading Web search engines rarely agree on which results to return on the first results page for any given search query. This finding confirms previous research results in the up-to-date context of a large study of major commercial Web search engines. The study results highlight the fact that different Web search engines, which use different technology to find and present Web information, yield different first page search results. There is also a high degree of uniqueness in sponsored links between the major paid search providers. Web search engine’s first page results are primarily unique, meaning the other engines did not return the same result on the first result page for a given query. The fact that no one Web search engine covers every page on the Internet and the majority of page one results are unique may contribute to the fact that almost half of all searches on the four major Web search engines fail to elicit a click on a search result (ibid: 1388-1389).

To mitigate this problem, i.e. the lack of overlap in results, the authors suggest using metasearch engines like those mentioned by Daniel (i.e. Metacrawler and Dogpile.com), which “harness[...] the collective content, resources, and ranking capabilities of ... top Web search engines and can deliver Web searchers a more comprehensive result set containing potentially relevant results from the top Web search engines to the first results page” (ibid: 1389). Due to the dynamic nature of Web content, single search engines are incapable of “cover[ing] the entire Web all of the time;” hence, the importance of using metasearch technology that “leverages the search power of the top Web search engines [and that] may reduce the time spent searching multiple Web search engines while providing the top ranked results from the single Web search engines” (ibid.).

Other technologies that promise to leverage the power of search engines as well as improve users’ search and navigation experience on the Web are those used in the attempt to expand the Web as we know it today, i.e. a medium of documents for humans to read, into a “Semantic Web” that includes data and information for computers to process and manipulate. At its core, the development of the Semantic Web involves describing content for computers to “understand” and “express” meaning. Obviously, as Paul Ford explains, “what’s going on is not understanding, but logic, like you learn in high school: If A is a friend of B, then B is a friend of A. Jim has a friend named Paul. Therefore, Paul has a friend named Jim (2002: n.p.).

Creating a new form of Web content that is meaningful to computers is not a new idea. Quite to the contrary, the concept has been around since 1994, when Tim Berners-Lee, the founder and main proponent of the Web, presented it “at the very first World Wide Web Conference. This simple idea, however, remains largely unrealized” (Shadbolt, Hall, and Berners-Lee 2006: 96). According to Berners-Lee, Hendler, and Lassila, the main challenge of the Semantic Web

is to provide a language that expresses both data and rules for reasoning about the data and that allows rules from any existing knowledge-representation system to be exported onto the Web. Adding logic to the Web—the means to use rules to make inferences, choose courses of action and answer questions—is the task before the Semantic Web community (2001: 37).

Two main technologies for creating the Semantic Web have already been in place for a number of years now. These are XML (eXtensible Markup Language) and RDF (Resource Description Framework). While XML lets users create their own tags and add structure to documents, it does not explain what the structures mean. In contrast, RDF “provides the technology for expressing the meaning of terms and concepts in a form that computers can readily process. RDF can use XML for its syntax and URIs to specify entities, concepts, properties and relations” (ibid: 38). In other words, using RDF language it is possible to create and combine logical statements for items (e.g. users and Web pages) to have properties (such as “is a friend of”) with certain values (e.g. another person or Web page). The relations among concepts and the rules for logically reasoning about them are defined by “ontologies” or “collections of statements written in a language such as RDF” (ibid.). So-called “agents”—software programs that run “without direct human control or constant supervision”—would then be responsible for collecting, filtering, and processing “information found on the Web” (ibid.). The impact that a Semantic Web of this kind would have on users’ searches was already envisaged by Berners-Lee more than a decade ago when he stated that

[i]f an engine of the future combines a reasoning engine with a search engine, it may be able to get the best of both worlds ... It will be able to reach out to indexes which contain very complete lists of all occurrences of a given term, and then use logic to weed out all but those which can be of use in solving the given problem (1998: n.p.).

Although Berners-Lee's conception of the Semantic Web still remains unrealized,¹⁵³ some progress has already been made towards its achievement (see Shadbolt, Hall, and Berners-Lee 2006 for advances made in this direction).¹⁵⁴ For the time being, however, users will continue to search today's Web taking advantage of the type of search engine capabilities described above. Search success will continue to depend largely on users' knowledge about how search engines work.

As briefly indicated earlier, from a user's perspective it is not so much the ranking algorithm of a search engine that matters but its search and matching functionality. Knowing the rules of the Web search engine(s) that we use is therefore a crucial issue for constructing effective search queries. In this context, i.e. from the perspective of search effectiveness, the queries that Bob and Daniel would have typed in the Google's Search box would probably be the most effective of all the queries formulated to address the first search topic. Bob, in particular, expressed a query that combines expanding and constraining operators. More specifically, he used the plus sign as a *reinforcer* (i.e. the query operator "MUST APPEAR," which can be identified by the lack of spaces after the + sign) to ensure that Google would retrieve documents matching the words "migration" and "Pacific" exactly as they were typed (using double quotes around single words produces the same effect). The reinforcer is particularly useful to prompt Google to retrieve documents containing synonyms for the keywords entered. Bob thus combined the MUST APPEAR operator with a phrase search for "gray whales" and the minus operator ("- " or NOT) to exclude other oceans from his search. Similarly, Daniel constructed a query that includes a phrase search for the type of whales specified in the search question combined with the keywords "migration" and "pacific" (which suggests that Daniel is aware of Google being case insensitive). Unlike Bob, however, Daniel did not exclude other oceans from his query, thus resulting in a less restricted search.

¹⁵³ Battelle claims that "a major hurdle to the rise of the Semantic Web has been standards" for specifying which tags are the right ones for which Web pages, thus emphasizing that "the nearly limitless possibilities of the Web do not lend themselves to top-down, human-driven solutions" for classifying content (2006: 265). Yet, what Battelle refers to as "the Force of the Many," made it possible for a new type of tagging system to emerge, i.e. "one based not on any strict, top-down hierarchy [e.g. that of directories], but rather on a messy bottom-up approach" (ibid: 266) that allows users to tag Web content and share those tags with other users (see 6.1.5.4 for more details).

¹⁵⁴ See Webster, Kui, and Quinan (2002) for an overview of the use of Semantic Web technology for Example-based Machine Translation (EBMT).

Laura, despite formulating an advanced query, only used a constraining operator (the double quotes), thereby specifying too many keywords in her phrase search. This restricts the search even further, which, in turn, compromises the likelihood of a search engine to retrieve documents matching the query's exact wording (in Laura's case the same wording as that of the search question, meaning that she did not transform the search question into appropriate search engine syntax). In addition, Laura, like Martha, also used the exact wording of the search question to construct a simple query but omitted the stop words, which suggests that both participants are aware that Google generally ignores said words. Unlike these participants, Anna included a stop word in her simple query. Furthermore, consistent with her answers above, she included a comma, which she thought would function as a constraining operator. Maria also expressed a simple query but used three keywords as opposed to five, i.e. she constructed a broader simple query (especially as she did not specify the type of whales) than those of the other participants. One of the main disadvantages of performing simple searches, however, is not so much the query length but the lack of specification concerning the proximity of the query terms. When the terms appear adjacent to one another or next to each other in a document, the likelihood of documents being relevant to the query is much higher than when the terms occur at a distance; hence, the value of using phrase searches as well as proximity operators (ADJ and NEAR, which, however, are not available in Google) when it comes to writing search query syntax.

In addition to expressing queries in Google's Search box, the participants were asked to construct searches that would allow them to find information on the first search topic using Google's Advanced Search. As Table 29 shows, only Bob constructed the exact same query as the one he would have typed in Google's search box (i.e. he used the same keywords and advanced search features). Daniel, however, converted his advanced query into a simple one (although he kept the same keywords), while the rest of the participants misinterpreted this question in one way or another. Laura, for example, admitted that she was not quite sure "what we were supposed to do with it, so I tried to fill in as much of it as possible without really thinking of real context." When I asked her whether she had associated the form included in questions 11 and 13 of the background questionnaire with that of Google's Advanced Search page, she replied that "I knew it was taken from there, but I just like, 'cause it was like a questionnaire I felt like I should fill all the spaces." Consequently, she gave an example of how she might

have searched for the required information using the advance search fields she seemed to consider most relevant. The examples provided in the “All these words” and “This exact wording or phrase” fields, in particular, correspond to the simple query and the phrase search she would have typed in Google’s Search box. Note, however, that Laura specified English and Spanish as the languages of the documents to be retrieved, although you can only specify one language in the “Language” field. When I asked her whether she thought she knew how to use Google’s Advanced Search, she admitted that she neither knew how to use it nor did she actually perform advanced searches.

Table 29. Search Topic 1 - Queries Formulated in Google’s Advanced Search Page

	Bob	Daniel	Laura	Maria	Anna	Martha
All these words:		<i>gray whale migration pacific</i>	<i>migration gray whales Pacific Ocean</i>	<i>whales migration pacific</i>	<i>(migration of gray whales in the Pacific Ocean)</i>	<i>migration of gray whales in the Pacific Ocean</i>
This exact wording or phrase:	<i>gray whales</i>		<i>the migration of gray whales in the Pacific Ocean</i>	<i>grey whales</i>	<i>"migration of gray whales in the Pacific Ocean"</i>	<i>migration of gray whales in the Pacific Ocean or gray whale migration in the Pacific Ocean</i>
One or more of these words:	<i>Pacific migration</i>		<i>migration gray whales Pacific Ocean</i>	<i>Whale</i>	<i>migration of gray whales in the pacific ocean</i>	<i>migration gray whales Pacific Ocean</i>
Any of these unwanted words:	<i>Atlantic Indian</i>					<i>Southern Ocean, Atlantic Ocean, Indian Ocean</i>
Results per page:				20	25	50
Language:			<i>English, Spanish</i>	<i>English</i>	<i>english</i>	<i>English or Spanish</i>
File type:				<i>All</i>		
Search within a site or domain:						

Like Laura, Martha stated that she had associated the form included in questions 11 and 13 of the background questionnaire with that of Google’s Advanced Search page but thought that I “wanted an answer for all the individual fields.” She thus explained “that it also might be partly because of the way the questionnaire is, that you usually have to like put something in the fields in order to advance.” Martha therefore provided an answer in every single search field, except for the site or domain field. She admitted that

she does not use Google's Advanced Search very often. Rather, she "usually just go[es] for the main search [Google's Search box], but ... tr[ies] to use things like the plus or the minus symbols." Should this fail to obtain relevant results, she would then try to use Google's Advanced Search. Her Web search performance shows, however, that she tends to formulate simple queries first. This type of behavior, i.e. resorting to advanced searches only after simple searches failed to retrieve relevant results, can also be identified in the Web search performance of the other translation students (i.e. Maria, Anna, and Laura).

Unlike all the participants mentioned above, Maria did not associate the questionnaire form with that of Google's Advanced Search page and hence provided an answer in all the search fields, except for the unwanted words and site/domain fields. Like Martha, Maria explained in the interview that she does not use Google's Advanced Search unless she has to. Similarly, when I asked Anna if she had associated the questionnaire form with that of Google's Advanced Search page, she said she "thought it looked familiar, but ... didn't make the connection at that time." Upon further inquiry, however, she asserted that she knew she did not have to provide an answer in every single field. In Anna's own words, "I know that because they, for the advanced search I know you only have to give them bits of information that you really, really wanted. And I mean there is no way you can have an answer for each of the boxes, you know, I can only do so much." She nevertheless expressed a query in most of the search fields (probably to indicate how she would search for information if she had to use each search field independently). Like Martha, and similar to Maria and Laura, Anna admitted that

I don't actually frequently use it [Google's Advanced Search], I only use it when I, when the simple searcher failed and then that's when I started using the advanced search, when I'm like, "Oh, actually I don't think the simple search would work." 'Cause like they have millions of them pop, I'm like, "That's not gonna happen." So I had to go in to advanced search and start narrowing down the things I want it to have.

Second Search Topic

The participants' query patterns to search for information on the second topic (maternity care in New Zealand) are similar to those identified for the first search topic. As far as query complexity is concerned, this time only Bob formulated an advanced query combining a phrase search with the "site:" query operator. In doing so, he constructed the most effective query of all, not only specifying the distance between the main query

terms but also limiting the results to New Zealand pages only. All other participants opted for simple queries consisting of an average length of 3.75 terms. These were, once again, determined by the search question, thus leading to a high level of term co-occurrence regarding all queries.

Table 30. Search Topic 2 – Queries Typed in Google’s Search Box

	Search Query	Comments
Bob	<i>"maternity care" site:nz</i>	
Daniel	<i>maternity care new zealand</i>	<i>would not select "NZ pages only", because there may be overseas-based websites with info about NZ maternity care</i>
Laura	<i>maternity care new zealand</i>	
Maria	<i>maternity care NZ</i>	
Anna	<i>maternity care, New Zealand</i>	
Martha	<i>New Zealand Maternity Care</i>	

Daniel and Laura formulated the exact same query, the only difference being that Daniel explained the reason why he did not construct an advanced query that would limit the results to New Zealand pages only, i.e. he also wanted to search for “overseas-based websites” that could provide information on the New Zealand maternity care system. Given the level of sophistication concerning the keyword matching and link-pattern analysis of today’s search engines, not constraining the search too much may indeed provide a good starting point upon which to further iterate an *initial query*, i.e. the very first query typed in a search engine box (this is particularly true when users possess low domain knowledge). Still, the problem with simple queries continues to be the lack of specification with regard to the distance of the query terms for search engines to retrieve and rank documents that might make a good match to a query.

As for the formulation of queries using Google’s Advanced Search, Bob, Daniel, and Laura constructed the same query as the one they would have typed in the search box. For reasons explained above, Laura expressed alternative search queries using the “All these words” and “This exact wording or phrase” fields. Maria and Martha also expressed alternative queries but, in contrast to Laura, did not enter the same query in the “All these words” field as that which they would have typed in the search box (Google’s search behavior is the same in both cases). Instead, they restricted their basic queries by adding new terms. Martha, in particular, limited her search to documents containing information on Plunket, one of the largest organizations in New Zealand providing support for the development and health of children under the age of five—i.e.

a resource not directly related to the issue of maternity care policy in New Zealand. Anna also expressed alternative queries and in doing so used once again the parentheses and the double quotes. Like Maria and Anna, she also limited the “Results per page” to a specific number.

Table 31. Search Topic 2 – Queries Formulated in Google’s Advanced Search Page

	Bob	Daniel	Laura	Maria	Anna	Martha
All these words:		<i>maternity care new zealand</i>	<i>maternity care new zealand</i>	<i>maternity care New Zealand children gouvernement program</i>	<i>(maternity care in New Zealand)</i>	<i>New Zealand + Maternity Care + plunket</i>
This exact wording or phrase:	<i>maternity care</i>		<i>maternity care in New Zealand</i>	<i>maternity care</i>	<i>"maternity care in New Zealand"</i>	<i>Maternity Care in New Zealand</i>
One or more of these words:			<i>maternity care zealand</i>		<i>maternity care in New Zealand</i>	<i>New Zealand + Maternity Care</i>
Any of these unwanted words:						<i>Australia, Cook Islands, Fiji, Tonga, Samoa</i>
Results per page:				20	25	50
Language:				<i>English</i>	<i>english</i>	<i>English</i>
File type:				<i>All</i>		
Search within a site or domain:	<i>nz</i>					

Based on the analysis of the questionnaire data and interview data so far, one could argue that the query behavior of the novice students of translation seems to be similar to that of most Web searchers, who generally “ignore the advanced search features” (Battelle 2006: 273). Based on a survey of “studies investigating the queries submitted by users to three major Web search engines – AlltheWeb.com, AltaVista and Excite,” Spink and Jansen found that “the use of query operators is about 10% of all Web queries” (2004: 77). Google provides an even lower number, claiming that “even very advanced searchers, such as the members of the search group at Google, use ... [the advanced search] features less than 5% of the time” (Google 2010).

As Battelle points out, users’ tendency to poorly structure their search intentions by ignoring advanced search options and using few keywords—a behavioral feature also identified in the Web search performance of my translation students—is the very reason why “Google and most other consumer-facing search engines are obsessively focused

on understanding user intent—on deriving the most relevant results regardless of how vague a query might be” (2006: 273).

6.1.5.3 Understanding Search Engines and Interpreting Search Results

As indicated earlier, understanding how search engines work may help improve users’ abilities to work with these tools for obtaining satisfactory results and knowing how to interpret these. Searches start with a query and the process of getting results with a crawler. As briefly indicated in 6.1.5.2, a crawler is a software application that “sends out a vast number of requests to pages on the Internet” for which a number of Web pages are returned and submitted to the indexer (Battelle 2006: 20-21). That is, the crawler sends the crawl data to the indexer (a massive database of Web pages), which breaks down the data and labels it according to the type of information, e.g. words, links, anchor text, etc. The analyzed and tagged data is then placed in the runtime system or query processor, which uses a search and matching algorithm to connect a user’s query to the index. The runtime system also deals with issues of relevance and the ranking of information (ibid.). In short, the user expresses a search query, the crawler collects potentially useful Web pages and places them in the indexer, and the query processor links the query to the index and assesses the relevance of the search results pages (SERPs) placed in the index.

Table 32. Statements about Search Engines and Search Results

	Bob	Daniel	Laura	Maria	Anna	Martha
A search engine always finds results from one single Website	x	x	x	x	x	x
When a search engine finds multiple results, the most relevant result according to the search engine is listed first	✓	✓	✓	✓	✓	✓
If a search engine yields more results (hits) for the term “localization” than for the term “localisation”, this means that the first term is the correct one	x	x	x	x	x	x
The URL “http://www.un.org/~slavic/actfl.htm” contains an html document from an educational site	x	x	x	✓	✓	x
The URL “http://www.my-adventures.co.nz” will direct you to a non-commercial site in New Zealand	x	x	x	x	x	x
The number and type of keywords typed in a search engine will affect the number and type of hits retrieved by the search engine	✓	✓	✓	✓	✓	✓

As Table 32 shows, all the participants of the study were familiar with very basic search engine features. They all knew that these tools retrieve information from a multitude of Websites and rank results from the most to the least relevant ones. They were also able to interpret the basic structure of URLs. Although the questionnaire data indicates that Maria and Anna thought the “.org” domain is used for educational sites, the interview data (see below) shows that they actually knew that this domain is used for organizations. All six participants were also aware of the impact that query syntax—in this case, the number and type of keywords used—may have on search engines for retrieving different search results.

Furthermore, the fact that different spellings of a search term can produce quantitatively different results does not seem to be a qualitative parameter that the participants would have considered for translation decision making. Yet, as sections 7.1.3 and 7.2.3 show, quantitative differences for choosing a term X over a term Y were often taken as a qualitative indicator by some of the participants, in particular by Anna. When I asked her about the use of quotation marks for conducting frequency checks, she referred to this technique as a way of compensating for not being a native speaker of English:

Vanessa: ... I also saw in your recordings that you tend to use the quotation marks to check things that could be expressed differently. For example in the CSIC text, remember that one? There was this expression you, I think, I had the impression you were struggling between saying either ‘pure enantiomerically’, or ‘enantiomerically pure’.

Anna: Yeah.

Vanessa: ... what do you use this type of searches for?

Anna: I think I want to know if it’s expressed in English as having the ‘pure’ in front or having the ‘pure’ at the back. Because, I know English fairly well, but it’s not at the, I’m not actually a native, native speaker I’ve had to check sometimes whether they would put it like this or they put it like that. Actually Martha and I for the last assignment we had to do, I had to do that a lot actually, ‘cause she told me, I think you were saying, I think there was this one expression that we used, and she says like, “I think you would say this.” But I’m like, “Why do I keep thinking it’s the other way round?” And so I actually put the quotation marks in and then I ran it through Google and I see how many results that I get. And I was like, “Actually I think you are right ‘cause yours come up with like six thousand ninety something or rather results.” And for me it was just like three thousand, and I’m like, “Ah!” (laughter)

Vanessa: So when you obtain the results is that one of the things that you usually look at?

Anna: Yeah, I think I see how many results that come up and I know that, and I'll know which is used more frequently, because there are more results that has the same sort of sets of words and so they use that as a standard thing, I don't know.

Vanessa: So do you also, I don't know, what else could you look at? So you generally look at the results ...

Anna: Mm, if I want to check whether that expression is used more this way or more that way, then I will just use the quotation marks and see how many results I get out of it.

When I asked Martha about the type of steps she would take online to look for translation equivalents, she also referred to the frequency checks that she and Anna conducted as part of the translation project they had carried out for the translation practice course on scientific and technical translation. Martha nevertheless admitted that she does not normally run frequency checks and thus expressed more skepticism than Anna regarding the usefulness and reliability of such checks:

Martha: Well when Anna and I were doing this, we were doing our [translation] project together, it was interesting 'cause if we wouldn't quite, if we'd come up with two different things separately and then we'd wanna see which one was probably the most correct, we would see which one came up with more hits on Google. And again that doesn't prove that it's right, but it's, well okay there's more pages where that's written on it.

Vanessa: Frequency checks, okay...

Martha: Yeah. But otherwise I don't normally do that.

Using frequency checks as a qualitative criterion for decision making in translation is a type of behavior that Gile also identified in the IPDRs completed by some of his translation students. According to Gile,

another type of frequently occurring event was the choice of term A over term B simply because it was found many more times when performing a "search" operation on a search engine such as Google. It is interesting that this quantitative difference was taken by the students as a qualitative indication. On one hand, it showed that they had understood that their approach to terminological choices was supposed to be descriptive more than prescriptive, in other words, that they had to find out what the sociolect of their target group was, and follow its usage rather than impose their own. On the other hand, it revealed that their analysis of the data obtained was still too superficial. For instance, they had understood that when writing for a French target group, their preference should go to French web sites, as opposed to Canadian sites, Swiss sites or Belgian sites, because of potential differences in the national varieties of French. What they did not take into account when basing their terminological decision on an overall quantitative indication given by their search engine was that Canadian sites were much more numerous than French, Swiss or Belgian

sites, and that the large number of hits for one term may have come from a majority of Canadian sites, whereas a majority of French sites may well use another term (2004: 14).

Concerning the last step in the process of seeking and retrieving information via search engines, i.e. the selection of search results, my translations students claimed to use the information displayed on Google's search results pages.¹⁵⁵ This information includes the title of the Web pages (i.e. the first line of any search result), the snippet (the short description of a Web page, which may include an excerpt from the page), and the URL or address of a result's Web page (see Alcina Caudet, Soler Puertes, and Estellés Palanca 2005: 227-228 for other types of information that search engines may display on their SERPs). Martha, for example, referred to both the snippet and the URL as sources of information she uses to interpret the results displayed on a given SERP and decide on which links to click on:

Vanessa: And when you use Google ... and then you get the main results page, with the ten hits, what do you look at to decide on which links you wanna click?

Martha: Well it's normally that, like what the, I look at the address of the site and then, without actually going to it, yeah.

Vanessa: Mm-hmm.

Martha: See if that's gonna give me the sort of answer that I want, without actually going there, that's why I don't necessarily always choose the first one, depending on what comes up.

Vanessa: ... then you know how to interpret the address, 'cause that's where you look isn't it, the URLs that are given in each hit?

Martha: Uh-huh.

Vanessa: So do you usually look at the whole address and then say, "Okay, that's reliable, that's not, that's interesting"?

Martha: That's part of it, I mean first of all I'd look at like the three lines or whatever they give you where the phrase or hit has come up.

Vanessa: Yeah, like the title you mean? No the snippet, the description.

Martha: Underneath, yeah the description underneath to see if it's even looking remotely like what I need, and then I will look at the address.

¹⁵⁵ As Alcina Caudet, Soler Puertes, and Estellés Palanca point out, "[p]ara saber si un resultado es útil, podemos pinchar en el enlace correspondiente y comprobar la temática, pero puede haber muchos enlaces que no nos aporten información de interés y puede llevarnos mucho tiempo entrar en cada una de esas páginas" (2005: 227). Therefore, to speed up the process of selecting search results, the authors suggest paying attention to the information that search engines display on their search results pages (ibid.).

Vanessa: And you know how to interpret...?

Martha: The endings?

Vanessa: Yeah.

Martha: Yeah ... For organisation, government.

Vanessa: Okay.

Martha: That sort of stuff, I don't know how I learnt that but at some point in my Internet usage...

Vanessa: Probably trial and error or, oh well...

Martha: No I think way back when the Internet was new and I probably learnt it then and it stuck.

Similar to Martha, Laura mentioned the snippets (and, ultimately, the address of the results' Web pages) displayed on Google's SERPs as the main source(s) of information she draws on to select which search results she wishes to explore. Furthermore, like her classmates, Laura was aware of the fact that not all search results are equally relevant and that these must be scanned before opening any of them:

Vanessa: So when you get your results do you have like a quick look, or do you stop and read the information there, or ...?

Laura: Yeah I have like a skim read of the little bits that it gives you on Google.

Vanessa: Mm-hm ... And is that usually enough or do you feel like...

Laura: It gives you an idea but sometimes something looks promising and you click on it and it's not actually useful. (laughter)

Vanessa: That happens very frequently. Do you actually look at the links that you are given below?

Laura: Mm-hm, 'cause you can see where it's from. ... You can see like what kind of website it is, like if it's a Wikipedia or like a company or something.

Vanessa: So you do look at them, the links there...

Laura: Mm, I mean sometimes it doesn't mean anything, in that case it doesn't really, like if I haven't heard of it before.

Vanessa: Okay, are you ... familiar with the address endings like .com?

Laura: Vaguely.

Vanessa: Which ones are you familiar with the most?

Laura: Well, you can tell sometimes what country it's from, or whether it's like a government website, or like a charity.

Anna also referred to the snippets and the types of Web pages retrieved by Google as information sources for determining which result links to click on:

Vanessa: ... So when you use Google to search for certain expressions and then you obtain the list of results what do you look at to decide which links, which results you want to click on or further explore?

Anna: I usually, if I found those expressions in different blogs I usually just skip the blogs because, I dunno, I don't want to read through people's ... personal things, yeah. And so I start looking for all the, like I said, the educational websites, or yeah just general websites that does not involve any other personal information. And it's, it will probably be able to give me a more sort of like a definitive thing as to whether I am looking at the right thing or they are just putting it in because they think it's fun, or yeah.

Vanessa: Yeah, but how do you decide that? What is it that you are looking at to decide, "Okay..."?

Anna: I think also, before I click in to the page I actually read the little...you know...

Vanessa: Snippet, the...

Anna: ...snippet, yeah they have all the ... they have the actual term, they have included the actual term in their paragraph.

Vanessa: So you tend to read that information?

Anna: I tend to read that information, or even if I don't I quickly scan through it and I go, "Oh, I think this is the right one." And I click it in and if I don't then I can always go back, but yeah.

Vanessa: Yeah, do you also have a look like at the URL given below, or?

Anna: Yeah.

Vanessa: Do you find that helpful somehow, or..?

Anna: Well it really depends 'cause I mean not all of them are like .edu, or .org or dot whatever. So yeah sometimes if I had to read blogs, then I just have to read blogs, 'cause I have to find what that expression means and yeah I have to make choices.

Similarly, for Maria, both the snippets and the URLs of the Web pages retrieved by Google are key information sources when it comes to selecting search results:

Vanessa: Okay, right so talking about Google, when you Google certain terms, or expressions, what do you usually look at or pay attention to, to decide which results you want to open, or which links you want to click on?

Maria: Oh, it's how it's highlighted, how it comes up in bold. And I read what it says.

Vanessa: ... the description?

Maria: Yeah, and also the address, obviously if it's a commercial site I try not to go, but if I don't have any other options I have to go. But normal yeah, I just click the first five.

Vanessa: Yes, so that's a criterion for you like whether they appear at the top...?

Maria: Yeah, I suppose so, not always. Sometimes I have to then go and do Advanced Search.

Vanessa: ... were you familiar with the site endings of the addresses?

Maria: Like org or com?

Vanessa: Yes.

Maria: Yeah, org is non-profit and com is commercial.

Vanessa: So you...

Maria: I try to go for org 'cause 'cause you should always, but I don't always find it.

Finally, it should be emphasized that Maria referred to the ranking of search results as another parameter that she would take into account for deciding which result links to click on. For her, the ideal search result should be ranked within the first five top results. Anna also referred to the ranking of search results when she explained that for her having “to go into the second page of the search results ... is like a total failure.” In addition, Martha stated that “I don't normal check many sites, if, it's like I choose maybe one or two options that come up in Google and then if it didn't answer the question then I'll try something completely different.” Interestingly, the screen recordings show that all four translation students seemed to feel a need to click on at least one or two result links—typically, one or more of the first five results ranked by Google—before further iterating their search queries. In contrast, Bob tended to iterate his initial queries until he found a result on any given SERP that potentially satisfied his search need(s). Daniel met all his information needs with the help of WordReference only. As shown in 6.2.1, Daniel had explained (in the online search report) that he was very familiar with the subject area dealt with in the Greenpeace text—i.e. the one used for the first embedding task—and hence may have not require much background and/or terminological research.

6.1.5.4 Evaluating and Saving Information Found on the Web

One of the main advantages of the Internet is that it allows for universal, fast, easy, and immediate access to a vast variety of documents on the Web. The ubiquity of information has transformed the way translators carry out their documentary research and approach their information needs. As a result, and as Alcina Caudet, Soler Puertes, and Estellés Palanca remark, “[a]hora la dificultad no está en hacer un gran acopio de datos, ya que eso ya nos lo ofrece Internet, sino cómo filtrar la información relevante, almacenarla masivamente y extraer de forma inequívoca los datos buscados” (2005: 222). For Palomares Perraut (1999) and Gonzalo García (2000), the main disadvantages

of the Internet relate to the dispersed nature of the information, the changing or dynamic nature of the content, the structure of the Internet, and the lack of reliable sources resulting from what these authors refer to as the “democratization of information.” As Sales Salvador puts it,

the Internet offers the translator an invaluable and inexhaustible source of information, a working medium and a means of communication which modifies the constraints of time and space. But, in view of what many critical voices have called ‘infoxication’ ... on the Internet, we need to stress the importance of maintaining a critical perspective when handling sources and evaluating their credibility (2006: n.p.) (cf. Sales Salvador 2005: 6).

The evaluation of Web documents—the second main phase in the Web searching process—involves considering various aspects related to authority; the accuracy, coverage, and currentness of information; link information, etc. The number of proposed models for determining the credibility and reliability of said content is rather extensive (see, for example, Codina 2000a, 2000b; Austerlühl 2001; Merlo Vega 2003; Gonzalo García and Fraile Vicente 2004; Alcina Caudet, Soler Puertes, and Estellés Palanca 2005; Pinto Molina and Sales Salvador 2008a). The same is true for the number of criteria used in the evaluation of digital content. Table 33 shows a number of general and specific indicators for evaluating Web resources based on authors’ credentials; document preparation and presentation; meta-information and links; accuracy and timeliness of content; coverage and consistency of information; objectivity; and intended audience (cf. Enríquez Raído 2008).

Table 33. General and Specific Indicators for Evaluating Web Documents (adapted from Austerlühl 2001: 64-66 and the University of Auckland Library 2008: 8)

General Evaluation Indicators	Specific Evaluation Indicators
Authority	<ul style="list-style-type: none"> - Author’s name and contact information - Author’s biographical information - Author’s affiliation details - Author’s motivation for content publication - Author’s reputation among peers - Person or organization sponsoring the page - Sponsor’s legitimacy
Document preparation and presentation	<ul style="list-style-type: none"> - Type of site (e.g. organizational site, commercial site, online journal, etc.) - Source(s) of information and evaluation process - Bibliography - Structure and presentation of information - Links to related Websites - Quality of related Websites

Meta-information and links	<ul style="list-style-type: none"> - Reviews, summaries, commentaries and ratings of Web documents - Links from external Websites - Quality of external Websites
Accuracy of content	<ul style="list-style-type: none"> - Reliability of information (verification against other sources) - Type of errors (factual, grammatical, misspellings, etc.)
Timeliness of content	<ul style="list-style-type: none"> - Up-to-date content (including links out) - Content publication date - Date of additional materials (charts, graphs, etc.) - Date when information was placed on the Web - Date when the Website was last revised
Coverage of information	<ul style="list-style-type: none"> - Topics included - Level of topic exploration (e.g. general vs. in-depth exploration) - Degree of information comprehensiveness - Degree of information coverage claimed by the site - Print vs. online formats
Consistency of information	<ul style="list-style-type: none"> - Contradictions - Changing data
Objectivity	<ul style="list-style-type: none"> - Degree of bias - Type of perspectives (e.g. one-sided views) - Type of tone
Audience	<ul style="list-style-type: none"> - Intended users (e.g. experts, laypersons, students, etc.)

Based on a selection of the indicators listed above, I asked the participants of the study to select the criteria—specified in question 15 of the background questionnaire—they thought should be considered for evaluating Web resources.

As Table 34 shows, all six participants agreed that the author as well as the accuracy and currentness of Web content are indicators that should be used for evaluating said content. Similarly, the host of the site, i.e. the person or organization sponsoring it, was an important criterion for all the participants, except for Maria. Furthermore, all six participants agreed that certain aspects related to the presentation of information, in particular the design of the site and the number of graphs and multimedia elements do not matter when it comes to assessing the credibility and reliability of Web resources. To this end, for Daniel, Bob, and Martha the number of external links does not count either. These participants along with Laura did not consider the number of internal links a relevant criterion for evaluating information on the Web either. In my opinion, it is indeed not so much the number of external and/or internal links that matters but the quality of the related Websites. Nevertheless, Maria and Anna (and, to some extent, Laura too) considered the quantitative dimension of links from and to related sites an important indicator for evaluating Web resources. These participants, however, did not

regard the type of intended audience a key parameter for evaluating the creditability and reliability of Web content. Neither did Martha.

Table 34. Criteria for Evaluating Information found on the Web

	Bob	Daniel	Laura	Maria	Anna	Martha
The author of the site	✓	✓	✓	✓	✓	✓
The accuracy of the information	✓	✓	✓	✓	✓	✓
The host of the site	✓	✓	✓	✗	✓	✓
The design of the site	✗	✗	✗	✗	✗	✗
The number of hits with links to the site	✗	✗	✓	✓	✓	✗
The intended users	✓	✓	✓	✗	✗	✗
The number of graphs and multimedia elements	✗	✗	✗	✗	✗	✗
The currentness of the content	✓	✓	✓	✓	✓	✓
The amount of site links to related sites	✗	✗	✗	✓	✓	✗

In addition to the criteria specified in Table 34, Bob referred to the “linguistics quality of the site” as a relevant evaluation criterion, one that could be linked to the accuracy of content in terms of grammatical and factual errors, misspellings, etc. Daniel also specified an additional criterion, referring to “the public reputation or image of the organisation and its field. Any positive or negative comments about the site or its contents made by users on other sites.” That is, meta-information in the form of reviews, summaries, commentaries, and ratings of Web documents seems to be a relevant evaluation indicator for Daniel. In contrast, Laura did not adopt a user-oriented perspective for specifying further evaluation criteria but rather a system-oriented point of view. She referred to search engines’ capabilities to “find [information] and the importance they give it in ranking it in their search results.” Nevertheless, in my interview with her Laura referred to the importance of author-related criteria for assessing the reliability of Web resources:

Laura: I guess you’ve gotta look to see whether it would be really relevant or if it’s just like an off-hand usage, or if it’s reliable, looks reliable or not.

Vanessa: And how do you assess that reliability? What things do you take in to consideration?

Laura: Oh, like whether, who the author would be, or who would be, who would have made the website and whether it’s like Wikipedia where just anyone can write something on. ... Like you can’t really trust it.

In a different context, one that required the translation students to assess the influence that the online search report might have had on their translation and/or Web search behaviors (see 6.3.2 for details), Laura further elaborated on the reliability of Wikipedia:

Vanessa: ... And what about the way you researched on the Web?

Laura: Probably it was good because otherwise I might have been like tempted to look at Wikipedia but then I would have been embarrassed to write Wikipedia.

Vanessa: Why?

Laura: I dunno, but I read an article just a couple of days ago about this famous composer dying. And this ... student from Ireland, he is writing some thesis on communications and he put on Wikipedia a fake quote about what this composer said about like, his dream, like what piece of music to play at his funeral. And about three or four really well respected news papers actually used that quote even though it was totally, and it didn't have any citation and it was only on Wikipedia. So yeah.

Vanessa: So you lost all of your trust? (laughter)

Laura: Oh yeah I mean I still look at it, just to, just...

Vanessa: You just have to be careful I think.

Laura: Yeah. Basically, yeah.

The passages from Martha's interview transcript below show that, similar to Laura, Martha seems to have a healthy critical attitude towards the reliability of certain types of resources and/or information found on the Web:

Martha: ... it's difficult to know actually on the Internet because there's so much garbage on the Internet that you can find stuff that's not even properly written and think, "Oh, okay then that term does exist" and you don't realise that that's not the correct term. But I dunno, some other have stuffed up their translations and (unintelligible, 0:24:11.5) (laughter) that's ended up on the Internet somehow.

Vanessa: So now that you mentioned that, how do you know you have found the correct term ... what does it make you think...?

Martha: ... I dunno I guess I look at the quality of the site that I'm looking at and if it seems like something official or, as opposed to somebody's blog then I'm more likely to give it more credence. But it depends what it is.

[...]

Martha: If, I mean, it's like a government site or something like that you would consider it that they will have more reliable information, although the quality of their translations is not always necessarily so good. But at least it's an official source.

[...]

Vanessa: But then, that's when your assessment techniques come in, then you would say, wouldn't you? You would say, "Mm, that's probably not a reliable source." Don't you think?

Martha: Yeah, no I think I would say that, but when you're looking for a, yeah so when you're looking for a technical term and you come across stuff like that it's not very helpful. The terminology is there but it's not being used correctly or you're not sure if that really is helpful. But I guess it's better than not having anything, having too many options rather than...

Vanessa: None at all. Well I dunno what to say about that. It's equally problematic (laughter).

Martha: Yeah I dunno, it's a blessing and a curse. Yes.

In contrast to Laura and Martha, and in line with the criteria that they selected for evaluating Web content in Table 34 above, Anna and Maria seem to have a less critical attitude towards the type of resources and information found on the Web. For instance, Anna, unlike Laura, regards Wikipedia and commercial sites as reliable sources of information. She nevertheless admits that educational sites are more reliable than commercial sites and thus seems to consider author-related aspects important evaluation indicators:

Vanessa: ... imagine that you are looking for an equivalent term in English ..., how do you know that you found the right term? What things make you believe, "Okay I found an equivalent, this is the right term"?

Anna: I think the first thing that I would do is probably look up the website and see where it is from and try and see if this is a really reliable resource. I mean if it is something like, I don't know, Wikipedia or like some sort of encyclopaedia or whatever then I know that I'm at a right place. Or yeah...

Vanessa: Ok ... that leads me in to the next question actually, which enquires about the things you usually take in to consideration to assess the reliability of a result when you Google something, or a resource you come across with. What sort of things do you usually consider?

Anna: I think, I usually just read the contents of the website and see if it was really, if they really know what they are saying, or it's just like a piece of junk that they put on the net just for fun kind of thing. So I don't know I tend to just kind of scroll up and down the webpage and see how it is all set out and like whether they have sort of information at the bottom that says who they are, or whatever like that. And then if it's from a company or whatever then I'll pretty much know that, at least they can't really put really wrong information, if they are a company you can actually trace them either by Internet, or with phones, or addresses, or anything like that. 'Cause if they had a problem with their information that's been put on the thing then I don't think their company would be very successful.

Vanessa: So if it is a commercial site you feel quite safe, if it is a .com or...

Anna: Yeah, a company website, or even better an education institute website and I'll be like, "I am totally at the right place."

As shown in the previous section, Maria regards the sites of non-profit organizations as being more reliable than commercial sites. Yet, she also considers forums as reliable resources, which, in the case of expert forums, are likely to provide reliable information. Maria's screen recordings show, however, that, with the exception of one consultation on the ProZ forum, she only visited the forums available at WordReference.com. Furthermore, Maria's interview data supports her belief that the number of site links to related sites is an important indicator for evaluating Web content:

Vanessa: ... Okay and what type of things do you usually consider to assess the reliability of resources, you find something and then you say, "Mm, this is good," or, "No, this is bad." What do you usually think about?

Maria: Well, if the website is good and got lots of links that take you to other websites and it's obviously not just to sell a product and has forums. So if it's like a big resource then it's probably reliable.

Vanessa: Yeah, I noticed that you like forums a lot (laughter), you use them quite often.

Maria: Yeah, I do.

Vanessa: You find them useful in general?

Maria: I dunno, it's just psychological. If I get to talk to someone directly and they respond directly to my question, I feel like it's more reassuring, rather than just going for a random answer. (laughter)

As it can be seen, consultation with (non-)experts would provide Maria the kind of reassurance she seems to require when facing the complexities of the Web as a resource of consultation.

Another aspect that should be considered when using this resource for seeking and retrieving information is the non-sequential nature of Web searches, i.e. users' *iterative search* processes—a major feature of users' navigational behavior. In evolving iterative Web searches, we tend to start a new search while still evaluating a candidate Web page. In other words, we often start a new Web search before completely evaluating the Web page we are currently reading. This means that certain results prompt additional search results, with the user moving from one result to the other via links (Web document discovery can in fact be highly structured via hyperlinks), new keyword searches, or a combination of both. This type of navigational behavior—i.e. the movement actions linking one information node to another—has two major implications for search processes. First, it highlights the need for integrating evaluation criteria into users'

search sessions. Second, it calls for effective navigational techniques that would allow users to reduce the cognitive load that is believed to increase substantially as we extend our Web searches (Kirsch 1995 and 2000), thus becoming less effective due to the number of Web browser windows that end up being simultaneously opened (Lee 2003 and 2005).¹⁵⁶

The very iterative nature of search processes means that, in addition to the simultaneous seeking, retrieval, and evaluation of information, translators need to select and classify said information in a way that can be (re-)used for various translation tasks. There are several procedures for saving and classifying information found on the Web. The most common ones involve bookmarking Web pages and/or saving said pages in dedicated folders on the hard drive. As Table 35 shows, bookmarking is the procedure that all the participants of the study, except for Maria, claimed to use for saving the Web pages they may need to re-access. In particular, Laura and Martha referred to the saving of information via bookmarking, while Daniel and Anna specified that they save *and* classify their search results in dedicated folders in the Favorites/Bookmarks menu. Maria did not refer to any of the procedures mentioned above, which suggests that she was not familiar with them. Instead, copying and pasting links into a Word file is the procedure she claimed to use for saving online information. This is indeed consistent with her Web search performance. Her screen recordings show that for the second embedding task she copied and pasted (into the Word file in which she was translating) all the links that she had used for translation problem solving and that she would later need to complete part of the online search report. Unlike Maria, the rest of the participants re-accessed Web pages either by clicking on Windows or tabs they had left open or by generating the same searches they had previously conducted to retrieve the links they wanted to specify in their OSRs.

Table 35. Procedures for Saving Information found on the Web

Bob	<i>Bookmarks, Download files (save as) into dedicated folder</i>
Daniel	<i>Sometimes will save result as a bookmark, stored in a temporary folder in the Bookmarks menu</i>
Laura	<i>Add it to Favourites</i>
Maria	<i>Copy links to a word document</i>
Anna	<i>Create a folder in the Internet Explorer's Bookmark section and add the page into the folder</i>
Martha	<i>Save as a bookmark if I think I will use it again</i>

¹⁵⁶ See 6.3.1.1 for an overview of the research participants' navigational styles.

In addition to bookmarking, Bob referred to the second procedure mentioned above, i.e. downloading files and saving them into a dedicated folder in the hard drive. To this end, he specified the use of the “Save as” command, which allows for downloading and saving individual Web pages (as opposed to entire Websites at a time using bulk downloaders such as HTTrack Website Copier or FlashGet). Most importantly, the fact that Bob saves individual Web pages in dedicated folders on his hard drive suggests that he compiles electronic corpora that allow for the acquisition of specialized knowledge and the identification of text type conventions, as well as for phraseological, terminological, and collocation searches, among others (cf. Austermühl 2001; Adab 2002; Sánchez Gijón 2005). There are a number of tools available for text searching and analysis. WordSmith, MonoConc, and WordCruncher are, for instance, popular software programs that allow for concordance or KWIC (Key Words in Context) searches and provide frequency wordlists, collocation information, etc. Term extraction tools such as MultiTerm Extract are useful to automatically extract terms from texts and create project-specific glossaries. As Alcina Caudet, Soler Puertes, and Estellés Palanca point out,

la capacidad de asimilar información es limitada en el tiempo, por lo que se necesitan herramientas y técnicas que permitan extraer automáticamente la información precisa de grandes volúmenes de documentos rápidamente, de manera que el trabajo del traductor resulte eficaz (2005: 222).

Finally, it should be pointed out that none of the participants referred to more recent and popular tagging services used for classifying and sharing links. As briefly mentioned in 6.1.5.2, in the late 2004 a new tagging approach emerged based on a bottom-up hierarchy that allows users to bookmark Web content by creating their own tags. This approach to Web-scale tagging is known as “folksonomies” (folk + taxonomies) and emerged as an alternative to the ontologies developed to render the semantics for the Semantic Web. According to Shadbolt, Hall, and Berners-Lee, folksonomies

represent a structure that emerges organically when individuals manage their own information requirements. Folksonomies arise when a large number of people are interested in particular information and are encouraged to describe it—or *tag* it (they may tag selfishly to organize their own content retrieval or altruistically to help others). Rather than a centralized form of classification, users can assign keywords to documents or other information sources (2006: 100).

Examples of software applications that allow for tagging on a Web scale include Flickr (a photo management and sharing application) and del.icio.us (a social site for sharing bookmarks), which are “driven by decentralized communities from the bottom up” and

are often referred to as “Web 2.0 or *social software*” (ibid: emphasis in the original). Web 2.0 tools include blogs, wikis, social bookmarking, and social networking applications, whose benefits for teaching in general and translation pedagogy in particular have been the object of research in recent years. From the perspective of documentary research for online translation-related information, I particularly perceive social bookmarking as a highly promising platform for letting translation trainees engage in the discovery, tagging, and sharing of expert information to be (re-)used in various collaborative translation projects.

6.2 Findings from the Translated Texts and the Online Search Reports

In this section, I will briefly elaborate on the quality of the translations that the participants of the study produced as part of the first and second embedding tasks. As explained in 5.8.1, these translations were evaluated both from a product and a process-oriented perspective using two different evaluation systems. In the following, and based on (a) the error categories identified in the numerical marking system as well as (b) the assessment parameters of the holistic method described in 5.5.4, I will discuss the quality of the participants’ translated texts in connection with their specified levels of source-text domain knowledge.

6.2.1 First Embedding Task

The first embedding task was carried out by all the research participants, i.e. the four translation students and the two participants of the pilot study. The source text used for this task (see Appendix A) is an excerpt from a Greenpeace guide to genetically-modified food. It is a popular science text dealing with agriculture and biology, which covers a broad topic and has an informative as well as an appellative function. The translation brief for this task asked the participants to translate the excerpt for immediate publication of an information package on genetically-engineered food for a New Zealand audience. In the following, I will discuss the translations produced by the participants according to three quality groups: high quality (Bob and Daniel), medium quality (Laura and Martha), and low quality (Anna and Maria).

Predictably, Bob and Daniel produced the highest quality translations of all. Daniel, for example, had the lowest number of translation errors with six minor errors and one major error. The former relate to the translation of two polysemous words, the use of a

colloquial term, the wrong treatment of an acronym, and one instance of redundancy. The latter concerns an unjustified omission, more specifically, a sentence in the first paragraph that Daniel most likely forgot to translate. Although Daniel hardly conducted any research online—he only spent a little more than two minutes researching a few information needs of a lexical nature (see 7.1.1 and 7.1.2 for details)—overall he produced a quality translation. Certain parts of the translated text follows a style close to that of the Spanish syntax, yet his translation reads fluently and sounds idiomatic in English. His familiarity with the topic dealt with in the text might have contributed to this fact. As Daniel explained in his online search report, he did not gain knowledge on genetically-modified organisms (GMOs) via previous training (e.g. courses, workshops, and seminars) but was nevertheless familiar with the topic of “GMOs and their risks. [He] [w]as a member of Greenpeace for a little while, and made a submission to the Royal Commission of Enquiry on GMOs in New Zealand, back in 2003 or so.” He also stated he had enough knowledge on the topic to understand most of the specialized concepts mentioned in the text.

Bob produced a translation that contains one major error and nine minor errors. The former (an unjustified omission) relates to the text title, i.e. the name of the Greenpeace guide to GM food, which Bob left untranslated. His minor errors include four typos, two grammar errors, and a country-related error involving the use of a date format (American) different to that of New Zealand. Had Bob run a spell-checker (his screen recording shows this was not the case), the number of translation errors would have been considerably reduced.¹⁵⁷ In spite of these errors, overall Bob produced a high-quality translation that not only adopts an appropriate style and register but that also detaches itself from the Spanish syntax, thus reading like a piece of text written in the original target language. Unlike Daniel, Bob conducted significant background research for this task. He spent the longest time (24 minutes) of all six participants researching his information needs, which did not involve any lexical searches in reference materials. The fact that Bob spent considerable time conducting online research could be explained by his lack of familiarity with the topic. Although he said to be familiar with “basic terms such as ‘*tóxico*,’ ‘*sanitario*,’ and ‘*contaminación*,’ he stated that he knew “none of the more specialized terms.” Furthermore, he ranked his level of domain

¹⁵⁷ Except for Daniel, none of the participants run the spell checker for this task.

knowledge as low by stating that he knew anything about the topic and did not understand any of the specialized concepts mentioned in the text (see the OSR for more information on the choice of answers to question 7).

The translations produced by Laura and Martha contain a total of 20 errors (one major and 19 minor) and 15 errors (one major and 14 minor), respectively. Laura's major error concerns an unjustified omission (she did not translate the sentence below the text title). Her minor errors are mostly language-related, in particular a spelling error, two typos, a grammar error, and a number of punctuation errors regarding the use of hyphens, commas, and quotation marks for (unnecessary) emphasis. Her translation also has a couple of stylistic errors concerning the use of several colloquial terms as well as a few consistency errors regarding the use of capitalization (in the main title and sub-title of the text) and two different translations of the same technical term. In addition, Laura used two inadequate technical terms and, like Daniel, also encountered difficulties with the translation of a polysemous word and one instance of redundancy. Although she specified in the OSR that she had not previously taken any courses or workshops related to the source-text topic and was not familiar with any subject-specific words, expressions or ideas mentioned in the text, she said she had enough knowledge to understand most of its specialized concepts (the broad nature of the topic indeed allows for an easy understanding of the text). Laura thus spent little time (above six minutes) researching her information needs, which, like Daniel's, were all of a lexical nature.

Although Martha's translation contains fewer errors than Laura's, in general it would require more revision than that of the latter. Martha's major error concerns an instance of inaccuracy (one of the secondary ideas in the text was inadequately rendered) and her translated text follows the Spanish style and syntax more closely than Laura's, thus reading less fluently. Yet, similar to Laura, Martha's minor errors involve terminological inconsistencies, a number of colloquialisms, the translation of two polysemous words, an instance of redundancy, two cases of number disagreement, syntactical errors, and several punctuation errors (including hyphens and commas). Martha explained that she had not acquired any source-text domain knowledge via previous training but was nevertheless familiar with most of the subject-specific words, expressions or ideas mentioned in the text:

I am familiar with most of the vocabulary in the text even though I have not done any specific research into the topic. I imagine this knowledge was gained through a series of different ways

such as reading the newspaper, watching the news or hearing it on the radio. I was brought up in a farming environment so have often had to use this terminology when speaking Spanish to describe something, be it in my past or a current situation. e.g [sic] On a recent tour in Patagonia, while visiting an ‘estancia’ (station or farm), I was asked to interpret a presentation about sheep shearing during a live demonstration. Accordingly these terms don’t stick out to me as being subject-specific because I have dealt with them for some time ...

Terms she was familiar with include *cultivo*, *contaminación*, *suelo*, *biodiversidad*, *resistencia*, *riesgos sanitarios*, *organismos*, *seres vivos*, *alimentación*, *alimentario*, *no sostenible*, and *ganadería ecológica*. In addition, Martha ranked her source-text domain knowledge as high, which allowed her to understand all the specialized concepts mentioned in the text. The fact that she was familiar with most of the ST terminology could explain why Martha’s online searches were, unlike Laura’s and Daniel’s, not just lexical but also thematic. Concerning the latter, Martha conducted a few searches to acquire basic knowledge on GMOs as well as on the type of guide referred to in the text. This, in turn, may have affected the length of time Martha spent online (almost twelve minutes), which is six times longer than Daniel’s and twice as long as Laura.

Anna’s and Maria’s translations, finally, contain a very high number of mistakes, with 30 and 45 errors respectively. Anna’s major errors (four in total) involve three syntactic and stylistic errors that affect the clarity and conciseness of information regarding certain parts of the translated text as well as one mistranslation (false sense). Her minor errors are primarily language related, including the incorrect use of the definite and indefinite articles; two cases of number disagreement; a couple of missing and incorrectly conjugated verbs; a few missing as well as inadequate prepositions; and several punctuation errors concerning the use of hyphens, among others. Like all the other participants, except for Bob, Anna did not detect the instance of redundancy in the source text. She also encountered a few translation difficulties concerning some technical as well as non-technical terms. Anna’s translated text also follows the Spanish syntax and style very closely, thus reading like a translation. The high number of grammatical and syntactic/stylistic errors as well as the information inaccuracy and the mistranslation means that her translated text would require thorough revision to reach a publishable standard.

In Maria’s case, the degree of revision required would be even higher, almost to the point of re-writing. Her translation contains four unjustified omissions (the title, the sub-title, an entire sentence, and part of another sentence were left untranslated) and a

high number of terms left in Spanish—partly as a result of translating in the source-text window and not selecting English as the language used to check the spelling and grammar (some English words were therefore automatically changed into Spanish by Windows' Autocorrect function). Her minor errors include a large number of grammatical, syntactic, and stylistic deficiencies as well as typos, misspellings, terminological, and punctuation errors. Overall, Maria produced a text that follows the Spanish syntax and style very closely and that reads like a translation.

Although Anna and Maria did not specify any particular terms, ideas or expressions in the text they might have been familiar with, they both ranked their source-text domain knowledge as basic. This and the fact that they are non-native speakers of English may partly explain the comparatively large amount of time that these two participants invested in researching their information needs online. While Anna spent over 21 minutes conducting both general background and terminological research, Maria spent slightly above 22 minutes conducting terminological research only. Unlike Anna, who carried out background research resulting in some good or very good translation renditions (see 7.1.4.2 for more details), Maria did not conduct any thematic searches involving the use of parallel texts. This might have allowed her to overcome some of the syntactic and stylistic difficulties she encountered in the translation of the first text. We should nevertheless remember at this point that Maria is the only participant who had no translation experience at the time of the study.

To sum up, Bob produced a high-quality translation that reads like a text originally written in English and which would require minor revision (primarily regarding typos and misspellings) to reach a publishable standard. Similarly, Daniel produced a quality translation that reads fluently and sounds idiomatic in English but where the Spanish syntax and style are visible at times. Like Bob, Daniel's translation would require minor revision to reach a publishable standard. In contrast, Laura and Martha produced medium-quality translations in which certain parts of the text read like a piece originally written in English and others read like a translation. Both translations would require considerable revision (Martha's more than Laura's) to reach a publishable standard. Anna produced a poor-quality translation that contains a mistranslation, a problem of information accuracy, and a high number of linguistic errors, among others. Her translation would require thorough revision to reach a publishable standard. Finally,

Maria's translation is of a very poor quality and would require the re-writing of large parts of the translated text for it to be publishable.

6.2.2 Second Embedding Task

The second embedding task was only carried out by the four translation students, i.e. those who took part in the introductory course on scientific and technical translation. The source text used for this task (see Appendix B) is an excerpt from a Spanish National Research Council's (CSIC) press release on the discovery of two new enzymes that could be possibly used in the treatment of AIDS. It is a popular science text dealing with a specialized topic that belongs to the subject areas of chemistry and biology, and has an informative function. The translation brief for this task asked the students to translate the excerpt for publication in the science and health news section of Reuters.com.

The translations obtained in the second embedding task, which took place in week five of the semester, reveal the steep learning curve of some of the students. This is especially true in the case of Laura who, after only a few translation teaching and learning sessions, produced a translation containing only four minor errors: three syntactic/stylistic and one grammatical. Although she stated in the OSR that she was not familiar with any of the terms, ideas or expressions mentioned in the text and ranked her level of source-text domain knowledge as very low, her translation clearly shows a good understanding of the ST topic.¹⁵⁸ For this task, Laura spent almost 30 minutes (i.e. a 20% increase compared to the time spent in the first embedding task) researching her information needs online. This time, her needs were both of a thematic and terminological nature. Laura's documentary research seems to have contributed to the production of a quality translation that adopts an appropriate style and register (her rendition of the press release title was particularly adequate for the type of text), is detached from the Spanish syntax, and, for the most part, reads like a text originally written in English. Her translation would require minor revision to reach a publishable standard.

Similar to Laura, Anna's translation reveals a rather steep learning curve. Although still containing a high number of errors (one major and 17 minor), her translation shows an

¹⁵⁸ In fact, despite the delay in time (seven weeks, including a two-week break) between the second embedding task and my interview with her, Laura was able to provide an excellent summary of the source-text topic when I asked her if she remembered anything about the text in question.

overall improvement in terms of fluency and idiomaticity. Her major error concerns a mistranslation (false sense), while her minor errors are primarily syntactic and/or stylistic. Other linguistic problems relate to cases of number disagreement, inadequate use of the definite article, and unclear back references. Like Laura, Anna stated in the OSR that she was not familiar with any of the terms, ideas or expressions mentioned in the text and ranked her level of source-text domain knowledge as very low. Nevertheless, she produced a translation that, in spite of its errors, shows considerable understanding of the ST topic. Furthermore, Anna, like Laura, spent more research time for this task than for the first one (slightly above 39 minutes, i.e. a 13% increase). Like in the first task, her research continued to involve a combination of lexical and thematic searches, with the former being more dominant than the latter. Unlike Laura, however, Anna produced a text that largely reads like a translation and which would require significant revision to reach a publishable standard.

The translations produced by Martha and Maria indicate that their translation learning was less steep than that of Laura and Anna. Martha, for example, produced a translation that contains three more errors than the one she produced for the first embedding task. More specifically, her translation for the second embedding task contains 18 errors in total, of which three are major and 15 are minor. The former include an important omission and two serious mistranslations (revealing Martha's lack of source-text understanding), while the latter involve mainly syntactic and terminological errors as well as a few problems regarding information accuracy. Although Martha stated in the OSR that she was familiar with some of the basic terms and expressions mentioned in the text (in particular *anti-sida*, *enzimas*, *farmacéutico*, *clínico*, *estructuras*, *métodos químicos*) and ranked her level of source-text domain knowledge as enough to understand several specialized concepts, she produced a poor-to-medium quality translation that still followed the Spanish style and syntax rather closely. She spent almost 18 minutes (i.e. a 3% increase compared to the first task) researching her information needs online. In contrast to those of the first embedding task, these needs were almost entirely of a terminological nature—i.e. this time there were hardly any thematic searches involved. While certain parts of Martha's translation read like a piece of text written in English, others read like a translated text. Her translation would require considerable revision to reach a publishable standard.

Maria produced a translation that, although showing some improvement compared to that obtained in the first embedding task, still contains a high number of errors (26 in total). Of these, three are major errors concerning serious mistranslations and 23 are minor errors revealing syntactical, grammatical (especially with regard to the use of the definite vs. indefinite article), and terminological problems. Like the other students, except for Martha, Maria stated that she was not familiar with any of the terms or expressions mentioned in the text and ranked her source-text domain knowledge as very low. Like Martha, however, Maria's research time did not increase much (8%) compared to that of the first embedding task. Her documentary research focused almost entirely on terminological searches, as well. Furthermore, the little background research she conducted involved, on a few occasions, several thematic searches related to the use of enzymes for treating cancer as opposed to AIDS (this reveals Maria's lack of ST understanding, which she confirmed during my interview with her). Overall, Maria produced a poor-quality text that still follows the Spanish syntax and style very closely, and that reads like a translation for the most part. Her translation would require thorough revision to reach a publishable standard.

Finally, it is worth pointing out that the analyses of translation quality, domain knowledge, and online research carried out so far suggests that source-text domain knowledge is one of the many factors that, along with task-related factors and linguistic ability, among others, seems to have a bearing on the participants' information needs. These, in turn, appear to influence the type and amount of research conducted online. While the former, i.e. research type, seems to correlate with translation quality at least to some extent, there appears to be no clear correlation between said quality and the latter, i.e. amount of time spent online (see Chapter 7 for more details).

6.3 Findings from the Screen Recordings

In this section, I will report the findings from the screen recordings concerning the participants' working styles, which, as indicated earlier, are conceptualized here in terms of time usage and task progression. First, the analysis of the participants' use-of-time profiles aims at providing an overview of the total time they spent carrying out each embedding task and of the distribution of said time among the three main online tasks of the study (cf. 5.8.3), i.e. translating, Web searching (referred to as "research" in

the two following sections), and online search reporting, as well as a fourth task I refer to as “switching” (see 6.3.1 below). Second, the analysis of the participants’ task progression profiles aims at examining the two aspects that became additional objects of research in this thesis: (a) the participants’ handling of the two embedding tasks from a multitasking perspective (see also 5.8.3) and (b) the order in which they completed the OSRs as well as their potential impact on the translation process (cf. 4.1.3 and 5.4). The analysis of the participants’ task progression profiles will also allow for an overview of the (non-)linear nature of the translation process (cf. 5.1.1).

6.3.1 Use-of-Time Profiles

As indicated above, the use-of-time profiles relate to the total times that the participants spent carrying out each embedding task as well as the distribution of the overall times among the four online (embedded) tasks, i.e. translating, researching, reporting, and switching (see below for details). Concerning the participants’ total times, these reflect the time during which the participants were actively engaged in each of the four online tasks. That is, total times only account for the participants’ active times, thus excluding long periods of idle time (identified here by the lack of screen activity such as mouse movement) as well as time spent in moving through the various stages of the OSRs (a total of 15 search tasks were included in the OSRs but not all of these were completed by the participants). Martha’s screen recording for the first embedding task shows, for example, two periods of idle time in the translation window of approximately four minutes and ten minutes each.¹⁵⁹ The participants’ total (active) times therefore do not necessarily coincide with the time lengths provided in Table 10.

With regard to the distribution of time among the four online tasks referred to above, it should be pointed out that translation time refers to time spent in the translation window to carry out a number of actions, such as typing, adding, deleting and/or modifying text rendered in the target language; selecting the spell checker; saving the translated file, etc. Research time refers to time spent in Web browser windows to carry out online actions

¹⁵⁹ This is the only screen recording showing idle time. Part of this time can be explained by the fact that Martha addressed me to discuss course-related contents in class, at which point I did not stop the screen recording to try and keep the whole exercise as natural as possible. Also, as I had distributed hard copies of the source text before the participants carried out the first embedding task, Martha may have used the hard copy instead of the electronic one for reference purposes. Having hard copies available for the first embedding task made it impossible to allocate the source-text reading times of certain participants to their total translation times (see 6.3.2 for details). This was, however, no longer the case in the second embedding task.

like typing or modifying a search query, clicking a link or a button, typing an URL, etc. Report time refers to time spent in the OSR window to specify and/or justify search needs, search goals, search results, and sources of consultation as well as to click on buttons for rating the participants' level of satisfaction with, success, and difficulty of their Web searches.¹⁶⁰ Finally, switching refers to time spent continuously clicking on taskbar buttons in order to locate a desired window or active element. As explained in 5.8.3, there are different ways to switch from one working environment (or element) to the other in MS Windows. For example, whenever a program, folder, or document is open in MS Windows, a button corresponding to that element is created on the taskbar. Clicking on the taskbar button corresponding to an active element will minimize said element and will display the one sitting immediately to the left of the taskbar. One may also click on the taskbar button corresponding to a non-active item in order to switch from one element to the other. In addition, switching between windows can also be done by using the ALT + Tab key combination. All three types of switching were counted towards switching time provided that the process of switching back and forth between windows was continuous (i.e. it does not include switching from one window to the other to perform one or more actions) and that each switch did not exceed a maximum of three seconds.

6.3.1.1 First Embedding Task

As Figure 3 shows, the completion times for the first embedding task range from slightly less than 37 minutes to more than 76 minutes. The average completion time is slightly above 62 minutes. Anna and Maria spent the most time on this task, i.e. 14 and almost nine minutes more than the average time. They are followed by Martha (around seven and half minutes above average) and Laura (one minute and 47 seconds below average).¹⁶¹ Bob and Daniel, the participants with the most translation and Web search expertise, took the least time to complete the task, with Bob having spent almost an hour (i.e. around three minutes and a half below average) and Daniel slightly less than 37 minutes (i.e. more than 25 minutes below average).

¹⁶⁰ Reporting time also includes time spent in the translation and/or Web browser windows to re-access any information (most typically, in the form of copy and paste) that the participants may have required to complete their OSRs, thus not skewing the time data for the translation and research categories.

¹⁶¹ The average completion time for the four student participants (i.e. Laura, Martha, Anna, and Maria) is 69 minutes and 16 seconds.

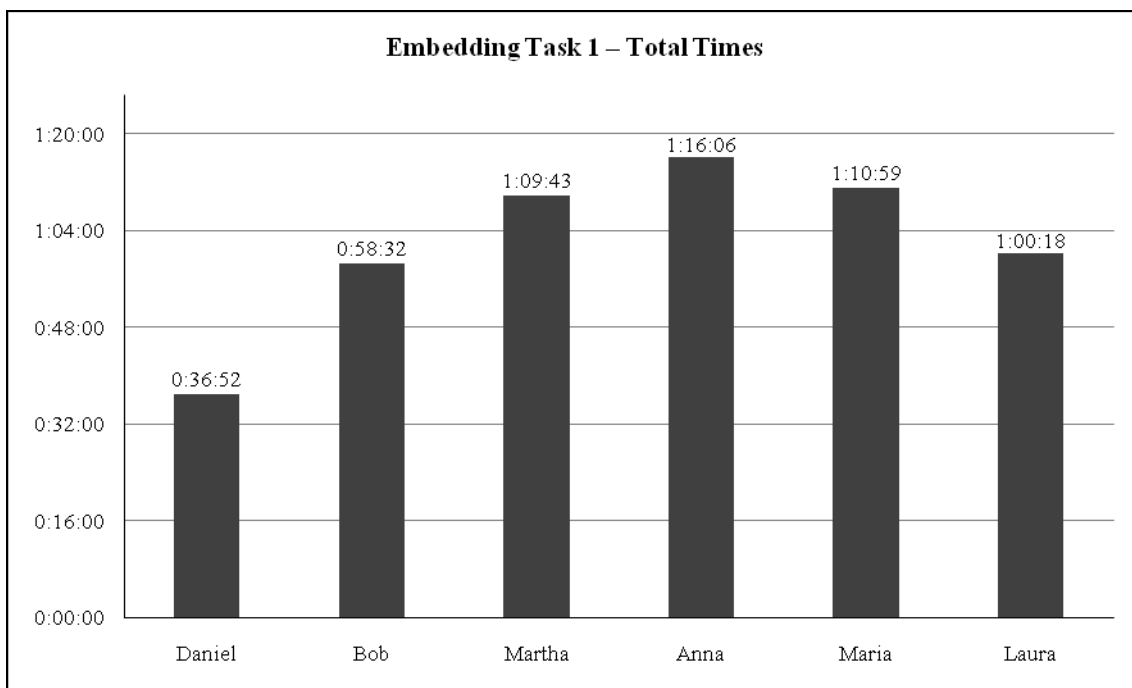


Figure 3. Total Times for Embedding Task 1

The participants' time distribution across the four online tasks (see Figure 4) shows that all of them, except for Martha and Bob, spent the largest amount of time translating. Bob spent more time researching than translating. Martha, for her part, invested more than twice as long completing the OSR than translating, despite the fact that she had fewer information needs (seven in total) to report than the rest of the participants, except for Daniel, who only had five information needs (see Table 36 for more details). Yet, the level of detail with which Martha completed the OSR is much higher than that of the other OSRs. This seems to have affected not only her reporting time but also her translation time, which is the lowest of all six participants, followed by Bob, Daniel, and the three remaining translation students.

Martha's low number of information needs and, hence, Web searches may also explain why she invested less time in research than her classmates. The only exception is Laura, who conducted five more searches but spent less research time than Martha. In contrast, Maria and Anna invested a similar amount of time researching the largest number of information needs, with 29 and 19 needs respectively (the need for increased support in L2 translation highlights the significant role that documentary research plays as an external resource of consultation). Yet, Maria spent less time reporting on her searches than Anna, who, like Martha, completed the OSR in greater detail. Unlike the translation students, Bob spent the largest amount of time researching his information

needs online despite having less needs (ten in total) than all the students, except for Martha. He also spent less time reporting his searches than these participants. Daniel had, as indicated above, the lowest number of information needs (five) and invested the lowest amount of time in both research and the OSR.

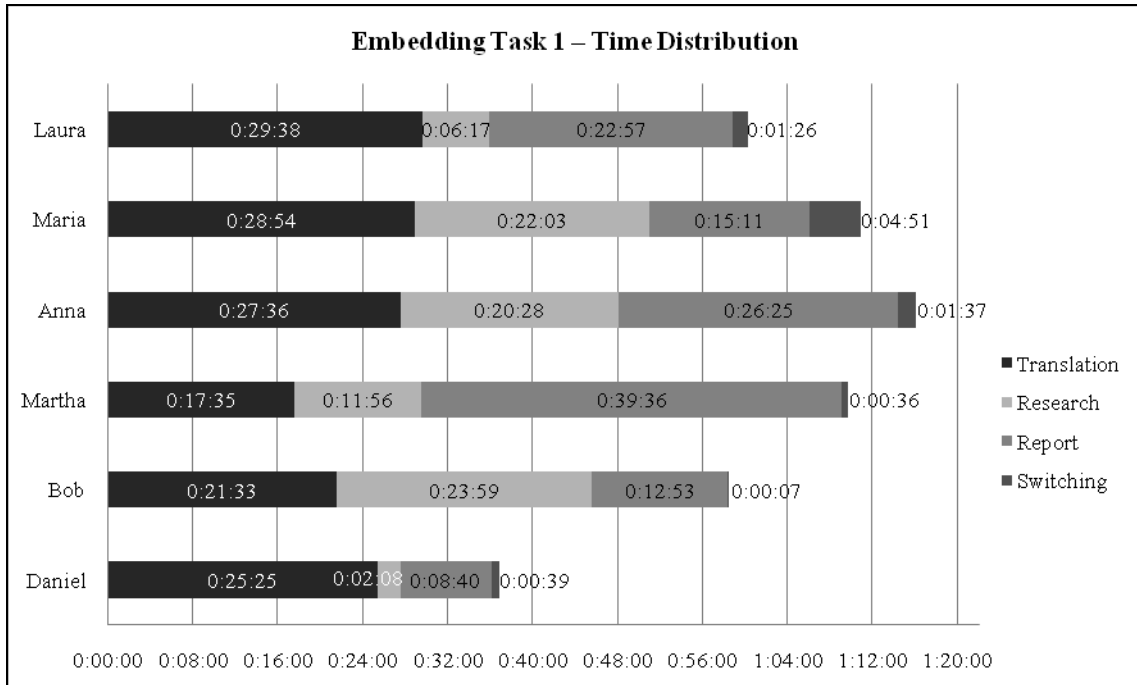


Figure 4. Time Distribution for Embedding Task 1

Finally, it should be noted that Maria spent the largest amount of time (almost five minutes) switching back and forth from one window to the other in order to find the desired one, which may be an indication that she is not used to working in an electronic and multitasking environment. Her high number of Web searches, her online navigational style (she opened several browser windows to conduct her searches), and the fact that she translated in a separate MS Word window than that of the source text (all the other participants translated in the source-text window, referred to as the translation window in the scripts) may have naturally influenced Maria’s “ricocheting” behavior for switching between windows. In contrast to Maria and the rest of the participants, Bob spent the least amount of time (seven seconds only) continuously switching back and forth between windows, followed by Martha, Daniel, Laura, and Anna. As with Maria, the number of researched items and online navigations styles most likely also affected these participants’ switching behaviors and switching times. Unlike Maria, they all worked with tabs within one or two single browser windows (in

my mind, a more effective away of browsing the Web), which, of course, reduces the switching time considerably.¹⁶²

6.3.1.2 Second Embedding Task

While the students' average completion time for the first task is 69 minutes and 16 seconds, their average completion time for the second task is 95 minutes and 37 seconds. As text 2 was shorter than text 1, the increase in total time for each participant can be taken as an indicator of the increased difficulty of the second task. All four translation students indeed confirmed in my interviews with them that the second task was far more challenging than the first one. As Figure 5 shows, Maria and Anna continued to spend the longest in completing this task, followed by Laura and Martha. The biggest difference in time completion between tasks 1 and 2, however, corresponds to Laura, who needed over 35 minutes more to complete the second embedding task than to complete the first one. She is followed by Maria (almost half an hour more), Anna (about 21 minutes more), and Martha (almost 20 minutes more).

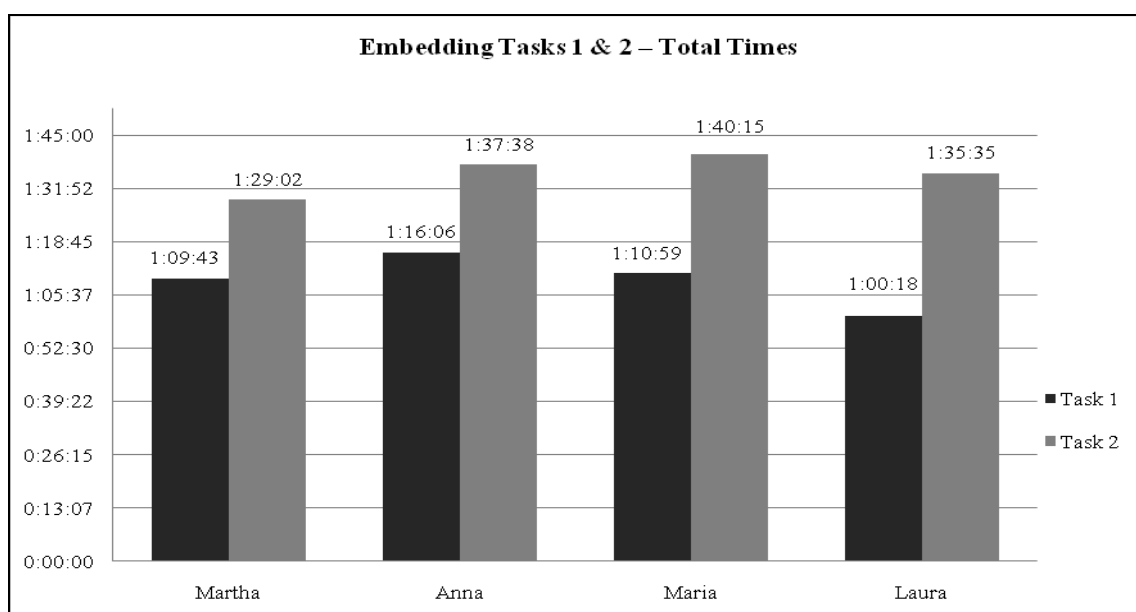


Figure 5. Comparison of Total Times (Embedding Tasks 1 and 2)

¹⁶² It should also be noted that Bob was the most efficient searcher when it came to re-accessing information online as he would leave his searches open in single tabs, thus having the main results page in Google always available in a separate tab to conduct new searches or iterate existing ones. Daniel only used a single resource (WordReference) to conduct all his searches and so no distinctive navigational style could be identified in his screen recording. Martha and Maria primarily used the Back and Forward buttons to re-access information, which made their navigational styles less effective than that of Bob. Anna, finally, used a combination of methods for re-accessing information, including the use of tabs, the Back and Forward buttons, the Address Bar drop-down menu, and, less frequently, the Recent Pages button available in Internet Explorer (this is the Web browser that all the participants used, except for Daniel and Martha, who used Firefox instead).

The participants' time distribution across the four online tasks (see Figure 6) shows that for the second task only Martha and Laura spent the largest amount of time translating. Compared to the first task, this represents a 7% decrease for Laura and a 33% increase for Martha, which represents the largest increase in translation time (see Table 36).

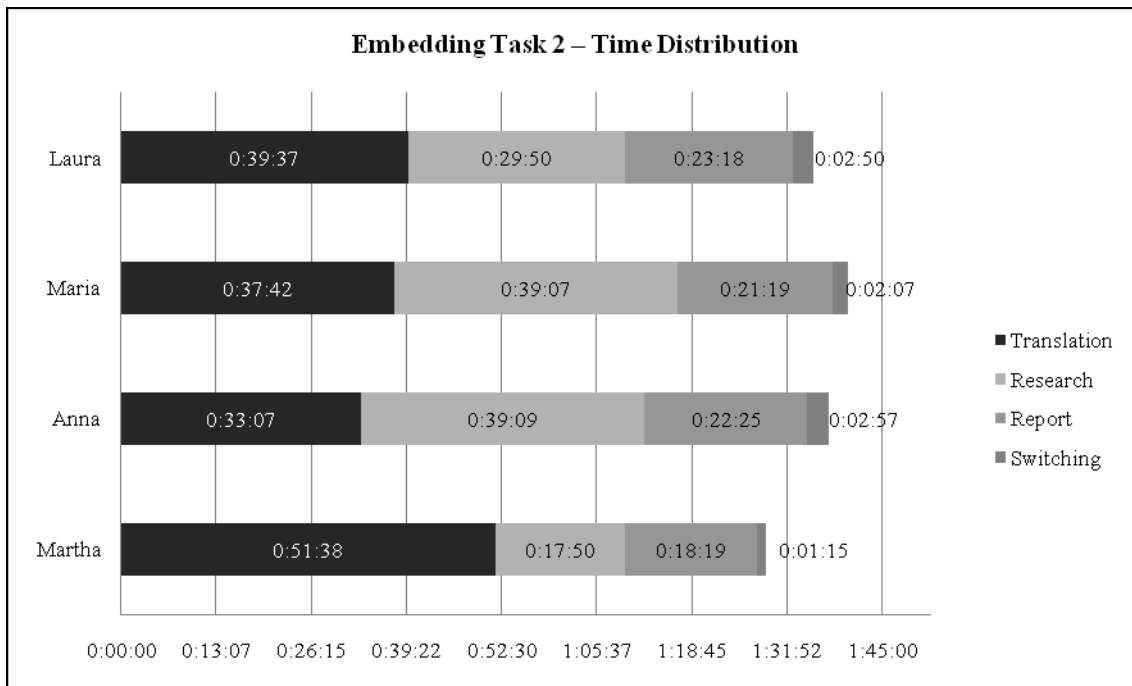


Figure 6. Time Distribution (Embedding Task 2)

In contrast, Maria and Anna spent more time researching than translating, thus both investing very similar amounts of time in both online tasks. While Maria's and Anna's translation times decreased by 3% and 2% respectively compared to the first embedding task, their research time increased by 8% and 13%, despite having almost the same or even less information needs for the second embedding task (23 and 21, respectively). Laura shows the highest increase in research time (20% more than for the first task). Having a larger number of information needs for the second task (19) than for the first one (11), she spent almost half an hour researching. Martha, in contrast, experienced the lowest increase in research time (only 3% compared to the first task). This could be explained by the fact that her number of information needs remained the same in the second task (seven in total). In other words, similar to the first embedding task, the translation students' research time seems to correlate in most cases with their number of information needs.

Table 36 also shows that the students' research times increased for the second task, while their reporting times decreased (by 36% for Martha, 14% for Laura, and 12% for

Anna). The only exception here is Maria, whose reporting time did not change. In Laura’s case, the decrease comes in spite of the fact that she had eight more needs in the second task than in the first one. In contrast, Maria had fewer information needs (six less) in the second task than in the first one, while Martha and Anna had the same or almost the same number of information needs in both tasks.

Table 36. Distribution of Time and Information Needs per Participant and Embedding Task

	Information Needs		Translation		Research		Report		Switching	
	Task 1	Task 2	Task 1	Task 2	Task 1	Task 2	Task 1	Task 2	Task 1	Task 2
Laura	11	19	49%	42%	11%	31%	38%	24%	2%	3%
Maria	29	23	41%	38%	31%	39%	21%	21%	7%	2%
Anna	19	21	36%	34%	27%	40%	35%	23%	2%	3%
Martha	7	7	25%	58%	17%	20%	57%	21%	1%	1%

The general decrease of the students’ reporting times as well as their level of specification could be attributed to the fact that they were unwilling to spend more time on filling out the OSRs.¹⁶³ This aspect was brought up by some of the students in their interviews when I asked them about their thoughts on the OSR as a learning tool as well as on its possible impact on their research and/or translation behavior (see 6.3.2 for more details). Martha, in particular, referred to the additional time required to complete the report by stating that “it’s just another thing that you’re having to think about and do in addition to the translation.” Similarly, Laura indirectly referred to the additional effort and time that the OSR requires when I asked her about some of the searches she had conducted on the Web but not reported in the OSR (incompleteness or lack of thoroughness is, as shown in 4.1.3, another disadvantage associated with the use of introspective written reports for research purposes). She replied that it was partly “because I thought I’d be writing, typing in that thing more than I would be” translating. Maria thought that the OSR has “advantages and disadvantages. It’s time taking, it’s time consuming and for me it’s always how long it takes me to do this or that.”

Finally, it should be pointed out that the switching time for Maria in the second task decreased by 5%, mainly as result of having translated in the same window as that of the source text (as opposed to two different windows) and used Firefox (as opposed to Internet Explorer), which, according to Maria, is her regular Web browser. Although Maria primarily used two Firefox windows to conduct all her searches, the Web

¹⁶³ As discussed in 4.1.3, one of the disadvantages of using written reports to elicit introspective data on problem solving is their time-consuming nature.

browser on the computer she worked with was set-up to automatically open new tabs, which also contributed to less time of continuous switching back and forth between windows. In contrast to Maria, Anna and Laura, who experienced a slight increase in switching time in the second embedding task, translated in a separate window to that of the source text, i.e. they had one more window to switch to and from than Martha and Maria.

6.3.2 Task Progression Profiles

Given that the participants chose when to complete the OSRs, i.e. before, parallel to, after translation, or any combination of these, the order of progression through the online tasks referred to above (translating, researching, reporting, and switching) inevitably became an additional object of analysis in this study. This analysis was carried out from a multitasking vantage point by creating a timeline that records the exact points in time at which changes from and to the various online tasks were performed by each participant in each embedding task.¹⁶⁴ As the graphs (these are not to scale) in the following sections show, the individual online tasks were assigned a number from one to four, so that changes to periods of continuous switching are represented by number 1, changes to the OSR window (referred to as “report”) by number 2, changes to the Web browser window(s) (referred to as “research”) by number 3, and changes to the translation window (referred to as “translation”) by number 4. In general, the analysis of the participants’ task progression profiles allowed for an overview of how the participants handled the demands of working with multiple tasks and how the OSR might have interfered with their processes of translation.

6.3.2.1 First Embedding Task

The following overview of the participants’ task progression profiles is grouped according to the quality of the translations they produced in the first embedding task. More specifically, I will start my description with the participants who produced the translations of the highest quality (Bob and Daniel) and will then move to the medium-quality translations of Laura and Martha, and the low-quality translations of Anna and Maria. As Figures 7 and 8 show, Bob and Daniel performed the least amount of online task changes, with a total of 29 and 43 changes, respectively. This shows a more

¹⁶⁴ A better term to refer to the participants’ changes from one online task to the other would be “switching.” As indicated above, however, this term was selected to refer to the participants’ continuous clicks on windows so as to locate a particular task.

controlled manner—particularly apparent in Bob’s case—of progressing through the various online tasks. For both Bob and Daniel, the periods of actions carried out in each online task are generally more distinct and stable than those of the translation students (especially Anna and Maria). In particular, Bob’s and Daniel’s task progression profiles show periods of uninterrupted translation that are generally longer than those of the students, indicating that they process larger units of information—typically, at the sentence and/or paragraph level—at a time.

Although the features mentioned above point to some commonalities between Bob’s and Daniel’s working styles, their task progression profiles vary significantly. Bob, for example, spent the first six and a half minutes reading the brief and the ST, and then proceeded directly to carrying out his background research before starting to translate. He continuously researched a number of items until the 25-minute mark, when he began translating, a process supported by his resorting to the Web to find translation variants or confirm his own solutions. That is, for Bob, translation progresses until a problem is encountered, at which point research is undertaken, and then translation is resumed. This process lasts until the 45-minute mark, when the first change to the report task occurs. The last 15 minutes focus solely on completing the OSR with only three switches to previous Web pages and the translation window to gain contextual information to complete the OSR (as briefly mentioned above, Bob did not carry out any translation revision before or after completing the OSR).¹⁶⁵ To sum up, Bob’s task progression profile shows four highly distinctive phases: ST reading, background research, translation interspersed with selected research, and OSR completion. The fact that Bob completed the OSR at the end of the embedding task suggests that this tool did not interfere directly with his translation and/or research processes.

¹⁶⁵ The pattern for re-accessing information (mainly, ST and TT terms or expressions as well as URLs) in order to complete the OSR is the same for all the participants, i.e. highlight element, copy, and paste.

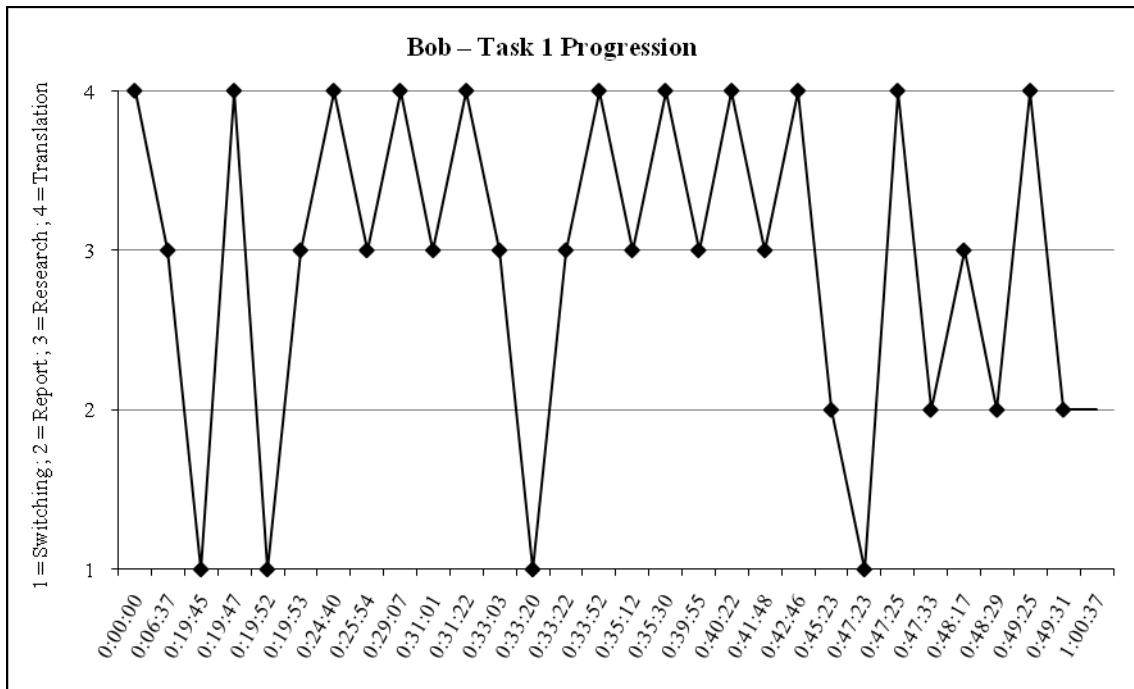


Figure 7. Bob's Task Progression Profile (Embedding Task 1)

Daniel's progression profile shows that he only spent a few seconds in the translation window before conducting his first search. This suggests that he used the hard copy to read the source text before researching his first translation problem. Daniel then proceeded to complete the first section of the OSR (dealing with ST domain knowledge) and fill out his first OSR entry. This took him to the 4-minute mark before he began translating. His first translation period lasts until the 10-minute mark, at which point he encountered a new problem, researched it, and then reported it before resuming translation. From the 15:30 to the 18:30-minute marks, this process is repeated for a new problem but in a slightly different order, whereby the problem is researched first, then translated, and finally reported. He repeats this process for the subsequent problems/searches that arise. This shows that Daniel's translation proceeds predominantly in large, uninterrupted periods of time with pauses only occurring for research and subsequent reporting. Daniel's working style thus seems to progress in a linear fashion with translation at the core and clusters of activity around translation problems where researching and reporting are attended to sequentially (either in the form of "translate-report-research" or "translate-research-report") before translation resumes. This suggests that the OSR directly interfered with Daniel's translation and research processes, although perhaps only up to a point as he only conducted five

searches. Finally, Daniel spent the last three and half minutes revising his final translation, which did not lead to any target-text editing.

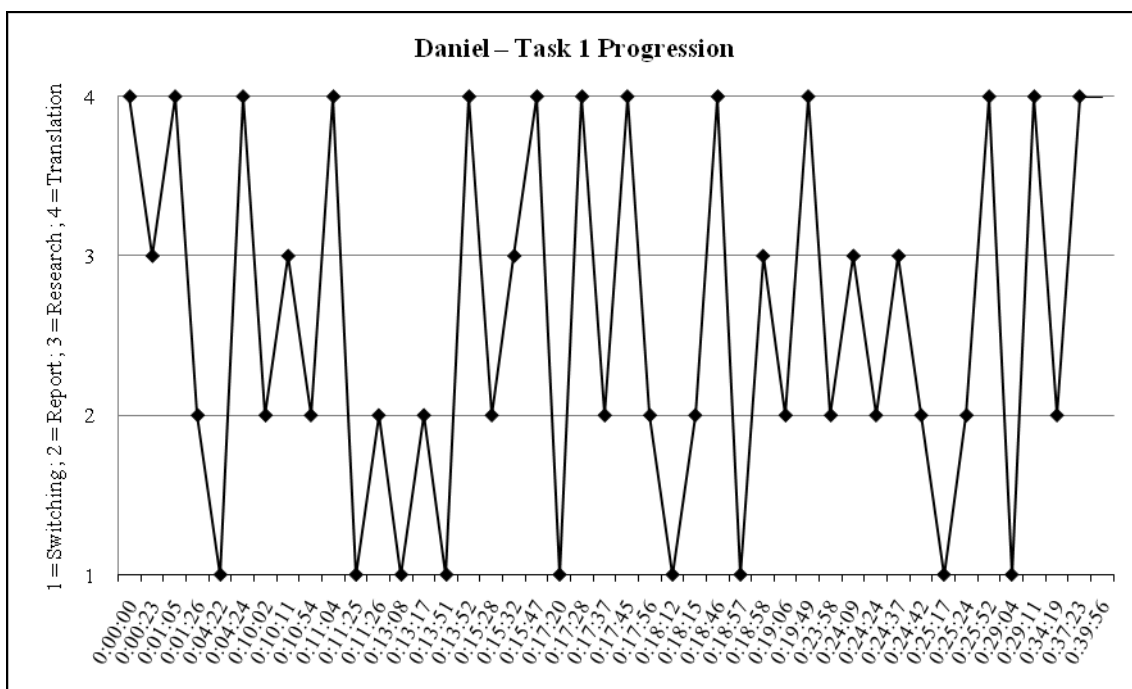


Figure 8. Daniel's Task Progression Profile (Embedding Task 1)

Laura's task progression profile (see Figure 9) shows that her number of online task changes (78 in total) is higher than Bob's and Daniel's. Yet, similar to these two participants, Laura spent rather distinct and stable periods of time in the various online tasks. Furthermore, she also processed relatively large units of information at a time (often at the sentence level). The first twelve minutes of her embedding task are characterized by frequent changes between all four online tasks (translation, research, report, and switching). During this time, she almost always changed from the translation window to a switching process before settling upon the next online task (reporting or researching). For approximately the next 20 minutes, a linear pattern of changes between translation and research emerges, where research is carried out on unfamiliar terms (which she highlights in the source text for completing the OSR at a later stage) and translation continues until the next search need arises. From the 33:45-minute mark until the completion of the embedding task, the focus shifts towards the OSR, with the majority of online task changes taking place between the OSR and the translation windows (the amount of switching also increases). Like the rest of the participants, changes to the research and translation online tasks in this final phase are largely in assistance of filling out the OSR. In short, Laura, like Daniel, starts by filling out the

first part of the OSR on ST domain knowledge and conducting her first two searches. Unlike Daniel, however, and similar to Bob, Laura then proceeds to translate the entire text with pauses only occurring when a problem is encountered and subsequently researched. Like Bob, Laura did not perform a final revision of the translated text. The final phase of her embedding task is characterized by the completion of the OSR, which suggests that this task did not interfere much with Laura's translation processes and Web searches.

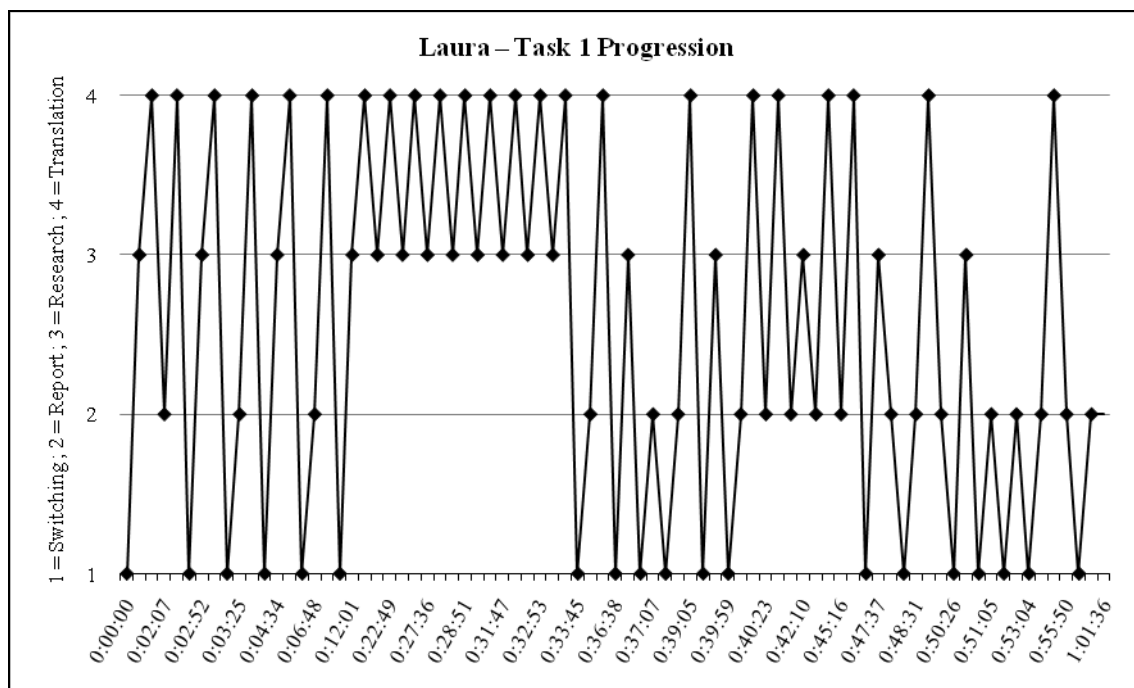


Figure 9. Laura's Task Progression Profile (Embedding Task 1)

Martha's progression profile (see Figure 10) is very different to that of all the other participants, as she first filled out the OSR and left the translation for the end. With a total of 70 online task changes, Martha started by reading the source text (for approximately two and a half minutes), and then spent eleven minutes filling out the first part of the OSR (i.e. ST domain knowledge). Up until the 50-minute mark, Martha shows a sequential pattern in which she identifies a problematic item in the source text, researches the item, and then completes the corresponding OSR entry without translating. From the 50 to the 54-minute mark, there is no screen activity, which is later followed by a second period of inactivity from 0:59:00 to 1:10:00. The last phase of Martha's embedding task is dedicated to translation only, which started at the 1:10:00-minute mark and took place in one consecutive block, i.e. it went on without any interruptions for about 15 minutes. This appears to indicate that the OSR did not

directly interfere with Martha’s process of translation. Nevertheless, the fact that she spent approximately 70% of her active online time on the OSR clearly indicates the impact of this tool on her working style—possibly as a result of the emphasis that I placed on the role of the report as a learning tool (cf. 5.4). Martha’s final translation period was conducted at a good pace, with each sentence being translated next to the original one. Proofreading and editing was carried out simultaneously, ending with a final check of the target text.

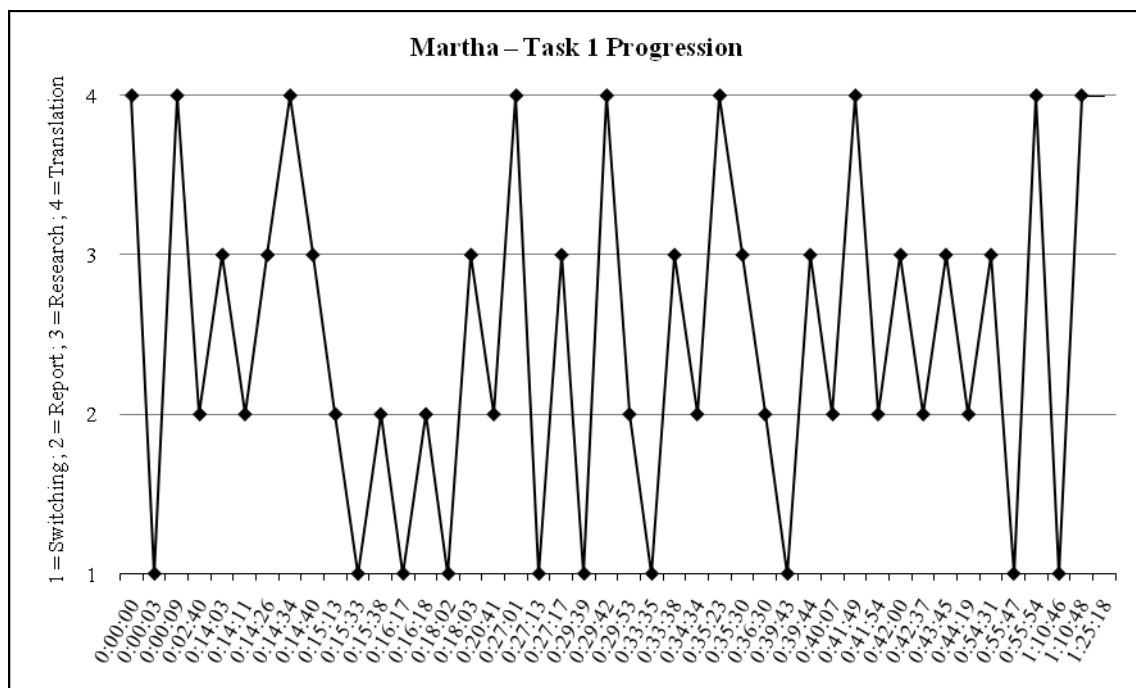


Figure 10. Martha’s Task Progression Profile (Embedding Task 1)

Anna’s task progression profile (see Figure 11) shows three distinct phases, despite the high number of online task changes (113 in total). The initial phase, which lasts for approximately 15 minutes, shows changes between the three online tasks translating, researching, and reporting. Although no distinctive pattern emerges during the initial phase, Anna’s profile shows that most of her activity is clustered around the research online task, which, according to her screen recording (and similar to Bob), involved several thematic searches. The middle phase, which begins at around the 20-minute mark and becomes her sole focus of attention between the 35 and 55-minute marks, shows (like with most other participants) a clear, linear translation-research process. This is then followed by the final phase, which focuses on the completion of the OSR (also with frequent changes to the Web browser and translation windows for re-accessing information) and includes a final period of revision-edition-confirmation that

lasts for approximately two and a half minutes. As Figure 11 shows, Anna's OSR completion periods are found mainly at the beginning and the end of her embedding task, with a relatively long intersection period in the middle phase (approximately 10 minutes), which suggests that the reporting task directly interfered with Anna's translation and research processes.

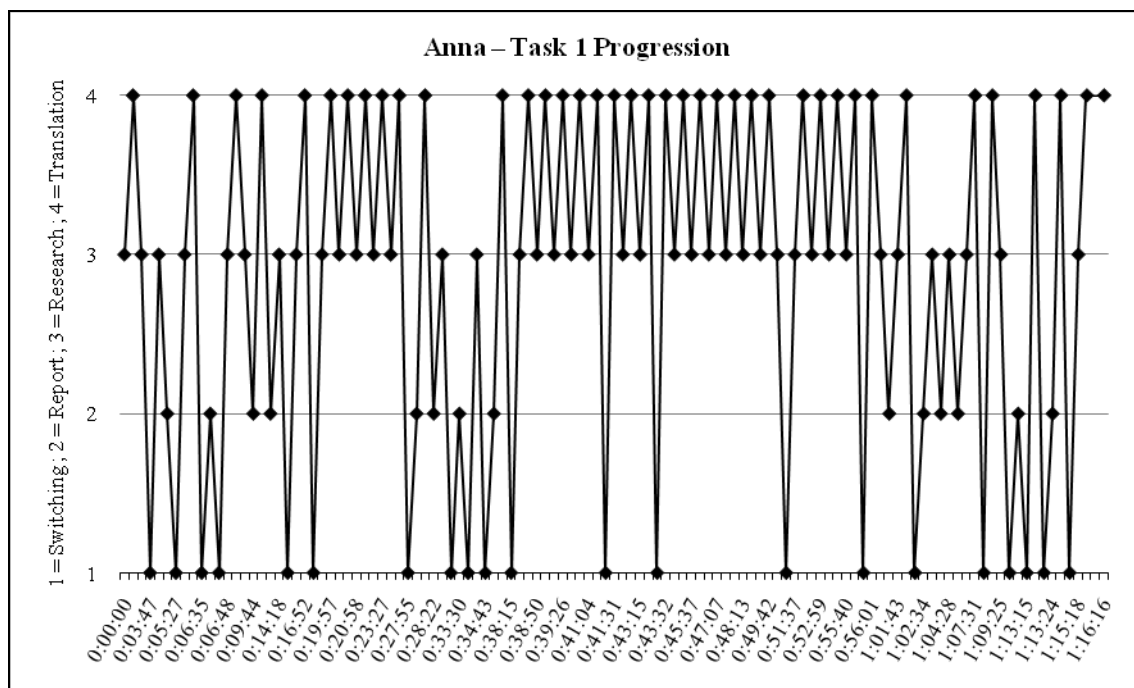


Figure 11. Anna's Task Progression Profile (Embedding Task 1)

Finally, Maria's task progression profile (see Figure 12) is less distinctive than that of the other participants, which is perhaps due to the high number of online task changes (186 in total). Nevertheless, it shows several progression phases. The initial phase, which lasts for five minutes, focuses exclusively on research. It is followed by an eight-minute period of changes between translation, the OSR, and some minor research. From the 13 to the 50-minute marks, a sequential pattern of changes between translation and research emerges, interspersed with reporting, for which Maria sometimes conducted repeat searches. The last phase starts at the 50-minute mark after the OSR reporting was finished and includes the remaining 20 minutes, which are dedicated to translation combined with research for checking purposes. Maria's task progression profile shows the highest level of interference between the OSR and the translation process.

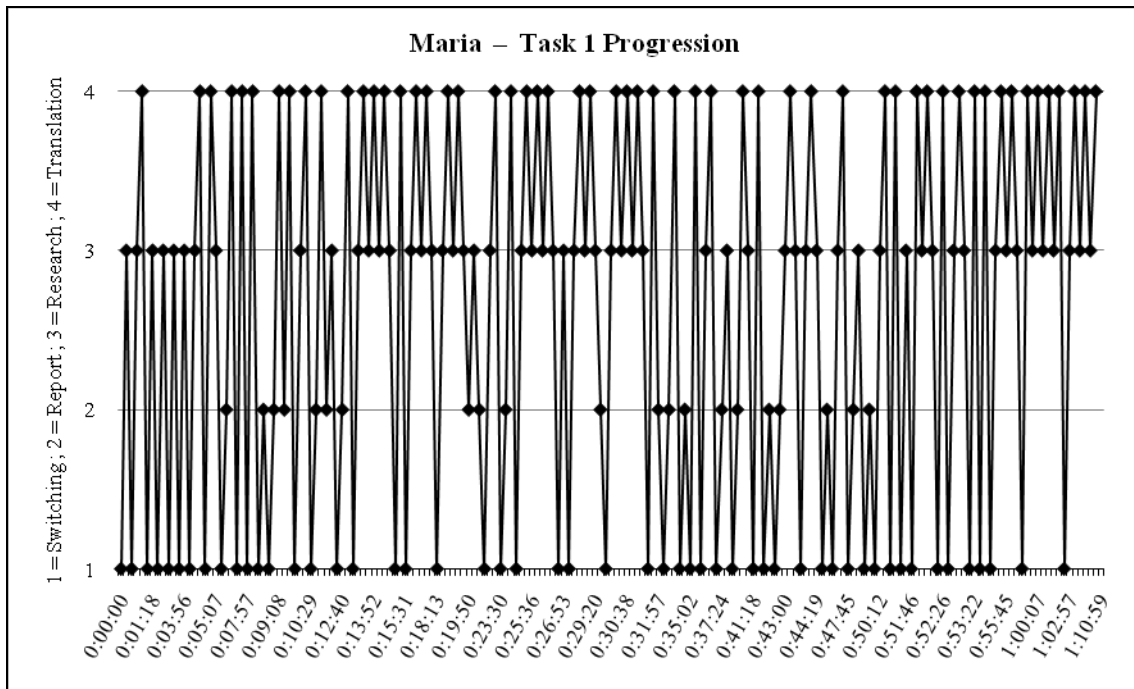


Figure 12. Maria’s Task Progression Profile (Embedding Task 1)

6.3.2.2 Second Embedding Task

The participants’ task progression profiles for the second embedding task are in many ways rather different to those of the first embedding task, which can possibly be explained by both a translation learning effect as well as differences between tasks. Laura, who produced the highest quality translation of all in the second embedding task, perhaps shows the least variation between this task and the first one. Nevertheless, some differences can be identified in her task progression profile (see Figure 13) for the second task. To start with, she seemed to progress in a more controlled and focused manner, despite the number of her online task changes being higher in the second task (126) than in the first one (78). This change in working style is perhaps best illustrated by the prolonged periods of time that Laura spent, first translating and researching, and then completing the OSR. Laura’s task progression profile for the second embedding task is thus characterized by two highly distinctive phases (as opposed to three in the first task). The initial phase, which lasts until the 50-minute mark (and of which the first four minutes are invested in reading the entire press release and not just the excerpt that was to be translated), is dominated by changes between the translation and research windows, a pattern which is only interrupted by one change to the OSR for filling out the section on ST domain knowledge. We can see more frequent changes between the translation and research windows than in the first embedding task, which can be

explained by the fact that Laura not only had more information needs but also processed smaller units of information (below the sentence level) in the second task than in the first one. In addition, the changes to the switching process that disrupt this linear translation-research pattern are mainly caused by the presence of multiple window tabs and the subsequent movement through these when various issues arise during translation.

Like in the first embedding task, Laura's last phase is dedicated to completing the OSR, combined with a small amount of revision and editing of the translated text. Here, the relationship between the research, translation, and reporting online tasks is also one of repeating searches for filling out the OSR as well as for finding translation alternatives and/or confirming individual translation solutions. Overall, despite the significant increase in the total number of online task changes, Laura's task progression profile remains more or less consistent across both embedding tasks, in which the OSR did not seem to directly interfere with her translation processes.

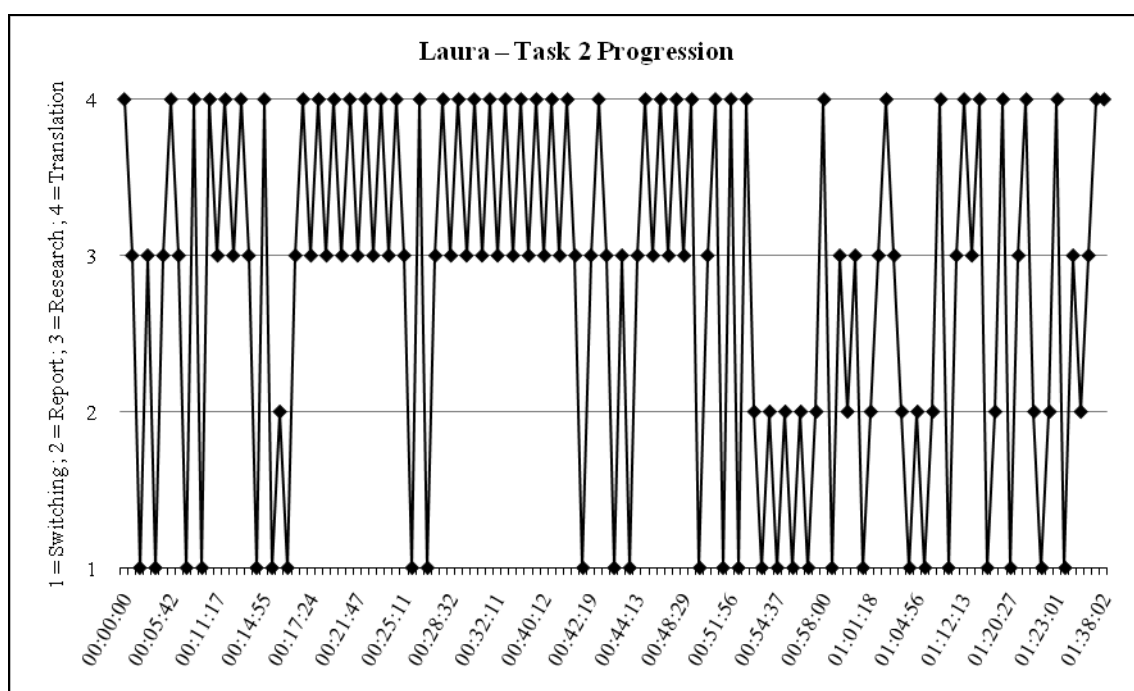


Figure 13. Laura's Task Progression Profile (Embedding Task 2)

Martha's task progression profile for the second embedding task (see Figure 14) seems at first similar to that of the first. Yet, a closer look reveals a number of differences. For instance, she performed a total of 52 online task changes, i.e. 18 changes less than for the first task, despite having the same number of information needs in both tasks. Also, unlike the first task, the second task does not show any distinctive phases. Martha

invests the first six minutes reading, first the excerpt to be translated, and then the entire press release. This is followed by approximately a five-minute period spent in MS Word to tile the source-text window and the translation window side by side on the screen, after which translation starts at around the 11-minute mark. In the following 10 minutes, Martha produced a draft of the first part of the target text, translating and editing her translation at the same time without changing to other tasks. What follows in the next half an hour (more precisely, until the 50-minute mark) is a fairly linear pattern of changes between the report and the research online tasks, which is interrupted by sporadic changes to the translation window. Martha's screen recording shows that she researched and subsequently reported the information needs that arouse during the production of the draft mentioned above, and then revised and edited this draft on the basis of her research. Martha repeats this process for the second part of the text. Here, she spent about another 10 minutes translating, and at the same time editing, the second half of the text. Once the draft for the entire text was finalized, Martha spent around seven minutes revising and editing this draft. This process is followed by 22 minutes of another fairly linear pattern of changes between the report and the research online tasks, combined with sporadic changes to the translation window for revising and editing purposes. Finally, Martha spent approximately the last five minutes further revising and editing her translation. Compared to the first embedding task, the OSR seemed to cause some minor interfere with Martha's translation process in the second task.

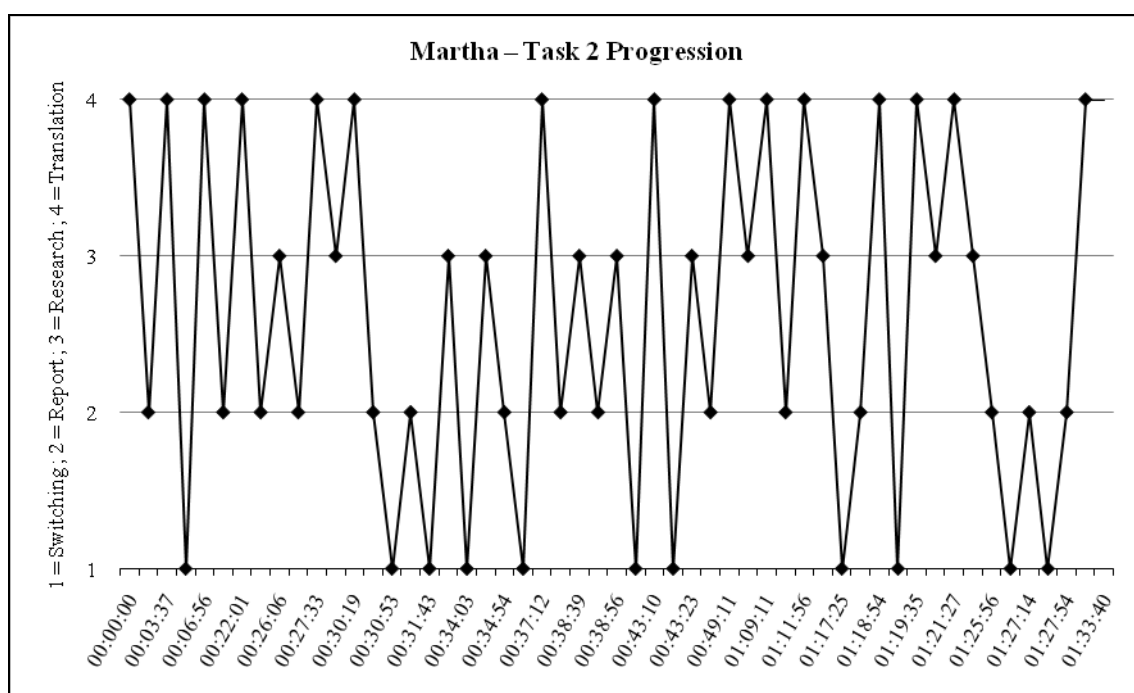


Figure 14. Martha's Task Progression Profile (Embedding Task 2)

In contrast to Laura and Martha, who spent considerable time reading the source text before engaging in any other online task, Anna's screen recording shows that she quickly scanned the text (for less than a minute) and then proceeded to complete part of the OSR section on ST domain knowledge. This short reporting period is followed by seven and half minutes of background research and sporadic changes to the translation window for contextual information. Anna then spent the next three minutes reporting on her previous research, after which a rather stable pattern of frequent changes between all four online tasks emerges, which lasts until the 1-hour-22-minute mark. Here, the task progression profile shows continuous blocks of time spent translating and researching, followed by blocks of time for subsequent reporting. This pattern suggests that the OSR interfered more with Anna's translation process in the second embedding task than in the first one. Nevertheless, while her blocks of reporting time are longer at the beginning, they get shorter towards the end of the embedding task. The inverted trend can be identified with regard to her blocks of translation and research time, the two tasks which become the sole focus of Anna's attention for the last 15 minutes (except for one change to the OSR window). Anna exclusively dedicates this last phase to revising and editing her translation on the basis of new as well as repeat searches to look for better translation alternatives and/or confirm her translation solutions. In Anna's case, the increased number of online task changes (a total of 160 changes, i.e. 47 more changes than in the first embedding task) is striking. The same goes for the continued presence of research throughout embedding tasks 1 and 2. Even more noteworthy is the increased presence of the OSR throughout the second embedding task, which could be explained by the increased difficulty of text 2 over text 1 and, hence, the increased number of information needs. This, in turn, may have contributed to the increase in switching time.

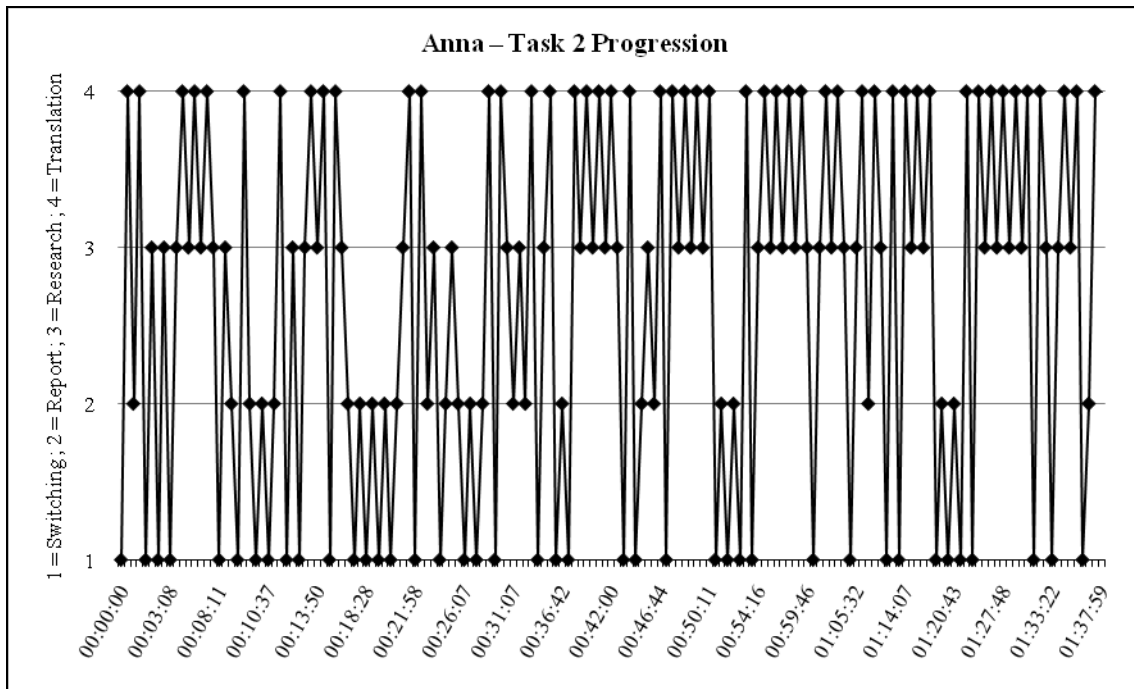


Figure 15. Anna’s Task Progression Profile (Embedding Task 2)

Similar to Laura, Maria shows a more focused working style in the second embedding task, thus having less online task changes (154) than in the first embedding task (186). Her task progression profile (see Figure 16) for the second task shows three distinctive phases. The first one, which lasts for approximately 51 minutes (of which almost four minutes are invested in reading the excerpt for translation and highlighting problematic items, most likely for filling out the OSR), is characterized by frequent changes between the translation and research online tasks, which is combined with occasional changes to the reporting task. The second phase lasts for almost half an hour and focuses exclusively on filling out additional entries in the OSR. The fact that the report was continuously present throughout a large part of the first embedding task but left to the end in the second task could be taken as an indication of the interference that the reporting process may have caused on previous translation processes. Finally, Maria, like Anna, dedicates the last phase (which lasts for around 20 minutes) to revising and editing her translation based on new as well as repeat searches that she carried out to find alternative translations and to check her own solutions.

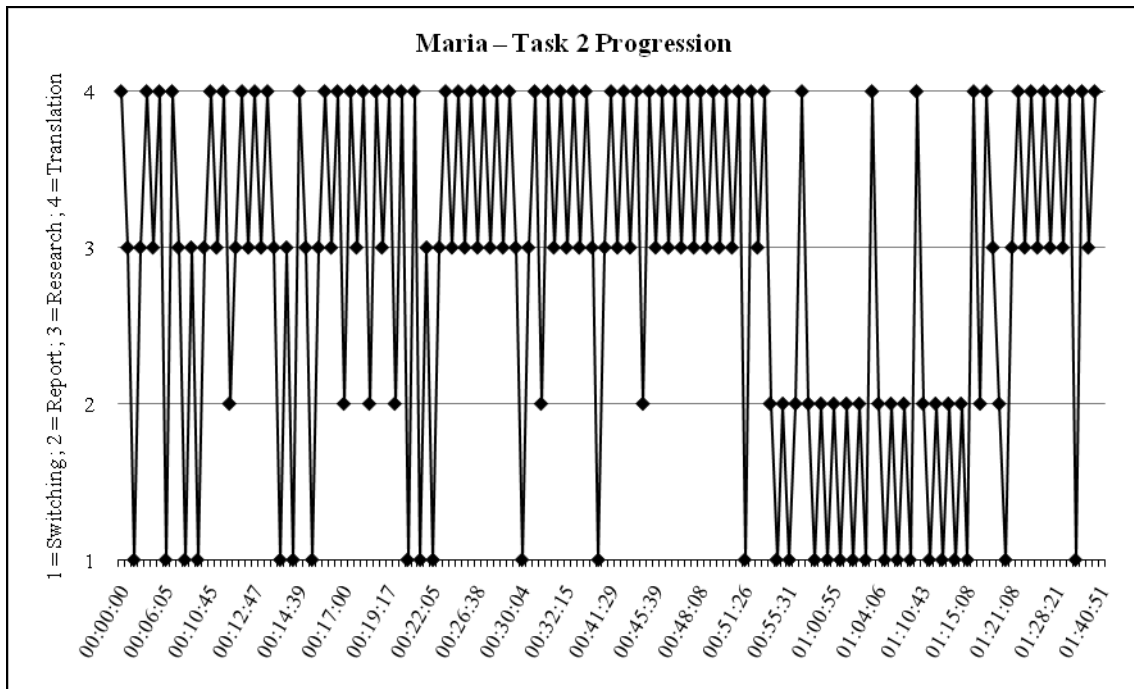


Figure 16. Maria's Task Progression Profile (Embedding Task 2)

As the findings from both embedding tasks show, all of the participants started their respective tasks by reading the source text. The only exception might be Anna, who only scanned the electronic version of the second text. However, most likely she read the hard copy of the first text. In addition, all the participants revised and edited their translations. The exceptions here are Bob and Laura, who did not revise the translations they produced for the first embedding task (Laura, however, did so for the second task). Furthermore, the participants who revised and edited their translations did mostly so at the end of their embedding tasks. Martha, however, combined this process with translation in both tasks (Anna also simultaneously translated and edited, in addition to doing a final check).

The amount of time spent in revising and editing varies among the participants, with Anna and Maria having spent the largest amount of revision and editing time for the second embedding task (this is also true for Maria concerning the first task). Regarding the translation process itself, all the participants proceeded in a fairly sequential manner, where translation is interrupted by more or less problematic items (of a comprehension and/or productive nature) that are subsequently researched (and sometimes reported) before translation resumes again. Martha is the only exception to this pattern. In the first embedding task, she conducted all her research first and left the translation to the end, which took place in one continuous block, i.e. without any research (or reporting)

interruptions. Similarly, in the second embedding task she translated the entire text in two consecutive blocks and then edited the draft produced in each block on the basis of her online research.

Other patterns observed refer to the relation between translation quality and the amount of online task changes on the one hand and the progression through the four online tasks on the other. Regarding the relation between the former, the findings above show that the lower the total number of online task changes—which, in turn, are influenced by the number of information needs—the higher the degree of translation quality. Bob and Daniel, who performed the least amount of task changes (29 and 43, respectively) in the first embedding task, produced the translations of the highest quality. They are followed by Laura and Martha, who performed more online task changes (78 and 70, respectively) and produced translations of a lower quality. Anna and Maria, who performed the largest number of online task changes (113 and 186, respectively), produced the lowest-quality translations. This type of correlation is also found in the second embedding task, however, with one exception. Martha, while performing far less online task changes than Laura (52 and 126, respectively)—mainly as a result of also having far less information needs—produced a translation that was not of a higher quality than Laura’s. Nevertheless, both Martha and Laura produced better quality translations than Anna and Maria, who had the largest amount of both online task changes (160 and 154, respectively) and information needs.

With regard to the relationship between translation quality and the participants’ task progression profiles, no clear correlations could be identified. In general, however, those who produced better quality translations seemed to progress through the various online tasks in a more controlled and focused manner, thus spending prolonged and stable periods of time in each online task. Here, highly distinctive progression phases can be identified (e.g. “translation + research” in one continuous block and problem-solving reporting in a separate block). This would seem to reflect a lower cognitive load than in cases with frequent interruptions and changes among all four online tasks, and where no progression phases can be clearly identified. The potential increase in cognitive load would appear to be related not only to the number of information needs but also to the interference that the OSR may have had on some of the participants’ translation and/or research processes. As the graphs above show, the OSR did not directly interfere with Bob’s, Laura’s, and Martha’s translation processes (and only

causing minor interferences in Daniel's case) regarding the first embedding task. In contrast, the degree of interference was considerably high for Maria and Anna, who had the largest amount of information needs to research and report on. The OSR also directly interfered with Anna's and, to a much lesser extent, Martha's translation processes in the second embedding task. Nevertheless, while Martha's translation quality decreased compared to that of the first task, Anna's increased. This is also true for Laura and Maria, whose translation quality increased in the second task, for which they had left the completion of the OSR to the end, i.e. the OSR did not directly interfere with the translation processes of these two participants.

When I asked the translation students whether they thought the OSR had somehow influenced their translation and/or research processes, all four of them agreed that it had had an impact on the way they approached their translations. More specifically, they referred to the fact that having to report about their translation problems made them think more carefully about these problems as well as about the solutions they adopted. In this regard, they all praised the usefulness of the OSR as a didactic tool for learning about translation. Martha, for instance, admitted, "I do think it helps 'cause it makes you stop and think, 'Why are you doing it this way?'" Similarly, Laura said, "I guess it has caused me to reflect on it [translation] a bit more." When I further asked Laura whether she thought she would have translated the texts differently without the search report, she replied "I dunno, but it was like (pause), like useful to actually stop and think about why I was choosing that word over another one 'cause I had to write it out." Anna also viewed the report as a tool that "help[s] perhaps to analyze how we do translations and such." She further explained that the OSR was useful to develop an increased awareness of problem detection and problem solving:

I think in a way it helps me think about the fact, sort of where I am lacking in the skills, because you know how on the very first page you asked us, "Do you have any background information?" sort of background knowledge on the text you are about to translate. Before I didn't think about that, I just go, "Oh, okay I got a text, okay now it's translate time." But now at least like I sort of look at it and I go, "Oh yes, this could be a potential problem and that could be a potential problem, how I should solve it," or, "Oh yeah, I did not have any sort of background information," that I, perhaps would have helped me if I could, you know, if I had it. Yeah, so at least it helps me to think sort of instead of just getting it and doing the translation straight away. I actually thought about what I'm about to translate ...

Similarly, the OSR seems to have a positive effect on Web searching from a didactic point of view. When I asked Anna whether she thought this tool had influenced the way she searched the Web, she replied

[i]t didn't really change the way I searched, but at least it kind of, because you know how we had to give the context that we found the results in. So at least I had to go in to the actual paragraph and start reading it in-depth and understand it and then I can copy and paste it, the context and where I found that term, expression.

Maria did not think that she would have translated differently without the OSR as she would "still do the research, so that was just a documentation of the research." She thought the OSR did not influence the way she searched the Web either but nevertheless stated "I think I really used it [the OSR] as a reflection of what I was doing." Similarly, Laura admitted that having the OSR "was good because otherwise I might have been like tempted to look at Wikipedia but then I would have been embarrassed to write Wikipedia."

The features that make written reports like the OSR useful for didactic purposes are, however, the very same features that threaten the reliability and the validity of these tools for research purposes, mainly because of the fact that they raise students' meta-cognitive levels of awareness and, hence, change the translation process (cf. 4.1.3). Other disadvantages linked with the use of written reports for cognitive research can be seen in this study. These include the disruption of the translation process (as shown above) and the recall of information (when reports are completed after translation is finished). Laura, for example, admitted that she completed the OSR at the end of the embedding tasks to avoid interrupting the translation process:

Laura: That's probably why as well, 'cause I did it [the OSR] at the end so I was like the ones [the problems] that weren't really that problematic I just kind of...

Vanessa: Skipped them?

Laura: Yeah.

Vanessa: ... why did you decide to leave it for the end?

Laura: I dunno, I guess it's the same thing that makes you want to just translate it all at once at the beginning and just wanna... like, do it all like in a burst, really.

Anna admitted that she would have preferred to translate without any OSR interruptions (as she partly did in the first embedding task) but referred to her short-term memory as

an obstacle for leaving the OSR to the end, i.e. after translation is finished (a problem also discussed in 4.1.3 above):¹⁶⁶

Anna: Yeah, 'cause I was just like, "Oh, let's just do this thing first." And I think for me I, like, translation comes to me as like a bit wave so it will be just, "Oh, do I really want to break the wave by completing the search report right now?" So I just go, "Okay, you know what? I'm just gonna save, I'm just gonna leave the page as it is and I'll just come back to it later." And I kind of forgot.

Vanessa: Yeah, in a way for you it has sort of interrupted the translation process and then that's why you decided to fill it in at the end [of Embedding Task 1].

Anna: At the end, instead of like go as I search, because I think sometimes you know, when I have, 'cause like I have really bad short term memory, so I just kind of forget what, the sentence I had in mind and at then end I'll be like, "Oh." So I'll be trying to retrieve what I had in my head, but I'll be like, "Oh no."

Finally, the lack of thoroughness with which students tend to report on their problem-solving processes—another feature associated with the use of written reports for research purposes—can also be found in this study, although only up to a point. I will discuss this aspect in the following chapter.

¹⁶⁶ As noted earlier, Laura and Maria developed their own techniques to cope with problems of recall of information by highlighting more or less problematic items in the source text. Maria also copied URLs into the translation window for later use in the OSR.

7. Modeling Participants' Web Search Behaviors

In this chapter, I will report the findings from the screen recordings and the online search reports regarding the participants' Web search behaviors, which I monitored using the notion of the Web search task. As discussed in 5.1.3, this notion involves four information-seeking (IS) stages within the context of translation problem solving, namely (a) the formulation of a search need, (b) the specification of a search goal, (c) the implementation of a search process, and (d) the selection of a search outcome. These four IS stages represent the main units of analysis within the two embedding tasks that I will discuss in the following sections. This discussion will primarily focus on those Web search tasks involving information needs that are common to at least two participants. This, in turn, will allow for comparisons among the participants' information seek and retrieval behaviors.

7.1 First Embedding Task

7.1.1 Search Needs

The six participants who completed the first embedding task had a total of 38 types of information needs that occurred in 81 instances (tokens). That means that on average one information need was shared by 2.1 participants. However, of these 81 instances a total of 48, i.e. more than half were generated by Maria (29) and Anna (19) alone. As suggested earlier, this phenomenon could be explained by these participants' lack of confidence in their skills to translate from their L3 into their L2 (or L1 in Anna's case). The remaining 33 instances of information needs were generated by Laura (11), Bob (10), Martha (7), and Daniel (5). It should be pointed out that while most of the participants reported a single information need in each of the Web search tasks they completed in their respective OSRs, Martha reported two different needs in one of her Web search tasks.¹⁶⁷ For ease of data analysis, these information needs and their respective searches were counted as two individual Web search tasks.¹⁶⁸

¹⁶⁷ As indicated in 5.7.3.2, the second part of the OSR asked the participants to report on their Web searches for translation problem solving. To do so, respondents had to answer a total of five questions, with question 1 addressing cognitive aspects of translation-embedded Web searching (i.e. search need, need rationale, search goal, search session, search outcome, and outcome rationale); questions 2, 3, and 4 addressing affective aspects of Web searching (perceived levels of search success, satisfaction, and

Table 37. Reported vs. Unreported Information Needs per Participant (Task 1)

	Reported Information Needs	Unreported Information Needs	Total
Martha	7	0	7
Anna	4	15	19
Maria	5	24	29
Laura	7	4	11
Daniel	5	0	5
Bob	6	4	10
TOTAL	34	47	81

A noteworthy characteristic of the participants' Web search behaviors for translation relates to the number of information needs that some of the participants researched but did not report in the OSRs (i.e. the number of unreported information needs). With the exception of Martha and Daniel, who reported all their information needs, the rest of the participants omitted to report a large number of needs. This is particularly prominent in the case of Maria and Anna, with Maria not reporting 24 (i.e. almost 83%) of her 29 information needs and Anna not reporting 15 (i.e. almost 79%) of her 19 information needs. They are followed by Laura and Bob, who only reported seven (i.e. slightly above 63%) and six (i.e. 60%) of their total number of information needs, respectively.

The fact that more than half of the participants' information needs (47 out of 81) and related searches for translation problem solving were unreported is significant in two ways. First, it supports previous claims about the non-comprehensive nature of the data collected by means of written reports (see, for example, Gile 2004 and Hansen 2006). As some participants in this study pointed out, reporting in writing takes time and effort, and this could partly explain—along with problems of information recall—the lack of thoroughness with which subjects tend to complete reports on problem solving (cf. 4.1.3). In this study, this methodological drawback was compensated for by combining the OSRs with the screen recordings. Nevertheless, the lack of introspective (written) data on the unreported information needs and related searches meant that the degree of inference for these searches had to be higher than that of the reported searches. In most

difficulty); and question 5 prompting any additional comments the participants may have had regarding a particular search. These five questions provide information on what I refer to as a Web search task. I will therefore refer to searches that fulfilled the above requirements as (Web) search tasks, while I will refer to searches that were conducted but not reported simply as “unreported searches.” In addition, on occasion, I will use the term “searches” to refer to both reported Web search tasks and unreported searches.

¹⁶⁸ These needs, which refer to the terms “conjunto” (“all”) and “imprevisible” (unforeseeable), are individually classified and highlighted in bold in Tables 42 and 43, respectively.

cases, this did not pose a major problem as the unreported searches were frequently conducted to confirm various translation hypotheses (such as word meanings and/or equivalents) and/or word spellings.¹⁶⁹

This leads to the second significant implication, i.e. the perception of problems and their degree of difficulty. In this regard, the interview data of this study challenges previous claims about the notion of problem as involving something serious or difficult. Quite to the contrary, and as discussed in 3.1.2, the answers that Laura, Anna, and Maria (i.e. the three students who did not report all their Web searches) provided as to why they had not reported certain information needs and their respective searches suggest that not all problems necessarily refer to serious or difficult processing, and that deliberative behavior also takes place when translators make unproblematic decisions (see, for example, Jääskeläinen 1993; Séguinot 2000a; Sirén and Hakkarainen 2002). This is most evident in Laura's account of her rationale for not reporting all her information needs and related searches. As shown in 6.3.2.2, she admitted that she had skipped the information needs "that weren't really that problematic." Furthermore, she had previously explained that she did not have "much to say" about information needs that were "really simple," which she thought would not be of interest to me. In Laura's own words, "Yeah, just like if it was really simple then it's not really, and I didn't think it would be of interest to you if I just like WordReferenced it and then I found it and then I wrote it. I didn't really have that much to say about it either."

For Anna and Maria, not reporting some of their information needs and searches could be explained by the fact that they perceived certain needs not so much as problematic but rather as a matter of reaffirmation or, in Maria's own words, "reassurance." This seems to support previous statements about these participants' lack of confidence in their L2 (or, in Maria's case, L3) translation skills.¹⁷⁰ Anna, for example, stated that

¹⁶⁹ The decision of what was worthy of reporting as a problem in the OSRs was the participants' alone, i.e. I did not impose any criteria on what qualified as a problem. This seemed to have had a negative impact on Anna when it came to reporting thematic searches that did not involve any specific ST item, but that simply concerned the acquisition of background knowledge on the topic dealt with in the source text for translation (see 7.1.1.2 for more details).

¹⁷⁰ This seems to be in line with previous suggestions that translators generally feel less confident in L2 translation than in other directions (see, for example, Kiraly 2000b). Yet, this lack of confidence does not necessarily have to be a bad thing. As Massey and Ehrensberger-Dow explain, "there is a risk of overconfidence and complacency when people translate into their L1" (2010a: 137). When people translate into their L2, however, they may feel encouraged "to be more cautious and check resources for unfamiliar terms" (ibid.).

certain information needs were not a problem “as such” and that she had conducted a number of searches “for confirmation purposes” only:

Vanessa: I noticed that you did a lot of dictionary searches in WordReference particularly, that weren't reported, like, I dunno, like the verb “suponer”, or you know like, a certain amount of verbs and nouns that you did search...

Anna: And I didn't report it...

Vanessa: Yeah, can you think of a reason why?

Anna: I think I know, I think it's because I knew what the word was, but I wasn't sure and I want to make it, I wanted make doubly sure that I, that it is what I am thinking it is.

Vanessa: So for you it was more for confirmation...

Anna: For confirmation purposes.

Vanessa: Ah.

Anna: Mm, that's why I didn't report, 'cause it wasn't a problem for as such 'cause I know what it is but I wasn't sure and I just thought, “Oh, I better check it.”

Vanessa: Oh okay, that makes sense because I noticed you did that with the three texts that (unintelligible, 0:53:16.5)

Anna: Yeah I do a lot of searches for it but it wasn't a problem for me as in such, but it was just for confirmation purposes, I wasn't sure, it was like, “Do I need to put this in?” ‘Cause it's not really a problem, but I was just like, “I just want to check.”

Vanessa: Just making sure.

Anna: Just making sure, yeah.

Similarly, when I asked Maria if she could think of a reason why she had not reported all her information needs and related searches, she replied: “Because probably for some of the searches I knew the answer and I was just making sure that was the correct one. So it wasn't actually a search as such it was just reassurance of my hypotheses.” If we take this into account, i.e. the fact that these participants' unreported searches were conducted for confirmation purposes only and that the nature of their information needs was unproblematic, then we can observe that all six participants had a similar number of more or less problematic information needs, ranging from four to seven in total.

7.1.1.1 Individual vs. Common Information Needs

As indicated previously, the participants faced a total of 38 *types* of information needs that occurred in 81 *instances*. Of all the 38 different types of information needs, 22 (i.e.

57.9%) are individual, i.e. subjective needs, while 16 (i.e. 42.1%) are information needs that were common to at least two participants.

Table 38. Individual vs. Common Information Needs (Task 1)

	N.	%
Individual	22	57.9%
Common	16	42.1%
TOTAL	38	100.0%

Of the 22 individual types of (reported and unreported) information needs—which generate 27.2% of the total instances (81)—only two were reported (by Maria and Laura) in the OSRs (see Table 39). Based on the information above, this would seem to indicate that the remaining 20 information needs were researched either to confirm translation hypotheses—these are perhaps best illustrated by searches conducted in the source language—or translation solutions—best represented by searches conducted in the target language.

Table 39. Individual Information Needs per Participant (Task 1)¹⁷¹

	Search Need	Need Rationale
Anna	<i>Inesperado</i> <i>lejos de</i> <i>Masivamente</i> <i>sostenible</i>	
Maria	<i>seres vivos</i> <i>Implication</i> <i>Suelo</i> <i>Organism</i> <i>Desirable</i> <i>Development</i> <i>Irreversible</i> <i>Sanitary</i> <i>Alimentación</i> <i>Desconocido</i> <i>Aparición</i>	<i>Collocation, needs to be translated appropriately into English</i>

¹⁷¹ The information needs reported in the OSRs—like any other data entered into these reports—are represented in this and other tables exactly as they were typed into the reports. For information needs that were not reported in the OSRs, I recorded the search item that was first entered by the participants in their Web searches (a forward slash is used to differentiate between items of the same expression that were searched individually by the participants). Also, like in Chapter 6, I only used “[sic]” for quoted material included in the running text and not in the tables.

	<i>Eficacia</i>	
	<i>Medicamento</i>	
	<i>Efectos</i>	
	<i>food supply</i>	
Laura	<i>Desnutrición</i>	<i>I thought initially that it might be either "starvation" or "malnutricion" so I looked it up</i>
Bob	<i>liberate/free gases</i>	
	<i>genetic contamination/pollution</i>	

Furthermore, in accordance to what appears to illustrate differences in linguistic ability among the participants, out of the 22 individual information needs 15 correspond to Maria alone, four to Anna, two to Bob, and one to Laura. With the exception of Laura, the other native speakers of the study (i.e. Martha and Daniel) did not have any individual information needs. It should thus be noted that while the searches of the three translation students were conducted to seek and retrieve lexical information on individual words—except for one collocation in the case of Maria—Bob’s searches were conducted for phraseological information only, more specifically, to confirm two collocations.

7.1.1.2 Types of Common Information Needs

Although the number of individual needs types (22) is greater than that of the common needs (16), the latter generate a far greater number of instances than the former. More specifically, and as Table 40 shows, the 16 different types of common needs occurred a total of 59 times in Task 1, which represents 72.8% of the total number of instances.

Table 40 also shows that certain information needs occurred more frequently than others. For the purpose of the following discussion, I categorized the participants’ common information needs into three main groups according to their frequency of occurrence, i.e. from the highest level to the lowest level of frequency. The group with the common information needs that occurred most frequently (see Table 41) includes the collocation “*armas predilectas*” (weapons of choice), which represented a more or less problematic item for all six participants. This first group further includes the term “*transgénicos*” (transgenic organisms), the acronym OMG (GMO or genetically-modified organism), and the name of the GE free food guide “*guía roja y verde*,” which prompted information needs that were common to all the participants, except for Daniel. This is most likely due to Daniel’s level of source-text domain knowledge, which he rated as high in the OSR.

Table 40. Frequency and Distribution of Common Information Needs per Participant (Task 1)

Common Needs	Martha	Anna	Maria	Laura	Daniel	Bob	N. of Occurrences	% of Common Needs	% of Total Needs
<i>armas predilectas</i>	1	1	1	1	1	1	6	10.2%	7.4%
<i>transgénicos</i>	1	1	1	1	0	1	5	8.5%	6.2%
<i>guía roja y verde</i>	1	1	1	1	0	1	5	8.5%	6.2%
<i>OMG</i>	1	1	1	1	0	1	5	8.5%	6.2%
<i>cultivo</i>	0	1	1	1	0	1	4	6.8%	4.9%
<i>conjunto</i>	1	1	1	1	0	0	4	6.8%	4.9%
<i>alcance</i>	0	1	1	1	1	0	4	6.8%	4.9%
<i>ganadería</i>	0	1	1	1	1	0	4	6.8%	4.9%
<i>malas hierbas</i>	0	1	1	1	0	1	4	6.8%	4.9%
<i>supone incremento</i>	1	1	1	0	1	0	4	6.8%	4.9%
<i>imprevisible</i>	1	1	1	0	0	0	3	5.1%	3.7%
<i>agentes tóxicos</i>	0	1	1	0	0	1	3	5.1%	3.7%
<i>pasar por</i>	0	1	0	1	0	0	2	3.4%	2.5%
<i>reforzar</i>	0	1	0	0	1	0	2	3.4%	2.5%
<i>resistencia</i>	0	0	1	0	0	1	2	3.4%	2.5%
<i>constituir</i>	0	1	1	0	0	0	2	3.4%	2.5%
TOTAL	7	15	14	10	5	8	59	100.0%	72.8%

The significance of this first group of common information needs is two-fold. First, except for the collocation “*armas predilectas*,” the remaining three information needs are directly related to the topic dealt with in the source text. Hence, these information needs would have to ideally involve thematic searches. Second, in contrast to the participants’ individual needs, which were predominantly unreported and seemed to be prompted by unproblematic items, the common needs mentioned above seemed to be prompted by what Nord (1991: 151) refers to as “translation problems.” For Nord, a translation problem is “an objective problem which every translator has to solve during a particular translation task” (ibid.).

As Table 41 shows, the rationale for the most frequent types of common needs vary across the participants.¹⁷² Concerning the collocation “*weapons of choice*,” all four translation students seemed to find the term “*predilecto*” (preferred, favorite) more or less problematic, with Martha not remembering its meaning and Laura suspecting it being a false friend.

¹⁷² This information is only available for the translation students and not for Bob and Daniel given that the OSR that I tested in the pilot study did not include the question that I later added to ask respondents to elaborate on the reasons why a certain text item prompted a specific search need.

Table 41. Common Information Needs per Participant - High Level of Frequency (Task 1)

	Search Need	Need Rationale
ARMAS PREDILECTAS		
Martha	<i>Son una de las armas predilectas</i>	<i>Couldn't remember what predilecta meant</i>
Anna	<i>Predilectas</i>	[Unreported]
Maria	<i>predilecto/arma</i>	[Unreported]
Laura	<i>Predilectas</i>	<i>I was unfamiliar with this word in spanish, all that I understood of it initially was its false-friend "predilection", so I had to look it up.</i>
Daniel	<i>Predilecta</i>	[Not applicable]
Bob	<i>armas predilectas</i>	[Not applicable]
TRANSGENICOS		
Martha	<i>Transgénico</i>	<i>Just wanted to verify the precise meaning and then search for equivalents in English</i>
Anna	<i>transgenicos as genetically- engineered or genetically- modified</i>	<i>both terms means the same thing</i>
Maria	<i>Transgénico</i>	<i>unfamiliar terminology</i>
Laura	<i>Transgenicos</i>	[Unreported]
Bob	<i>Transgenicos</i>	[Not applicable]
GUIA ROJA Y VERDE		
Martha	<i>Guia roja y verde</i>	<i>This does not appear to be the normal use of these colours</i>
Anna	<i>guia roja y verde</i>	<i>there is no English correspondence to this expression</i>
Maria	<i>guia roja y verde</i>	[Unreported]
Laura	<i>roja y verde</i>	[Unreported]
Bob	<i>Guia Roja and Guia Verde</i>	[Not applicable]
OMG		
Martha	<i>Los riesgos sanitarios a largo plazo de los OMG</i>	<i>OMG is an acronym I am unfamiliar with and it is not specified in the text</i>
Anna	<i>OMG as the abbreviation of GMO (Genetically Modified Organisms) in Spanish</i>	<i>I was unsure if that is the case</i>
Maria	<i>OMG</i>	<i>I do not know the equivalent in English</i>
Laura	<i>OMG</i>	[Unreported]
Bob	<i>OMG</i>	[Not applicable]

The student participants who elaborated on their rationale for the remaining information needs expressed gaps in their terminological knowledge, which led to problems of source-text comprehension and/or target-text production (see 7.1.2.1 for more details). Furthermore, the allosemantic words (i.e. words that are used in an unusual sense) in the Spanish name of the GE free food guide, i.e. the colors red and green used to refer to food brands that contain or do not contain GMOs, were also problematic for all the

participants, except for Daniel. The fact that Laura did not report any of the thematic information needs could perhaps be explained by what Anna described as a difficulty in reporting background searches that require the use of parallel texts:¹⁷³

I think some of the reason [for not reporting all the searches] was probably because for me searching for a parallel text is probably not a problem as in such, like 'cause I think to search for parallel text just means that I have no background information on this so I need to read up on it. And so I didn't consider it as a problem and I wasn't sure if I should report it and how I'm going to report it.

Anna nevertheless reported all her thematic information needs, which, like most participants, she presented as terminological problems (said needs in fact required terminological information that was sometimes retrieved via reference works, parallel texts, or a combination of both). The fact that certain searches may have been difficult to report in the OSR could be explained by the students' lack of adequate resources and/or terminology to accurately describe their translation problems and actions taken to solve said problems. As discussed in Chapter 4, however, the use of novice students for research into translation processes very much depends on the nature and goals of the research project.

Table 42 shows a second group of information needs, which occurred less frequently than the needs discussed above. This second group includes a total of six common information needs that are of a lexical nature, except for one lexico-syntactic information need encountered by Anna (and classified under "malas hierbas"). Three of the six information needs were caused by polysemous words, in particular the nouns "alcance" (scope in the context of the source text) and "conjunto" (all as in all living organisms), as well as the verb "suponer" in the expression "supone incremento" (i.e. to lead to an increase in). It is interesting to note that the first five information needs in this group were common to Anna, Maria, and Laura. Of these information needs, Bob found the terms "cultivo" (to grow crops) and "malas hierbas" (weeds) somehow problematic, Martha the term "conjunto," and Daniel the terms "alcance" and "ganadería" (cattle farming). In contrast to the other four participants, Bob and Laura did not find the expression "supone incremento" problematic.

¹⁷³ Maria did not report one of the thematic needs either, in particular the one concerning the title of the Greenpeace text, i.e. the GE free food guide. She did not report this need because she did not find a satisfactory solution and hence left the title untranslated. In Maria's own words, "I just wasn't sure what was 'the' correct translation, so I didn't just want to put whatever."

Table 42. Common Information Needs per Participant - Medium Level of Frequency (Task 1)

	Search Need	Need Rationale
CULTIVO		
Anna	<i>cultivo</i>	[Unreported]
Maria	<i>cultivo</i>	[Unreported]
Laura	<i>cultivo</i>	<i>wasn't 100% sure of the meaning of the word, obviously similar to English, but my first thought of "cultivations" doesn't make sense</i>
Bob	<i>cultivo</i>	[Not applicable]
CONJUNTO		
Martha	<i>Los efectos sobre el conjunto de los seres vivos son irreversibles e imprevisibles</i>	Conjunto and imprevisible caused me some difficulty
Anna	<i>conjunto</i>	[Unreported]
Maria	<i>conjunto</i>	[Unreported]
Laura	<i>conjunto</i>	<i>Didn't understand too well this word in this particular context, only in musical terms</i>
ALCANCE		
Anna	<i>alcance</i>	[Unreported]
Maria	<i>alcance</i>	<i>Polysemia</i>
Laura	<i>alcance</i>	<i>again i knew the word in it its context meaning "reach" but not in the use here</i>
Daniel	<i>alcance</i>	[Not applicable]
GANADERIA		
Anna	<i>ganaderia</i>	[Unreported]
Maria	<i>ganaderia</i>	[Unreported]
Daniel	<i>ganaderia</i>	[Not applicable]
Laura	<i>ganaderia</i>	[Unreported]
MALAS HIERBAS		
Anna	<i>desarrollo de resistencias en insectos y 'malas hierbas'</i>	<i>development of insect and weed resistance sounds strange in English</i>
Maria	<i>"malas hierbas"</i>	<i>I was not sure how to translate the phrase I didn't know the spanish term for weeds and seeing the term between speech marks suggested some idiomatic or ironic usage, so I wanted to be sure</i>
Laura	<i>"malas hierbas"</i>	
Bob	<i>malas hierbas</i>	[Not applicable]
SUPONE INCREMENTO		
Martha	<i>El cultivo de transgénicos supone incremento</i>	<i>supone is used in a different way than normal</i>
Anna	<i>suponer/incremento</i>	[Unreported]
Daniel	<i>suponer</i>	[Not applicable]
Maria	<i>implies/incremento</i>	[Unreported]

Finally, Table 43 shows the third group of common needs that occurred with the lower frequency among the participants of the study. Similar to the second group of common information needs, the third group includes information needs that are of a lexical nature only. Anna and Maria, for example, shared three of the six information needs in this group. These were prompted by the adjectives “imprevisible” (unforeseeable) and “tóxico” (in the expression toxic agents), as well as the verb “constituir” (to be, in the context of the source text). Bob also found the expression toxic agents problematic. However, unlike the translation students, who only researched the adjective “tóxico,” Bob researched the entire expression in English (see 7.1.3 for details on the participants’ searches). Bob, like Maria, also found the term “resistencia” (resistance) more or less problematic. Yet, Bob only researched this term to check its English spelling. Daniel, like Anna, researched the term “reforzar” (to strengthen, reinforce), while Laura, like Anna, researched the polysemous verb “pasar por” (in this case, to be or to involve). In contrast to all the participants, Martha did not face any of the information needs in this group, except for the adjective “imprevisible.”

Table 43. Common Information Needs per Participant - Low Level of Frequency (Task 1)

	Search Need	Need Rationale
IMPREVISIBLE		
Martha	<i>Los efectos sobre el conjunto de los seres vivos son irreversibles e imprevisibles</i>	<i>Conjunto and imprevisible caused me some difficulty</i>
Anna	<i>imprevisible</i>	[Unreported]
Maria	<i>imprevisible</i>	[Unreported]
AGENTES TOXICOS		
Anna	<i>toxicos</i>	[Unreported]
Maria	<i>toxico</i>	[Unreported]
Bob	<i>toxic agents</i>	[Unreported]
PASAR POR		
Anna	<i>pasa</i>	[Unreported]
Laura	<i>pasa por</i>	<i>initially I thought it meant “to go beyond” but then reading the whole sentence I found it didn’t make sense, looking it up on wordreference.com only suggested “to pass for” (i.e. look the same)</i>
REFORZAR		
Anna	<i>reforzar</i>	[Unreported]
Daniel	<i>refuerzan</i>	[Not applicable]
RESISTENCIA		
Maria	<i>resistencia</i>	[Unreported]
Bob	<i>resistence</i>	[Unreported]
CONSTITUIR		
Anna	<i>constituir</i>	[Unreported]
Maria	<i>constituir</i>	[Unreported]

As we have seen, with the exception of Anna's lexico-syntactic problem, the majority of the participants' information needs were primarily lexical, i.e. prompted by terminological problems. The language learners in Lörcher's 1991 study (cf. 3.1.1), for example, also problematized primarily at the lexical level, with 70% of all the instances of problems referring to lexical items, followed by lexico-syntactic problems (22%), and purely syntactic problems (8%) (ibid: 207). Similarly, To and Jernudd (2002) found that Internet language professionals in Hong Kong predominantly face terminological problems.¹⁷⁴ Not surprisingly, however, the number and type of terminological problems encountered by these language professionals differ significantly to those of the participants in this study (the population and subject area in both studies are indeed very different). For example, most queries in To and Jernudd's study involved "nouns (92.5%). 30 out of 80 collected queries were acronyms. Only 6.25% were verbs and one was an adverbial. [In addition], most queries concerned the English Language (97.5%), only 2.5% concerned Chinese" (ibid: 118).

In this study, except for Anna's lexico-syntactic problem, the participants' information needs (both common and individual) for the first embedding task concerned 15 nouns (39.47%), eight adjectives (21.05%), five multi-word expressions (13.16%), four collocations (10.53%), three verbs (7.9%), two adverbs (5.26%), and one acronym (2.63%). Furthermore, of the 23 instances of individual information needs, 69.6% were *initially* searched in Spanish, while 30.4% were initially searched in English. Of the 59 instances of common information needs, 91.5% were initially searched in Spanish, while initial searches in English accounted for only 8.5% of all the instances.

The analysis of the participants' rationale for their search needs show that the main causes for their knowledge gaps are rooted in unknown words, allosemantic words, polysemous words and/or false friends. These results are somewhat akin to those of Bogaards' (1998) study concerning the type of words that a group of 45 first-year students of French underlined when reading two texts (the first taken from a French magazine on the Japanese comics "mangas" and the second from a linguistics textbook) and looked up when translating a third text consisting of "11 isolated sentences" (ibid: 154). Bogaards manipulated the texts to include three categories of words, namely "unknown words," "allosemantic words," and false friends (ibid.). His findings show that

¹⁷⁴ Palomares Perraut and Pinto Molina also found that the most frequent information needs of professional translators are terminological, regardless of their professional experience (2000: 98).

unknown words were looked up “in about two thirds of the cases,” while false friends were “at best looked up in one third of the cases.” In addition, both false friends and allosemantic words appeared to be “underestimated as sources of errors by most of the students” (ibid: 156).

7.1.2 Search Goals

In this section, I will analyze the participants’ search goals in relation to their reported and unreported common information needs. More specifically, I will examine the nature (comprehension goals, production goals, or both) and type (e.g. definitions of source-text items, translation equivalents, resolution of acronyms, contextual meaning of selected source-text or target-text items, etc.) of the participants’ search goals as well as their initial search actions taken to meet these goals. The reason for examining the participants’ initial search actions in this section relates to the claim—put forward by White and Iivonen (2001)—that questions regarding the type of information needed influence users’ choice of initial search action, which, in turn, determines subsequent online actions (see below for more details).

7.1.2.1 Nature and Types of Information Goals

As Table 44 shows, 27.1% of all instances of common information needs led to information goals related to target-text production. This is followed by information goals of a source-text comprehension nature (18.6%) and information goals of a combined comprehension-production nature (11.9%). 42.4% of all instances correspond to the common information needs and goals that were unreported (by Maria and Anna, and, to a lesser extent, Laura) and were thus not classified under any of the three categories mentioned above. These instances involve unreported searches that were either exclusively or initially conducted in WordReference (i.e. an online bilingual dictionary that provides definitions *and* equivalents in several language pairs and directions), which suggests that these participants might have searched for information of a comprehension and/or production nature either to confirm their own translation hypotheses (see the interview data above) or find translation variants.¹⁷⁵

¹⁷⁵ This is also the case with the 22 types of individual information needs, which, like the unreported common needs, were either initially or exclusively researched in WordReference. Of the 22 individual needs, two were reported by Maria and Laura, respectively. Maria reported a production goal, while Laura reported a comprehension one.

Table 44. Distribution of Information Goals per Common Information Need (Task 1)

Common Needs	Comprehension	Production	Both	Unreported	TOTAL
<i>armas predilectas</i>	2	2	0	2	6
<i>transgénicos</i>	0	1	3	1	5
<i>guía roja y verde</i>	1	2	0	2	5
<i>OMG</i>	1	0	3	1	5
<i>cultivo</i>	0	2	0	2	4
<i>conjunto</i>	2	0	0	2	4
<i>alcance</i>	1	2	0	1	4
<i>ganadería</i>	0	1	0	3	4
<i>malas hierbas</i>	1	2	1	0	4
<i>supone incremento</i>	1	1	0	2	4
<i>imprevisible</i>	1	0	0	2	3
<i>agentes tóxicos</i>	0	1	0	2	3
<i>pasar por</i>	1	0	0	1	2
<i>reforzar</i>	0	1	0	1	2
<i>resistencia</i>	0	1	0	1	2
<i>constituir</i>	0	0	0	2	2
TOTAL	11	16	7	25	59
%	18.6%	27.1%	11.9%	42.4%	100.0%

In addition to the 25 unreported (and unclassified) instances of common information needs and related goals, there are two further instances that Bob omitted to report. Yet, as these instances concern usage information regarding the expression “toxic agents” and the English spelling of the word “resistance” (both items researched in English), the search goals for these items were classified in Tables 44 and 45 as requiring information of a target-text production nature.

If we examine the nature of the reported search goals per participant (see Table 45), a number of patterns can be identified. It is possible to observe, for example, that the student participants who are native speakers of English, i.e. Martha and Laura, primarily reported search needs requiring information of a source-text comprehension nature.¹⁷⁶ In contrast, Daniel, the remaining native speaker of the study whose translation expertise is higher than that of Martha and Laura, only required information for target-text production purposes. This is also true for Bob, who placed more emphasis on production goals than on comprehension goals. This seems to be more or less consistent with the results of some of the studies discussed in 3.1.2, in particular those conducted by Gerloff (1986), Jääskeläinen (1987 and 1990), and Lörcher (1996).

¹⁷⁶ As Martha stated in the interview, however, she sometimes uses monolingual definitions of source-text items as a resource to find translation variants.

Table 45. Distribution of Information Goals per Participant (Task 1)

	Comprehension	Production	Both	Unreported	TOTAL
Martha	5	1	1	0	7
Anna	0	3	1	11	15
Maria	0	2	2	10	14
Laura	5	1	0	4	10
Daniel	0	5	0	0	5
Bob	0	5	3	0	8
TOTAL	10	17	7	25	59
%	16.9%	28.8%	11.9%	42.4%	100.0%

More specifically, Gerloff found that the foreign language learners of her study “almost exclusively” worked with “comprehension goals in mind,” while “competent translators” focused much more on “production goals” (1986: 252). Similarly, Jääskeläinen states that the two advanced translation students of her study faced primarily production problems (in the form of monitoring), while the two novice students mostly faced comprehension problems (1987: 47-50). She obtained similar results in her 1990 study, in which she found that in the successful translation processes “a larger share of attention units” involved the production of an improved translation product, and that “the more successful translators worked with higher level production goals than the less successful translators” (ibid: 217). In Lörcher’s study, the non-translators tended to face lexical problems “arising from lack of competence in SL or TL” (1996: 30-31). The competent translators, however, primarily faced formulation problems, “with the optimal expression of sense according to the TL norms of text production” (ibid: 31).

The findings above also seem to apply, at least to some extent, to the novice students who are not native speakers of English in this study. As Table 45 shows, Anna and Maria faced goals of a combined comprehension-production nature (part of their unreported searches most likely falls in this category as well). Their search goals are mainly linked to lexical problems that in fact seemed to arise from their lack of confidence in their SL and/or TL skills. As indicated previously, however, Anna’s and Maria’s lack of confidence in their TL skills may explain the fact that, as a result of tighter TL monitoring processes, these participants faced more production goals than the other novice students who are English-native speakers (i.e. Martha and Laura).

The participants’ *types* of information goals were coded in Table 46 as SL “definitions,” TL “equivalents,” “acronym resolution” (in the SL, the TL, or both), “contextual

meaning” (or use of certain SL terms or expressions in context), “usage” (use of certain TL terms or expressions in context), “lexico-syntactic,” and “spelling.” In addition, the category “definition and/or equivalent,” which appears italicized in Table 46, was assigned to all the unreported searches.

Table 46. Information Goals per Common Information Need and Participant (Task 1)

	Common Needs	Search Goal(s)	Coding
ARMAS PREDILECTAS			
Martha	<i>Son una de las armas predilectas</i>	<i>the meaning in Spanish so looked on the www.rae.es website</i>	Definition
Anna	<i>predilectas</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>predilecto/arma</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>predilecto</i>	<i>simple dictionary explanation</i>	Definition
Daniel	<i>predilecta</i>	<i>English translation</i>	Equivalent
Bob	<i>armas predilectas</i>	<i>English equivalent</i>	Equivalent
TRANSGENICOS			
Martha	<i>transgénico</i>	<i>First to confirm the meaning was genetically modified and then see what the correct expression is in English</i>	Definition + equivalent
Anna	<i>transgenicos as genetically-engineered or genetically-modified</i>	<i>which terms to use</i>	Usage
Maria	<i>transgenico</i>	<i>explanation of the terminology, translation into English</i>	Definition + equivalent
Laura	<i>transgenicos</i>	[Unreported]	<i>Definition and/or equivalent</i>
Bob	<i>transgenico</i>	<i>definition, English equivalent</i>	Definition + equivalent
GUIA ROJA Y VERDE			
Martha	<i>Guia roja y verde</i>	<i>the use of this term in other texts</i>	Contextual meaning
Anna	<i>guia roja y verde</i>	<i>an expression that best corresponds to this expression</i>	Equivalent
Maria	<i>rojo</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>roja y verdre</i>	[Unreported]	<i>Definition and/or equivalent</i>
Bob	<i>Guia Roja and Guia Verde</i>	<i>English equivalents</i>	Equivalents
OMG			
Martha	<i>Los riesgos sanitarios a largo plazo de los OMG</i>	<i>What it stands for in context</i>	Acronym resolution
Anna	<i>OMG as the abbreviation of GMO (Genetically modified Organisms) in Spanish</i>	<i>GMO in Spanish</i>	Acronym resolution + equivalent
Maria	<i>OMG</i>	<i>explanation and equivalent in English</i>	Acronym resolution + equivalent
Laura	<i>OMG</i>	[Unreported]	<i>Definition and/or equivalent</i>
Bob	<i>OMG</i>	<i>Long form in Spanish and English</i>	Acronym resolution + equivalent
CULTIVO			
Anna	<i>cultivo</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>cultivo</i>	[Unreported]	<i>Definition and/or equivalent</i>

Laura	<i>cultivo</i>	<i>english equivalent</i>	Equivalent
Bob	<i>cultivo</i>	<i>English equivalent</i>	Equivalent
CONJUNTO			
Martha	<i>Los efectos sobre el conjunto de los seres vivos son irreversibles e imprevisibles</i>	<i>a Spanish-Spanish explanation</i>	Definition
Anna	<i>conjunto</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>conjunto</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>conjunto</i>	<i>monolingual dictionary definition to find other contextual meanings</i>	Contextual meaning
ALCANCE			
Anna	<i>alcance</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>alcance</i>	<i>the right choice of translation</i>	Equivalent
Laura	<i>alcance</i>	<i>to find other contextual meanings that would fit with this text and usage</i>	Contextual meaning
Daniel	<i>alcance</i>	<i>translation in English</i>	Equivalent
GANADERIA			
Anna	<i>ganaderia</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>ganaderia</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>ganaderia</i>	[Unreported]	<i>Definition and/or equivalent</i>
Daniel	<i>ganaderia</i>	<i>English translation</i>	Equivalent
MALAS HIERBAS			
Anna	<i>desarrollo de resistencias en insectos y ‘malas hierbas’</i>	<i>a better term for the resistence against insecticide and herbicide</i>	Lexico-syntactic
Maria	<i>"malas hierbas"</i>	<i>maybe it has a certain equivalent in English, so I was looking for an equivalent</i>	Equivalent
Laura	<i>"malas hierbas"</i>	<i>definitions, other contextual usage</i>	Contextual meaning
Bob	<i>malas hierbas</i>	<i>translation, confirmation that it is no specialized term</i>	Equivalent + contextual meaning
SUPONE INCREMENTO			
Martha	<i>El cultivo de transgénicos supone incremento</i>	<i>other texts with this useage</i>	Contextual meaning
Anna	<i>suponer/incremento</i>	[Unreported]	<i>Definition and/or equivalent</i>
Daniel	<i>suponer</i>	<i>synonyms in English</i>	Equivalents
Maria	<i>implies/incremento</i>	[Unreported]	<i>Definition and/or equivalent</i>
IMPREVISIBLE			
Martha	<i>Los efectos sobre el conjunto de los seres vivos son irreversibles e imprevisibles</i>	<i>a Spanish-Spanish explanation</i>	Definition
Anna	<i>imprevisible</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>imprevisible</i>	[Unreported]	<i>Definition and/or equivalent</i>
AGENTES TOXICOS			
Anna	<i>toxicos</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>toxico</i>	[Unreported]	<i>Definition and/or equivalent</i>
Bob	<i>toxic agents</i>	[Unreported]	Usage
PASA POR			
Anna	<i>pasa</i>	[Unreported]	<i>Definition and/or equivalent</i>

Laura	<i>pasa por</i>	<i>more definitions</i>	Contextual meaning
REFORZAR			
Anna	<i>refuerzar</i>	[Unreported]	<i>Definition and/or equivalent</i>
Daniel	<i>reforzar</i>	<i>English translation</i>	Equivalent
RESISTENCIA			
Maria	<i>resistencia</i>	[Unreported]	<i>Definition and/or equivalent</i>
Bob	<i>resistence</i>	[Unreported]	<i>Spelling</i>
CONSTITUIR			
Anna	<i>constituir</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>constituir</i>	[Unreported]	<i>Definition and/or equivalent</i>

Of the most frequent common information needs and related goals, the collocation “*armas predilectas*” led to the search for definitions in the case of Martha and Laura, and equivalents in the case of Bob and Daniel (Maria and Anna might have needed either type or both types of information). The term “*transgénico*” caused most participants to search for both definitions and equivalents, except for Anna, whose goal was to choose between two translation variants. The Spanish title of the Greenpeace GE free food guide led Anna and Bob to look for equivalents, Martha to search for its meaning in context, and the remaining participants to search for definitions and/or equivalents. The acronym “OMG” led the participants who reported this search item to look for its long form either in Spanish only (Martha) or both in Spanish and English (Anna, Maria, and Bob). The remaining information goals involved the search for definitions, equivalents or both. The only exceptions are Anna’s “lexico-syntactic” search goal and Bob’s spelling search. The fact that most information goals involved searches for definitions and/or equivalents, some of which were conducted (primarily by Anna, Maria, and Laura) for “checking” purposes in WordReference (see Table 47 below), seems to support House’s distinction

between two conditions generally holding in connection with the use of translational aids: 1. an absence of knowledge, especially in the form of gaps in lexical knowledge. These gaps are most painfully felt in connection with co-textually determined idiomatic expressions and routines, 2. a vague insecurity about self-constructed candidates for translational equivalence, which – despite a learner’s subjectively felt ‘passive’ lexical knowledge – often drives the learner to ‘make sure’ and check relevant items in a reference work (2000: 158).

Finally, it should be noted that for information goals of a comprehension nature, the distinction between definition and contextual meaning is an important one in this study as each type of information seemed to be associated with different comprehension needs. While searches for contextual meaning appeared to indicate that a given participant already had an idea about the meaning(s) of a certain ST item, the search for definitions

generally indicated that they did not. Furthermore, as Tables 46 and 47 show, searches for contextual meaning are mainly reported in connection with polysemous words (e.g. “alcance,” “suponer,” and “pasar por”), while searches for definitions are primarily reported in relation to more or less specialized terms or expressions (e.g. “transgénicos” and “armas predilectas”).

7.1.2.2 Information Goals and Initial Search Actions

One could argue that different types of information pre-determine to some extent the types of information sources to be consulted. For instance, based on the distinction above, the search for contextual meaning would ideally involve the use of parallel texts, while the search for definitions could be conducted in reference works and, of course, in parallel texts if required. In other words, the type of information sources used to satisfy different information needs depends on the questions that users ask regarding the type of information they need, i.e. regarding their search goals. White and Iivonen, for example, view search questions as “expressions of the information needs raised by information problems” (2001: 723). The way in which questions “are formulated and phrased has implications for information retrieval (IR) and provides insights into the individual’s understanding of the problem and of information necessary to address it” (ibid.).

White and Iivonen specifically distinguish between “two question characteristics: the open/closed nature of the questions and the predictability of the source of the answer” (ibid.). As briefly discussed in 6.1.5.1, closed questions elicit factual and unambiguous information, and are typically asked when searchers want brief and exact answers. Searchers thus “have little discretion in judging correct answers or choosing alternatives. Instead, they may face many options about where to find correct answers” (ibid.). Generally speaking, definitions and translation equivalents, for instance, would seem to yield questions of a closed nature for which various options for suitable answers are available. In contrast, when questions are of an open-ended nature,

there is no one exact answer and searchers must develop acceptable responses. There are many relevant sources, and searchers may have to study them and perhaps combine information available from several sites. For some questions, searchers know or can guess with high probability of success where relevant information can be found; for other questions they cannot do this. Instead they have to find appropriate sources to be able to develop responses by using various search services or by linking from related sites (ibid.).

The need for contextual meaning, phraseological information (e.g. collocations) or thematic information could lead to more or less open questions for which multiple sources of information may need to be combined in order to find satisfactory answers. Moreover, these (or, for that matter, any other) information needs could lead to questions that combine White and Iivonen's two characteristics, thus forming the following four types: closed/predictable source, closed/unpredictable source, open/predictable source, and open/unpredictable source (ibid: 721). Question characteristics, in turn, may have an impact on users' choices about their initial "Web search strategy" (ibid: 723). This initial search strategy or, in my terminology, initial search action, refers to the first step in a search process, which may involve subsequent steps. This particular decision point in a user's search behavior is of key relevance because, as White and Iivonen point out, "it has implications for the continuation of the search" (ibid: 722).

Users may start their searches by choosing one of the three approaches to information seeking described in 6.1.5.1. These are institutional searches (via URLs), thematic searches (via subject trees), and keyword searches (via search engines) (Austermühl 2001: 52), which correspond to White and Iivonen's "direct address," "subject directory," and "search engine" types of "search strategies" (2001: 722). Direct address searches generally take "only one step to reach a specific site" as searchers typically know the URL of the site or are able to infer the specific address "based on their knowledge of a company or organization's name, the address structure, categories and abbreviations" (ibid.). Subject directory searches allow users to browse data through subject trees or thematic categories of information. These searches involve multiple steps and are based on "recognition" rather than "recall, which is important in the other [search] options" (ibid.). Here, users "need to be able to recognize topical or other categories that are likely matches for specific questions" (ibid.). Searches carried out in search engines, finally, yield all kinds of information and, like subject directory searches, also involve a multiple-step process. As indicated earlier, users depend on their understanding of search engine features in order to transform questions into appropriate search queries.

In this study, two of the three approaches to information searching mentioned above were identified in connection with the participants' initial stage of their search processes. As Table 47 shows, these approaches are direct address searches and search engine

queries. None of the participants conducted subject directory searches at the initial stage of (or at any point in) their search processes. Some of the participants, however, initiated their search processes by conducting one of the two further types of searches identified in this study. These are “navigational queries” and “browse searches” (as further discussed below, however, a browse search does not represent an initial search step in the strict sense). Navigational queries, as briefly shown in 6.1.5.1, involve typing in a search engine box a word (or words) that a user knows will yield the site they wish to visit (Battelle 2006: 31). Navigational queries generally take two steps only (i.e. typing the word and clicking the known site link) and hence provide one of the shortest routes (in addition to direct address searches) to a site known to exist. Browse searches involve navigating the Web, which itself is “supported by a structure that allows and encourages users to follow links” (White and Iivonen 2001: 724). Searchers typically “navigate in a small area with frequent use of backtracking ... and conduct swift, flexible searches, making quick decisions about where to click next” (ibid.). Although browse searches cannot be chosen as an initial search action, they have been included here as they provided (on occasion) some of the participants with a starting point to search new items on the basis of previously researched items. Browsing thus emphasizes the changing nature of information needs as searches evolve during the search process, providing users with starting points to conduct new searches.

Table 47. Distribution of Initial Search Actions per Common Information Need, Participant, and Information Goal(s) (Task 1)

Common Needs	Search Goal(s)	Direct Address Searches	Navigational Queries	Search Engine Queries	Browse Searches
ARMAS PREDELICTAS					
Martha	Definition	RAE			
Anna	<i>Definition/equivalent</i>	WordReference			
Maria	<i>Definition/equivalent</i>	WordReference			
Laura	Definition	WordReference			
Daniel	Equivalent	WordReference			
Bob	Equivalent			Google Search box (.co.nz)	
TRANSGENICOS					
Martha	Definition + equivalent	RAE			
Anna	Usage	WordReference			
Maria	Definition + equivalent	WordReference			
Laura	<i>Definition/equivalent</i>	WordReference			
Bob	Definition + equivalent			Google Search box (.com)	
GUIA ROJA Y VERDE					
Martha	Contextual meaning			Google Advanced	

Anna	Equivalent		Search (.co.nz) Google Search box (.co.nz)
Maria	<i>Definition/equivalent</i>	WordReference	
Laura	<i>Definition/equivalent</i>	WordReference	
Bob	Equivalents		Google Search box (.co.nz)
OMG			
Martha	Acronym resolution	RAE	
Anna	Acronym resolution + equivalent		Google Search box (.co.nz)
Maria	Acronym resolution + equivalent	WordReference	
Laura	Definition/Equivalent	WordReference	
Bob	Acronym resolution + equivalent		Google Search box (.com)
CULTIVO			
Anna	<i>Definition/equivalent</i>	WordReference	
Maria	<i>Definition/equivalent</i>	WordReference	
Laura	Equivalent	WordReference	
Bob	Equivalent		Wikipedia
CONJUNTO			
Martha	Definition	RAE	
Anna	<i>Definition/equivalent</i>	WordReference	
Maria	<i>Definition/equivalent</i>	WordReference	
Laura	Contextual meaning	WordReference	
ALCANCE			
Anna	<i>Definition/equivalent</i>	WordReference	
Maria	Equivalent	WordReference	
Laura	Contextual meaning	WordReference	
Daniel	Equivalent	WordReference	
GANADERIA			
Anna	<i>Definition/equivalent</i>	WordReference	
Maria	<i>Definition/equivalent</i>	WordReference	
Laura	<i>Definition/equivalent</i>	WordReference	
Daniel	Equivalent	WordReference	
MALAS HIERBAS			
Anna	Lexico-syntactic		Greenpeace
Maria	Equivalent	WordReference	
Laura	Contextual meaning		Google Search box (.co.nz)
Bob	Contextual meaning + equivalent		Google Search box (.co.nz)
SUPONE INCREMENTO			
Martha	Contextual meaning		Google Advanced Search (.co.nz)
Anna	<i>Definition/equivalent</i>	WordReference	
Daniel	Equivalent		WordReference
Maria	<i>Definition/equivalent</i>	WordReference	
IMPREVISIBLE			
Martha	Definition	RAE	

Anna	<i>Definition/equivalent</i>	WordReference			
Maria	<i>Definition/equivalent</i>	WordReference			
AGENTES TOXICOS					
Anna	<i>Definition/equivalent</i>	WordReference			
Maria	<i>Definition/equivalent</i>	WordReference			
Bob	Usage			Google Search box (.co.nz)	
PASA POR					
Anna	<i>Definition/equivalent</i>	WordReference			
Laura	Contextual meaning	WordReference			
REFORZAR					
Anna	<i>Definition/equivalent</i>	WordReference			
Daniel	Equivalent	WordReference			
RESISTENCIA					
Maria	<i>Definition/equivalent</i>	WordReference			
Bob	Spelling				Wikipedia
CONSTITUIR					
Anna	<i>Definition/equivalent</i>	WordReference			
Maria	<i>Definition/equivalent</i>	WordReference			
TOTAL		44	1	11	3
%		74.6%	1.7%	18.6%	5.1%

As Table 47 shows, direct address is the preferred initial search action in this study (74.6%), followed by search engine queries (18.6%), browse searches (5.1%) that led to new searches in a couple of instances, and one navigational query (1.7%). The frequent use of direct address searches reveals that known sites are important for all the student participants as well as Daniel. This is consistent with the search behavior of regular users, who tend to “start their searches from known sites and visit known sites many times during their searches ... or over time” (White and Iivonen 2001: 723). In contrast, Bob, the participant with the most search experience of all, preferred search engine queries as his initial search action. That is, while the participants with the least search experience (Martha, Laura, Anna, Maria, and, eventually, Daniel) started their searches from ‘the known,’ Bob, the most experienced searcher of all, preferred to initiate his searches with ‘the unknown.’

The results obtained also show that there is little or no variation of initial search action across the participants of the study. Bob systematically used search engine queries to initiate all his searches, except for two browse searches. Maria used direct addresses to initiate all of her searches, while Daniel and Laura also did so, except for one occasion in which they conducted a navigational query and a search engine query, respectively. Similarly, Martha and Anna chose to initiate all their searches using direct addresses, except for two initial search engine queries in both cases and one additional browse

search in the case of Anna.¹⁷⁷ Furthermore, not only did most of the participants use one and the same initial search action in all situations, they also chose the same source of information regardless of the type of question asked (or search goal pursued). In other words, questions characteristics seemed to have no impact on either the participants' initial choice of search actions or their selection of information sources (the latter phenomenon, however, does not apply to Bob). This is particularly true for Maria, Anna, Laura, and Daniel, who used WordReference as the only resource for searching linguistic information, extra-linguistic information, or both. Similarly, Martha used RAE (a Spanish monolingual dictionary) as the only initial resource for searching linguistic as well as extra-linguistic information. As Martha herself stated in my interview with her, and as suggested above, this could be explained by the fact that “you tend to stick with the things that you know” (see 7.1.3.1 for more details). Bob, in contrast used Google as a platform for finding and selecting different sources of information based on the types of search needs and goals, which mostly concerned extra-linguistic information. These findings are somewhat similar to those reported by Massey and Ehrensberger-Dow (forthcoming) concerning a pilot survey of resource use that was “completed by 14 instructors and 96 students of translation.”¹⁷⁸ According to Massey and Ehrensberger-Dow,

[t]he greatest differences in research behavior between the students and instructors emerged for extra-linguistic problems requiring expert or specialized knowledge. Online dictionaries (both monolingual and multilingual) featured high on the students' list of resources, as did multilingual print/CD/DVD dictionaries ... By contrast, the top choices for the instructors were model or parallel texts and various uses of search engines. ... As in the case of linguistic research, instructors again showed a greater preference for monolingual print and CD/DVD dictionaries than the students did (ibid.).

The fact that the student participants (along with Daniel) did not differentiate their initial search actions and sources of information based on question type highlights the need for formal training in question analysis. As Table 47 shows, all the student participants heavily relied on dictionaries as their initial source of information independently of the type of information needed and thus frequently misused said

¹⁷⁷ Note also that while Martha, Anna, and Laura conducted their initial search engine queries in Google.co.nz, Bob did not always restrict his searches to New Zealand pages alone.

¹⁷⁸ As part of this survey, respondents “were asked to recall a recent translation or revision assignment they consider to be representative of the work they did, and to answer questions about it” regarding “the types of tools and resources they used in the process of translation or revision” (ibid.).

dictionaries. The misuse of dictionaries is perhaps best illustrated by the fact that all the student participants (as well as Daniel) searched the collocation “*armas predilectas*” in a regular monolingual (Martha) or bilingual dictionary (Anna, Maria, Laura, and Daniel). This was also the case with regard to the acronym OMG—with the exception of Anna, who searched this acronym in Google.co.nz. In addition, Laura and Maria used WordReference to search the colors red and green included in the Spanish name of the Greenpeace GE free food guide, possibly to find out about additional meanings of these colors. Breaking multi-word expressions into smaller constituents is also a strategy that both Maria and Anna used to look up the word combination “*supone incremento*” in WordReference.¹⁷⁹ Maria, finally, also used WordReference to search the term “*malas hierbas*.”

7.1.3 Search Processes

In this section, I will first discuss the participants’ search sessions, or temporal series of interactions with the Web, to address their information needs. These sessions were measured using a time unit (minutes and seconds) that was complemented with information on the number of online actions carried out per participant and per common information need. Second, I will examine the participants’ adopted approaches to Web searching, i.e. their direct address searches, search engine queries, and browse searches (navigational queries are excluded from the data analysis as there were only two such queries for the first embedding task). More specifically, I will analyze the participants’ direct address searches in relation to their use of reference works, given that these searches systematically involved resorting to known dictionaries and/or encyclopedias for information acquisition. I will describe the participants’ query behaviors using primarily two of the three measures presented in 6.1.5.2, namely query complexity and query length. The third measure, i.e. query effectiveness, will also be taken into account to provide an overview of the participants’ abilities to transform questions into appropriate query statements and hence will be examined in relation to their query construction and query modification behaviors. Before discussing the participants’ overall query effectiveness, however, I will briefly elaborate on the types of queries (classified here as initial queries, subsequent queries, and/or repeat queries) used to

¹⁷⁹ This seems to correlate with novice students’ translation performance regarding their units of translation. As previous translation process studies as well as this study show, novice trainees tend to break sentences down into smaller units that vary in size and grammatical level (cf. 3.1.1).

address some of the common information needs that emerged from the first embedding task. In addition, I will provide an overview of the total number of pages accessed to research said information needs. Concerning browse searches, I will examine these for the two participants (Bob and Anna) who conducted this type of search.

This multi-faceted analysis of the participants' search behaviors will allow me to discern several qualitative IS&R patterns concerning the participants' range and depth of search behaviors as well as their degree of repetitive behavior. While the number of Websites visited is taken here to provide an indication of the participants' range of search behavior, their interactions and level of engagement with Website content—as manifested, for example, by the number and type of internal site queries conducted, internal and external pages accessed, and overall time spent consuming Website content—provide an indication of their depth of search behavior. The number and type of search engine query modifications also adds to this dimension, i.e. to the depth of search behavior. Repetitive behavior, finally, refers both to the number of repeat visits to the same Website and the number of repeat searches addressing the same information need. While the number of repeat visits to the same Website “tells us something about Website loyalty and satisfaction” (Nicholas et al. 2006: 215), the number of repeat searches “may indicate the fact that a user has not found all that they wanted the first time around” (ibid: 225).

7.1.3.1 Search Sessions

One of the main difficulties associated with the comparison of Web searching studies (or any studies in other disciplines) concerns the definition of adequate evaluation metrics and the lack of consistent terminology to refer to the same metric. To compensate for this and facilitate both the presentation and comparison of results obtained in different Web searching studies, Jansen and Pooch (2001: 243) recommend three levels of data analysis along with their respective terms and definitions. These levels are the *session*, the *query*, and the *term* (ibid: 243-244). I will discuss these concepts in the following sections, starting with the session level of analysis.

In Web searching studies, a search session is typically understood as the sequence of interactions between a searcher and a Web search engine aimed at locating relevant information that addresses a single information need. Hence, the session level has always been “a key paradigm for measuring the performance of Web search engines”

(Jansen et al. 2007: 862). Yet, one of the difficulties in analyzing users' Web search sessions involves "determining 'exactly what is the session' in practical terms" (ibid: 863). While in traditional IR systems (such as online library catalogues) users can be identified based on their logon details, identifying single user sessions on the Web becomes a difficult task due to the "stateless nature of client-server relationship" (ibid.). According to Jansen et al.,

[m]ost Web search engine servers have used the Internet Protocol (IP) address of the client machine to identify *unique visitors*. With referral sites, Internet service providers (ISP), dynamic IP addressing, and common user terminals, it is not always easy to identify a single user session on a Web search engine. Therefore, a single IP address does not always correspond to a single user ... In response to the dynamically allocated IP situations, Web search engine researchers have moved to the use of cookies, along with IP addresses, for user identification. The use of cookies minimizes the session identification problem somewhat, but with common-access computers (i.e., computers at libraries, schools, labs, office shops, and manufacturing floors which many people share) along with spyware and cookie management software, one computer may not correspond to one searcher. Additionally, a single searcher may engage a search engine with multiple information needs simultaneously or in rapid succession ... during a single searching episode. To consider these multiple information needs together presents significant problems for recommender systems and personalized online content. Therefore, some search engines also use a temporal boundary along with cookies to help address this problem. This temporal boundary helps minimize the common user terminal issue and also helps delineate repeat searchers to a Web search engine who have returned, but with a new information need; however, this approach does not address the multiple information needs during a single searching episode issue (ibid: 863-864).

All three methods identified by Jansen et al. "(IP address; IP and cookie; and IP, cookie, and temporal boundary) ... employ a mechanical definition of a session rather than a conceptual definition that defines a searching session within an information-seeking task" (ibid: 864). In this study, however, like in many other studies that take a holistic rather than a 'technical' approach to Web searching, I defined the notion of search session from a contextual point of view as a temporal series of online actions aimed at satisfying a specific information need (cf. 5.1.3). This notion is based on other contextual definitions like that of Jansen et al., who view a search session as "a series of interactions by the user toward addressing a single information need" (ibid: 863; cf. Spink and Jansen 2004: 101). Yet, unlike most contextual definitions of search session (including Jansen et al.'s), which are restricted to online actions performed *only* in Web search engines—e.g. "submitting a query, viewing result pages, clicking on URLs, viewing Web documents, and returning to the Web search engine for query

reformulation” (ibid.)—I expanded my notion of search session to include all other actions that can be performed to seek and retrieve information on the Web (e.g. typing an URL, clicking a browser’s Back and Forward buttons to navigate the Web, typing a site query in a Website’s internal search engine, etc.). I also expanded my notion of search session to include online search actions aimed at addressing more than one information need at a time whenever said actions could not be clearly attributed to a single information need (see below for more details). This, in turn, allowed me to take into consideration the dynamic, interactive, and evolving nature of some of the searches performed by some of the participants in this study.

According to Jansen and Pooch (2001: 243), the analysis of the session first involves its length, which is often measured by the number of queries per searcher. Alternatively, sessions can be measured in a time unit (usually minutes) that accounts for the search actions taken by a user (Kaske 1993: 80). In this study, session length was measured in minutes and seconds, and was complemented by the number of online actions taken by the participants to (potentially) satisfy an information need. Search sessions were thus delimited by changes in online tasks. To be more precise, a single search session addressing a specific information need was delimited by a change of Web search task (i.e. one that addresses a new information need), which may have been preceded by a change to the translating or reporting tasks (these changes do not involve switching back and forth between tasks but rather performing task-specific actions). Multiple search sessions addressing the same information need were also delimited by a change of online task, i.e. from Web searching to translating, reporting with OSR, or initiating a different Web search task. Finally, as further shown below, searches addressing more than one information need at a time (these needs may have been reported within the same Web search task or a different one) were considered part of the same search session whenever a clear distinction between needs and related search actions could not be established.

Table 48 ranks the participants’ common information needs according to the average session length, i.e. from the longest to the shortest duration, the average number of online actions, and the total number of occurrences. Naturally, the data provided in Tables 48 and 49 is not directly comparable as not all information needs are common to all participants.

Table 48. Ranking of Common Information Needs per Session Length, with Online Actions and Occurrences (Task 1)

#	Common Needs	Average Time	Average No. of Actions	No. of Occurrences
1	<i>guía roja y verde</i>	0:04:24	29.4	5
2	<i>OMG</i>	0:02:55	19.8	5
3	<i>pasa por</i>	0:01:29	4.5	2
4	<i>malas hierbas</i>	0:01:21	8.8	4
5	<i>Transgénicos</i>	0:01:18	8.0	5
6	<i>supone increment</i>	0:01:16	8.8	4
7	<i>Cultivo</i>	0:00:48	5.3	4
8	<i>Imprevisible</i>	0:00:41	4.7	3
9	<i>resistencia</i>	0:00:37	3.0	2
10	<i>Conjunto</i>	0:00:28	4.0	4
11	<i>Alcance</i>	0:00:27	4.3	4
12	<i>Ganadería</i>	0:00:26	4.8	4
13	<i>agentes tóxicos</i>	0:00:22	4.7	3
14	<i>armas predilectas</i>	0:00:22	4.2	6
15	<i>Reforzar</i>	0:00:16	4.0	2
16	<i>Constituir</i>	0:00:12	3.0	2
AVERAGE		0:01:05	7.6	3.69

Nevertheless, several observations can be made. It is possible to see, for example, that the average time length does not always correlate with the total number of occurrences and the average number of online actions taken to address an information need. While, in some cases, the higher the number of occurrences is, the higher the average time length and the average number of online actions are, in other cases such a correlation cannot be established. This is particularly true with regard to two information needs that stand out as clear exceptions to the former trend. These are the collocation “*armas predilectas*,” which, despite being common to all six participants, took an average time of only 22 seconds to research, and the verb “*pasar por*,” which, despite being common to two participants only, took an average time of one minute and 22 seconds to research.

A closer look at Table 49 reveals that for “*armas predilectas*” all the participants, except for Bob, conducted one-stop searches to address their information needs and goals. This is evident not only in the small amount of time spent but also the few actions taken to research this collocation. Only Maria spent more time on this need and performed twice as many actions as the other student participants, including Daniel, which can be explained by the fact that she searched for the collocation components individually, whereas the other participants only searched for the adjective “*predilecto*.” This, in turn, resulted in Maria carrying out two search sessions. As Table 47 above shows, with the

exception of Bob, the other participants initially searched for this collocation in WordReference or, in the case of Martha, in RAE. The short length of the search sessions and the low number of actions taken indicate that there were no further searches conducted to address this common information need, a phenomenon supported by the video recordings of the first embedding task. Bob, in contrast, spent almost a minute searching for said collection in Google until he found a satisfactory answer.

In the case of the second exception mentioned above, “pasar por,” we find that while there are only two occurrences, the average session time is considerable higher than that of other information needs that occurred more frequently. This results from the fact that Anna alone spent two minutes and 13 seconds on this search (Laura, the second participant with this search need only spent 45 seconds). In particular, Anna carried out a two-session search in WordReference for what appeared to be confirmation and/or reassurance purposes (see the parallels to Maria’s search for “imprevisible” discussed below).

Table 49. Search Sessions, Session Length, and Online Actions per Common Information Need and Participant (Task 1)

Common Needs		No. of sessions	Total Time	Total Actions
ARMAS PREDILECTAS				
Martha	<i>Son una de las armas predilectas</i>	1	0:00:24	3
Anna	<i>predelictas</i>	1	0:00:07	3
Maria	<i>arma/predilecto</i>	2	0:00:27	6
Laura	<i>predilectas</i>	1	0:00:09	3
Daniel	<i>predilecta</i>	1	0:00:08	3
Bob	<i>armas predilectas</i>	1	0:00:58	7
Subaverage			0:00:22	4.17
OMG				
Martha	<i>Los riesgos sanitarios a largo plazo de los OMG</i>	1	0:01:00	9
Anna	<i>OMG as the abbreviation of GMO</i>	1	0:00:58	14
Maria	<i>OMG</i>	1	0:01:54	22
Laura	<i>OMG</i>	1	0:02:14	13
Bob	<i>OMG + transgenicos</i>	2	0:08:30	41
Subaverage			0:02:55	19.8
TRANSGENICOS				
Martha	<i>transgénico</i>	1	0:01:07	9
Anna	<i>genetically- engineered or genetically-modified</i>	1	0:04:47	12
Maria	<i>transgénico</i>	1	0:00:11	3
Laura	<i>transgenicos</i>	1	0:00:23	8
Bob	<i>OMG + transgenicos</i>	0	0:00:00	0

Subaverage			0:01:18	8
GUIA ROJA Y VERDE				
Martha	<i>Guia roja y verde</i>	1	0:03:34	12
Anna	<i>guia roja y verde</i>	2	0:08:15	67
Maria	<i>Rojo</i>	1	0:02:54	21
Laura	<i>roja y verde</i>	1	0:01:10	13
Bob	<i>Guia Roja and Guia Verde</i>	2	0:06:06	34
Subaverage			0:04:24	29.4
CULTIVO				
Anna	<i>Cultivo</i>	1	0:00:10	3
Maria	<i>Cultivo</i>	2	0:00:32	6
Laura	<i>Cultivo</i>	1	0:00:12	3
Bob	<i>Cultivo</i>	1	0:02:19	9
Subaverage			0:00:48	5.25
CONJUNTO				
Martha	<i>conjunto</i>	1	0:00:53	3
Anna	<i>conjunto</i>	1	0:00:16	3
Maria	<i>conjunto</i>	1	0:00:22	3
Laura	<i>conjunto</i>	1	0:00:21	7
Subaverage			0:00:28	4
ALCANCE				
Anna	<i>Alcance</i>	1	0:00:07	3
Maria	<i>Alcance</i>	1	0:00:33	5
Laura	<i>Alcance</i>	1	0:00:25	6
Daniel	<i>Alcance</i>	1	0:00:43	3
Subaverage			0:00:27	4.25
GANADERIA				
Anna	<i>ganaderia</i>	1	0:00:10	3
Maria	<i>ganaderia</i>	1	0:00:07	3
Laura	<i>ganaderia</i>	1	0:01:11	10
Daniel	<i>ganadería</i>	1	0:00:15	3
Subaverage			0:00:26	4.75
MALAS HIERBAS				
Anna	<i>desarrollo de resistencias en insectos y 'malas hierbas'</i>	1	0:01:55	7
Maria	<i>"malas hierbas"</i>	1	0:01:37	11
Laura	<i>"malas hierbas"</i>	1	0:00:27	6
Bob	<i>malas hierbas</i>	1	0:01:27	11
Subaverage			0:01:21	8.75
SUPONE INCREMENTO				
Martha	<i>El cultivo de transgénicos supone incremento</i>	1	0:03:21	13
Anna	<i>suponer/incremento</i>	2	0:00:18	8
Daniel	<i>Suponer</i>	1	0:00:42	8
Maria	<i>implies/incremento</i>	2	0:00:43	6
Subaverage			0:01:16	8.75
IMPREVISIBLE				
Martha	<i>imprevisibles</i>	1	0:00:23	3
Anna	<i>imprevisible</i>	1	0:00:10	3

Maria	<i>imprevisible</i>	2	0:01:30	8
Subaverage			0:00:41	4.67
AGENTES TOXICOS				
Anna	<i>Toxicos</i>	1	0:00:09	3
Maria	<i>Toxico</i>	2	0:00:29	6
Bob	<i>toxic agents</i>	1	0:00:27	5
Subaverage			0:00:22	4.67
PASA POR				
Anna	<i>Pasa</i>	2	0:02:13	6
Laura	<i>pasa por</i>	1	0:00:45	3
Subaverage			0:01:29	4.5
REFORZAR				
Anna	<i>refuerzar</i>	1	0:00:16	5
Daniel	<i>Reforzar</i>	1	0:00:15	3
Subaverage			0:00:16	4
RESISTENCIA				
Maria	<i>resistencia</i>	1	0:00:55	3
Bob	<i>resistence</i>	1	0:00:18	3
Subaverage			0:00:37	3
CONSTITUIR				
Anna	<i>constituir</i>	1	0:00:08	3
Maria	<i>constituir</i>	1	0:00:17	3
AVERAGE			0:00:12	3

Other information needs involving one-stop searches concern most of the lexical items listed in Table 49. These are, in particular, the nouns “cultivo,” “conjunto,” “alcance,” “ganadería,” and “resistencia;” the verbs “reforzar” and “constituir;” and the adjectives “tóxico” and “imprevisible.” The session lengths for these information needs averaged between 12 seconds (for “constituir”) and 48 seconds (for “cultivo”). The individual session lengths, i.e. the time spent by the individual participants, were mostly under one minute. Only three individual searches exceed the one-minute mark. These are Bob’s search for “cultivo” (2 min. 19 sec.), Maria’s search for “imprevisible” (1 min. 30 sec.), and Laura’s search for “ganadería” (1 min. 11 sec.). For Bob and Laura, the above-average session length can be explained by the fact that their searches included the consultation of more than one source of information. In particular, Bob used browse searching to consult Wikipedia and one organization site dealing with environmental issues (such as GMOs), while Laura consulted the dictionaries WordReference and Dictionary.com using direct searching and one navigational query, respectively.¹⁸⁰

¹⁸⁰ Along with Daniel’s navigational query performed to yield the WordReference site, Laura’s navigational query for Dicitonary.com represents the only other example of that type of query found in the participants’ search processes for the first embedding task.

Maria's search, in contrast, did not involve multiple sources of information. Rather, it showed iteration, i.e. repeat visits to the same source of information (or Website). In particular, she conducted two separate search sessions in WordReference, looking for terms in both language directions.¹⁸¹

The information presented in this and the following sections suggests that the student participants' range of search behavior for the lexical items listed above was very limited as well as "loyal" and "sticky" (see below). It was limited because these participants (including Daniel) only visited one Website (as opposed to multiple Websites) per search need, and loyal because they always resorted to the same Website (i.e. WordReference, except for Martha, who used RAE instead). For Nicholas et al., the number of repeat visits or the

number of times someone returns to a Website is ... a key metric, and tells us something about Website loyalty and satisfaction. Coming back to a Website constitutes a conscious and directed use. The industry calls it 'Website stickiness,' and everyone wants their Website to be 'sticky' (2006: 215).

At first site, a repeat and limited range of search behavior may seem somewhat unsuccessful. As Nicholas et al. remark, "[t]he greater the number of Websites visited the greater the likelihood of a positive ... outcome" (2006: 219). This is mainly due to Websites not presenting information in the same way and with the same level of detail; hence, the value of visiting multiple sites for triangulation purposes. Yet, "the frequency at which people return to a Website is related to the nature and purpose of the Website" (ibid.). In my view, it is also related to the nature and purpose of the information sought. Although, in some cases, resorting to WordReference in this study led to unsuccessful or partially successful outcomes (most notably regarding the identification of the correct meaning for certain polysemous words), it also led to successful search outcomes in other cases (mainly concerning definitions and selected equivalents; see 7.1.4.2 for more details). Furthermore, most of the searches concerning the above-mentioned lexical items were unreported, which, as indicated previously, suggests that said items involved somewhat unproblematic processing as well as searches conducted for checking and/or reassurance purposes.

¹⁸¹ Similarly, Maria looked up the adjective "tóxico" in WordReference twice (i.e. in two separate sessions), i.e. she carried out both a repeat search and a repeat query.

In contrast to the lexical items and the collocation mentioned above, the search sessions for the remaining common information needs averaged between 1 min. 16 sec. (for “supone incremento”) and 4 min. 24 sec. (for “guía roja y verde”). With respect to the individual search session lengths, Table 49 shows that in general the participants spent at least one minute mark researching the Spanish title of the GE free food guide (i.e. “guía roja y verde”), the acronym “OMG,” and the multi-word expression “malas hierbas.” This is particularly true in the case of “guía roja y verde,” for which Anna spent the longest time (8 min. 15 sec.), carrying out multiple search sessions (2). She is followed by Bob, who also conducted two search sessions but spent slightly above six minutes, and Martha (3 min. 34 sec.), Maria (2 min. 54 sec.), and Laura (1 min. 10 sec.), who conducted single search sessions.¹⁸² With regard to the acronym “OMG,” only Anna did not exceed the one-minute mark (she nevertheless spent 58 seconds researching this item). This could be explained by the fact that she had spent almost five minutes researching the term “transgénico,” which may have provided her with sufficient information regarding the topic dealt with in the source text. The reversed trend may apply to the remaining participants, who spent more time researching the acronym “OMG” than the term “transgénico.” Bob, in contrast to the student participants, researched both terms together, thus spending a total of eight and half minutes searching for background information on the Web. Although he reported both search needs in separate Web search tasks with different information goals, Bob constructed search engine queries that combined both terms in the same query. Hence, in his case it was impossible to distinguish which searches specifically belonged to which information need and/or goal. Both search needs were therefore considered part of the same search session, which was counted only once under OMG (see 7.1.3.3 for more details on the differences in Bob’s searching style as compared to that of the other participants).

Finally, concerning the expression “malas hierbas,” the four participants who researched this search need spent more than one minute, except for Laura, who spent approximately half a minute. This can be explained, once again, by the fact that Laura only visited one Website (retrieved by Google), while the other participants visited

¹⁸² Whereas the multiple sessions conducted by Anna and Maria to research selected lexical items seem to be associated with issues of reassurance, multiple sessions conducted by Anna and Bob in relation to items involving thematic searches seem to be connected with their degree of search success for finding satisfactory answers.

multiple Websites (using direct searching and a search engine query in the case of Maria, browsing in the case of Anna, and search engine queries in the case of Bob). It should also be pointed out that for the expression “supone incremento,” the reverse trend can be observed, i.e. the participants who researched this need spent less than a minute, except for Martha, who spent above three minutes searching for relevant information in Google. In contrast, Anna and Maria searched this expression in WordReference by looking at its individual components separately (which resulted in these participants carrying out two sessions, respectively), while Daniel ‘wordreferenced’ the polysemous verb “suponer” only.

As I will show in the following sections, most of the individual search sessions that exceed one minute (such as the ones mentioned above) correlate with a wider range of search behavior, i.e. with visits to multiple websites as opposed to visits to one Website only (i.e. what I referred to above as one-stop searches).

7.1.3.2 Direct Address Searches

An analysis of the participants’ direct address searches throughout their entire search processes (as opposed to only their initial search actions) shows that this type of search is still associated with the use of reference works only, except for those searches that involved typing the address of Google.com or any of its regional variants (these searches will be treated separately as part of the participants’ search engine queries discussed in 7.1.3.3). As Table 50 shows, WordReference (WR) accounts for 91% of the all searches conducted in reference works for Task 1, followed by RAE (9%). The only exceptions to these sources of information are Dictionary.com and Wikipedia.org, which, as indicated previously, were consulted by Laura to look up the term “ganadería” and Bob to check the English spelling of resistance, respectively. These consultations, however, were not performed via direct address searching and are therefore not included in Table 50.

The analysis of all direct address searches also shows that the student participants, including Daniel, used the two types of dictionaries mentioned above (i.e. WordReference and RAE) only in the initial stages of their search processes. The only exceptions to this pattern concern the repeat searches (carried out in separate search sessions) that Anna and Maria conducted for some of their search needs. These include, as noted earlier, Anna’s repeat searches for “pasa por” and “supone incremento” as well

as Maria’s repeat searches for the latter expression, the collocation “*armas predilectas*,” and the terms “*cultivo*,” “*imprevisible*,” and “*tóxico*.” In addition, Maria searched for “*guía roja y verde*” twice in WordReference as part of the same search session, first by looking up the color red and then the entire expression (as further discussed below, between these two search actions Maria performed two search engine queries).

Table 50. Reference Works per Common Information Need and Participant (Task 1)

Common Need		RAE	WR	TOTAL
ARMAS PREDILECTAS				
Martha	<i>armas predilectas</i>	1	0	1
Anna	<i>Predilectas</i>	0	1	1
Maria	<i>predilecto/arma</i>	0	2	2
Laura	<i>Predilectas</i>	0	1	1
Daniel	<i>predilecta</i>	0	1	1
Bob	<i>armas predilectas</i>	0	0	0
TRANSGENICOS				
Martha	<i>Transgénico</i>	1	0	1
Anna	<i>transgenicos as genetically- engineered or genetically- modified</i>	0	1	1
Maria	<i>Transgenico</i>	0	1	1
Laura	<i>Transgenicos</i>	0	1	1
Bob	<i>OMG + transgenicos</i>	0	0	0
OMG				
Martha	<i>OMG</i>	1	0	2
Anna	<i>OMG as the abbreviation of GMO in Spanish</i>	0	1	1
Maria	<i>OMG</i>	0	1	1
Laura	<i>OMG</i>	0	1	1
Bob	<i>OMG + transgenicos</i>	0	0	0
GUIA ROJA Y VERDE				
Martha	<i>Guia roja y verde</i>	0	0	0
Anna	<i>guia roja y verde</i>	0	1	1
Maria	<i>guia roja y verde</i>	0	2	2
Laura	<i>roja y verde</i>	0	1	1
CULTIVO				
Anna	<i>Cultivo</i>	0	1	1
Maria	<i>Cultivo</i>	0	2	2
Laura	<i>Cultivo</i>	0	1	1
Bob	<i>Cultivo</i>	0	0	0
CONJUNTO				
Martha	<i>Conjunto</i>	1	0	1
Anna	<i>Conjunto</i>	0	1	1
Maria	<i>Conjunto</i>	0	1	1
Laura	<i>Conjunto</i>	0	1	1
ALCANCE				
Anna	<i>Alcance</i>	0	1	1

Maria	<i>Alcance</i>	0	1	1
Laura	<i>Alcance</i>	0	1	1
Daniel	<i>Alcance</i>	0	1	1
GANADERIA				
Anna	<i>Ganaderia</i>	0	1	1
Maria	<i>Ganaderia</i>	0	1	1
Laura	<i>Ganaderia</i>	0	1	2
Daniel	<i>Ganadería</i>	0	1	1
MALAS HIERBAS				
Anna	<i>desarrollo de resistencias en insectos y ‘malas hierbas’</i>	0	0	0
Maria	<i>“malas hierbas”</i>	0	1	1
Laura	<i>“malas hierbas”</i>	0	0	0
Bob	<i>malas hierbas</i>	0	0	0
SUPONE INCREMENTO				
Martha	<i>supone incremento</i>	0	0	0
Anna	<i>suponer/ incremento</i>	0	2	2
Daniel	<i>Suponer</i>	0	0	0
Maria	<i>implies/increment</i>	0	2	2
IMPREVISIBLE				
Martha	<i>Imprevisibles</i>	1	0	1
Anna	<i>Imprevisible</i>	0	1	1
Maria	<i>Imprevisible</i>	0	2	2
AGENTES TOXICOS				
Anna	<i>Toxicos</i>	0	1	1
Maria	<i>Toxico</i>	0	2	2
Bob	<i>toxic agents</i>	0	0	0
PASA POR				
Anna	<i>pasa</i>	0	2	2
Laura	<i>pasa por</i>	0	1	1
REFORZAR				
Anna	<i>Reforzar</i>	0	1	1
Daniel	<i>Refuerzan</i>	0	1	1
RESISTENCIA				
Maria	<i>Resistencia</i>	0	1	1
Bob	<i>Resistance</i>	0	0	1
CONSTITUIR				
Anna	<i>Consituir</i>	0	1	1
Maria	<i>Constituir</i>	0	1	1
TOTAL		5	49	54
%		9%	91%	100%

Finally, the screen recordings for the first embedding task show that the use of WordReference (or RAE in Martha’s case) was not only Daniel’s and the student participants’ first port of call in 74.6% of all their instances of common information needs (cf. Table 47), but also the last one regarding all the lexical items mentioned in the previous section, i.e. the terms “cultivo,” “conjunto,” “alcance,” “ganadería,”

“resistencia,” “pasar por,” “reforzar” “constituir,” “tóxico,” and “imprevisible,” for which these participants conducted one-stop searches only.¹⁸³ The remaining types of common information needs were further researched via search engine queries by at least one participant. These search needs and their respective queries are the object of discussion in the following section.

7.1.3.3 Search Engine Queries

Having discussed patterns of direct address searches, I will, in the following, examine the participants’ use of search engines,¹⁸⁴ i.e. I aim at analyzing their search behaviors at the level of the query. According to Jansen and Pooch, at the level of the query—typically referred to as the string of characters entered in a search engine or any given Web IR system—the researcher should be looking at analyzing the *query length*, *query complexity*, and *failure rate* (2001: 244). The query length is usually determined by the number of string characters or terms entered in the IR system. The notion of query complexity refers to the search or query syntax, i.e. to the use of advanced search options, operators and/or term modifiers entered by the user. Failure rate “is defined as deviation from the published rules of the IR system,” or, in other words, the number of queries that are formatted or expressed incorrectly (ibid.).

I will be employing the first two metrics mentioned above, i.e. query complexity (simple vs. advanced queries) and query length (here determined by the number of terms in a query, excluding articles, prepositions, and punctuation; cf. 6.1.5.2). I will not discuss the participants’ failure rate as there was only one case of deviation from Google’s published search engine rules found in the first embedding task (see 7.1.3.3 for details).¹⁸⁵ Furthermore, although typos and misspellings frequently occurred in the queries formulated by all six participants, these mistakes are excluded from the data analysis.

¹⁸³ This also applies to the student participants’ individual information needs, which involved one-stop searches conducted in WordReference only (this applies to Anna, Maria, and Laura). In contrast, Bob researched his two individual information needs (the word combinations “to free/liberate gases” and “genetic contamination/pollution”) using search engine queries and direct address searches, as well as several other sources of information. More specifically, he combined search engine queries with consultations in the English dictionary Merriam Webster for the first search need, and search engine queries with consultations in Wikipedia for the second search need.

¹⁸⁴ It should be noted that Google is the only search engine used by the participants to perform all their queries for the first embedding task.

¹⁸⁵ Cases of failure are nevertheless found in relation to the dictionary use by the student participants (except for Martha), who sometimes entered plural and/or feminine forms of nouns as well as conjugated forms of verbs.

In addition to query complexity and length, I will look at the notion of query type. Here, the two main types are initial queries and subsequent queries, with the latter being further classified into modified queries, repeat queries, and unique queries. As Jansen and Pooch explain, the first query in a session is known as the *initial query*; subsequent queries that are identical to other queries in the session are referred to as *repeat queries*; subsequent queries that are different from previous queries in the session are called *modified queries*; and queries that differ from any other queries in the session are known as *unique queries* (ibid.). I will also be giving an overview of the total number of pages accessed by the participants.

Based on the analysis of the above notions, I expect to gain a better understanding of the participants' range and depth of search behaviors, i.e. of the various Websites they visited and their level of engagement with the content accessed. Finally, I will discuss the participants' query (re-)formulation patterns, which will allow for an overview of their query construction and query modification behaviors from the perspective of query effectiveness.

Query Complexity

With regard to query complexity, Table 51 shows the seven common information needs for which at least one search engine query was performed. As we can see, the majority of the 41 searches were advanced queries (78.05%). At first glance, this comes as a surprise considering that, as shown above, the participants' first port of call are dictionaries accessed via direct address, i.e. a rather simple, yet oftentimes effective way of looking for information. One would therefore expect to find more simple searches than advanced searches. What we see here, though, is that simple queries only make up 21.95% of the total number of queries and, of those, two thirds are searches that aim at resolving the acronym OMG. Only Martha and Bob constructed advanced queries (one and four queries, respectively), to search this need.

Having said that, a closer look at the advanced queries shows that more than half of them (59.38%) were carried out by one participant alone, namely Bob. This means that when looking only at the queries carried out by the four translation students, we see that they conducted nine simple queries and 13 advanced queries. Of Bob's 19 advanced queries (he did not perform any simple queries), seven alone concerned the title of the GE free food guide.

Table 51. Query Complexity per Common Information Need and Participant (Task 1)

Common Needs	Simple Queries	Advanced Queries	Total
ARMAS PREDILECTAS			
Martha	0	0	0
Anna	0	0	0
Maria	0	0	0
Laura	0	0	0
Bob	0	3	3
OMG			
Martha	0	1	1
Anna	1	0	1
Maria	3	0	3
Laura	2	2	4
Bob	0	4	4
TRANSGENICOS			
Martha	1	0	1
Anna	0	0	0
Maria	0	0	0
Laura	0	0	0
Bob	0	0	0
GUIA ROJA Y VERDE			
Martha	0	1	1
Anna	0	3	3
Maria	2	2	4
Laura	0	1	1
Bob	0	7	7
MALAS HIERBAS			
Anna	0	0	0
Maria	0	1	1
Laura	0	1	1
Bob	0	3	3
SUPONE INCREMENTO			
Martha	0	1	1
Anna	0	0	0
Maria	0	0	0
AGENTES TOXICOS			
Anna	0	0	0
Maria	0	0	0
Bob	0	2	2
TOTAL	9	32	41
%	21.95%	78.05%	100%

As we can further see in Table 51, this common information need (i.e. the title of the GE free food guide) also generated a high number of advanced queries among the student participants. In particular, there were seven advanced queries for this need, which represent more than half of the students' total number of 13 advanced queries. In contrast to Bob and the students, and as mentioned earlier, Daniel did not carry out any

search engine queries at all, except for one navigational query aimed at yielding the WordReference site. He is consequently excluded from the analysis of the participants' query behaviors.

Table 51 also shows that concerning the word combinations “*armas predilectas*” and “*supone incremento*,” for which one would expect to see queries aimed at retrieving contextual information and/or checking tentative translation solutions, only two participants (Bob and Martha) performed search queries. More precisely, Bob carried out three advanced queries to research “*armas predilectas*” (the other word combination did not pose a problem for him), while Martha conducted one advanced query to research “*supone incremento*.” She did not carry out any queries for “*armas predilectas*,” presumably for the same reason than that of the other student participants and Daniel, who seemed to find satisfactory answers in the dictionaries they used (i.e. WordReference and RAE).

In addition, concerning the word combination “*agentes tóxicos*” only Bob queried this need with two advanced searches aimed at checking the frequency of usage of his own tentative solutions, i.e. “*toxic agents*” and “*toxic elements*” (as briefly indicated above, Bob also conducted frequency checks regarding his two individual information needs, i.e. the word combinations “*to free/liberate gases*” and “*genetic contamination/pollution*”).

Information on transgenic organisms (i.e. “*transgénicos*”) was only queried by Martha,¹⁸⁶ who conducted a simple query to verify the meaning of the term in English and to check whether said term is a synonym of genetically-modified food. As further discussed in the Search Outcomes section (see 7.1.4), Martha's lack of additional research led her to believe that both terms had the same meaning and could thus be used interchangeably (this applies to the rest of the student participants as well as Daniel). Bob's combined search for OMG and transgenic organisms, on the contrary, allowed him to find out that these terms do indeed not have the same meaning and that the latter is a variety of the former—a distinction that is not clearly made in the original source text.

Finally, with regard to “*malas hierbas*,” all the participants who shared this need performed at least one advanced query, except for Anna, who used browse searching to

¹⁸⁶ Anna also researched this need but did so via browse searching (see 7.1.3.4 for details).

research this item. It should also be noted that some of the participants conducted a number of queries using the internal search engines of specialized Websites. These queries, here referred to as “site queries,” are treated separately from the search engine queries (performed in Google) due to the different nature of the sites as well as their less frequent occurrence among the participants’ online search actions. Anna and Bob are the only two participants who conducted site queries, which concern the acronym OMG and the title of the GE free food guide. More specifically, Anna carried out a simple site query for the English acronym in Wikipedia,¹⁸⁷ while Bob queried (also via a simple search) the English acronym on Greenpeace.org. With regard to the title of the GE free food guide, both participants researched this need on Greenpeace-sponsored sites, with Anna conducting a simple query for “guía roja y verde” in Greenpeace Spain and Bob performing one simple and two advanced queries for several of his own translation variants in Greenpeace.org.¹⁸⁸

Query Length

With regard to the lengths of the simple and advanced queries, Tables 52 and 53 give an overview of the total number of terms per query, the total number of queries and query terms, and the average number of terms per query. Concerning the simple queries—and taking into consideration that only three information needs were queried using simple searches—there were a total of nine searches, all carried out by the student participants. Of these nine, five alone were Maria’s. Six of the nine searches concern the information need OMG. The number of query terms used per search varies from one (Anna’s search for OMG) to four (as in the case of Maria’s searches for OMG and “guía roja y verde”). Overall, the searches averaged 2.44 query terms per search. Of course, the above-mentioned long searches carried out by Maria had an impact on this average. Nevertheless, the average length of the simple queries in this study is in line with findings obtained in other Web searching studies focusing on regular search engine users (cf. 6.1.5.2).

¹⁸⁷ Searches conducted in reference works accessed via search engine queries are analyzed in relation to the participants’ query behaviors and not their direct address search behaviors.

¹⁸⁸ These site queries were conducted either on Websites that were immediately retrieved via search engines or on Websites that were later re-accessed for additional or new research in the form of browse searching (see 7.1.3.3 and 7.1.3.4 for more details).

Table 52. Simple Query Length per Common Information Need and Participant (Task 1)

Common Needs	No. of Terms per Query						Total No. of Queries	Total No. of Terms	Average No. of Terms per Query
	1	2	3	4	5	6			
OMG									
Martha	0	0	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	1	1	1
Maria	0	1	1	1	0	0	3	9	3
Laura	2	0	0	0	0	0	2	2	1
Bob	0	0	0	0	0	0	0	0	0
Subtotal	1	3	1	0	1	0	6	15	2.5
TRANSGENICOS									
Martha	0	0	1	0	0	0	1	3	3
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	0
Laura	0	0	0	0	0	0	0	0	0
Bob	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	3	3
GUIA ROJA Y VERDE									
Martha	0	0	0	0	0	0	0	0	0
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	1	1	0	0	2	7	3.5
Laura	0	0	0	0	0	0	0	0	0
Bob	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	1	1	0	2	9	3.5
TOTAL	3	1	3	2	0	0	9	22	2.44

Like that of the simple queries, the length of the advanced queries was also measured by the number of individual terms in a query (and also excluding articles, prepositions, and punctuation).¹⁸⁹ As discussed in 6.1.5.2, phrase searches were counted as one term only, independently of any multi-word expressions they may have contained. Taking this information into account, the high number of advanced queries with only one search term (19) is not surprising. Of the total 32 advanced queries (which cover six information needs), none exceeds three terms in length. In addition to the 19 one-term queries, there are ten searches with two query terms and three searches with three query terms. The latter were all carried out by Bob. In fact, Bob's combination of phrase searches and additional single terms generally resulted in a longer length. This is also reflected in the fact that two thirds of all query terms (i.e. 32 out of 48) used in advanced queries were employed in searches carried out by Bob alone. Taking a closer

¹⁸⁹ The length of the advanced queries also excludes search operators and modifiers, which are discussed separately in 7.1.3.3 along with the participants' query modification behaviors.

look at the overall number of searches, we see that 19 of the total 32 advanced queries were carried out by Bob. The remaining 13 are distributed rather evenly among the four student participants, with Laura carrying out four searches, and Anna, Martha, and Maria each carrying out three searches.

Table 53. Advanced Query Length per Common Information Need and Participant (Task 1)

Common Needs	No. of Terms per Search						Total No. of Searches	Total No. of Terms	Average No. of Terms per Search
	1	2	3	4	5	6			
ARMAS PREDILECTAS									
Martha	0	0	0	0	0	0	0	0	0
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	0
Laura	0	0	0	0	0	0	0	0	0
Bob	1	2	0	0	0	0	3	5	1.67
Subtotal	1	2	0	0	0	0	3	5	1.67
OMG									
Martha	1	0	0	0	0	0	1	1	1
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	0
Laura	2	0	0	0	0	0	2	2	1
Bob	2	1	1	0	0	0	4	7	1.75
Subtotal	5	1	1	0	0	0	7	10	1.43
GUIA ROJA Y VERDE									
Martha	0	1	0	0	0	0	1	2	2
Anna	3	0	0	0	0	0	3	3	1
Maria	1	1	0	0	0	0	2	3	1.5
Laura	1	0	0	0	0	0	1	1	1
Bob	2	3	2	0	0	0	7	14	2
Subtotal	7	5	2	0	0	0	14	23	1.64
MALAS HIERBAS									
Anna	0	0	0	0	0	0	0	0	0
Maria	1	0	0	0	0	0	1	1	1
Laura	1	0	0	0	0	0	1	1	1
Bob	2	1	0	0	0	0	3	4	1.3
Subtotal	4	1	0	0	0	0	5	6	1.2
SUPONE INCREMENTO									
Martha	0	1	0	0	0	0	1	2	2
Anna	0	0	0	0	0	0	0	0	0
Daniel	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	0
Subtotal	0	1	0	0	0	0	1	2	2
AGENTES TOXICOS									
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	0
Bob	2	0	0	0	0	0	2	2	1
Subtotal	2	0	0	0	0	0	2	2	1
TOTAL	19	10	3	0	0	0	32	48	1.50

As with the simple queries, the thematic search needs OMG and “guía roja y verde” led to the highest number of advanced queries (seven and 14, respectively). The average number of search terms per query is 1.5, i.e. half the average of the simple query length. Again, this length is influenced by the decision to count phrase searches as one-term queries.

Query Types

With regard to query type, Table 54 shows that the six common information needs, which led to a total of 41 search engine queries, were initially queried 17 times. Of these 17 initial queries, seven were one-time searches that did not involve any subsequent queries. Of these seven one-time queries, four belong to Martha alone. She only carried out one query each for the thematic items “transgénicos,” “OMG,” and “guía roja y verde,” as well as for the word combination “supone incremento.” Furthermore, Martha did not conduct any subsequent queries for any of her search needs. Similarly, Anna only conducted one query for OMG (yet, as indicated above, she further researched this item via browse searching), while Maria and Laura carried out one single query each for “malas hierbas.”

Furthermore, with the exception of Martha, who conducted the one-time searches mentioned above, the student participants did not query four of the six common information needs listed in Table 51. These are “armas predilectas”, “transgénicos,” “supone incremento,” and “agentes tóxicos.” This suggests that the students’ range of search behaviors for these and the above-mentioned common information needs is, like with the lexical items discussed earlier, very limited. In other words, their search behavior involved little or no research conducted via search engine queries. Instead, it involved mostly fast and easy access to WordReference only. This, in turn, suggests that the student participants’ as well as Daniel’s depth of search behavior for Task 1 was generally “shallow,” as no significant content was consumed (see below for more details). This is line with Nicholas et al.’s claim that

[d]igital information consumers are generally characterized by their shallow searching. ... Website penetration is the metric we use to determine this and it represents the number of items viewed during a search session. It provides an indication of how involved or engaged people get with Websites or digital services. The metric typically shows that visits are characteristically brief, to-the-point, and possibly cursory (2006: 210).

Table 54. Query Type per Common Information Need and Participant (Task 1)

Common Needs	Initial Queries	Modified Queries	Repeat Queries	Total
ARMAS PREDILECTAS				
Martha	0	0	0	0
Anna	0	0	0	0
Maria	0	0	0	0
Laura	0	0	0	0
Daniel	0	0	0	0
Bob	1	2	0	3
OMG				
Martha	1	0	0	1
Anna	1	0	0	1
Maria	1	2	0	3
Laura	1	3	0	4
Bob	1	3	0	4
TRANSGENICOS				
Martha	1	0	0	1
Anna	0	0	0	0
Maria	0	0	0	0
Laura	0	0	0	0
Bob	0	0	0	0
GUIA ROJA Y VERDE				
Martha	1	0	0	1
Anna	1	1	1	3
Maria	1	3	0	4
Laura	1	0	0	1
Bob	1	6	0	7
MALAS HIERBAS				
Anna	0	0	0	0
Maria	1	0	0	1
Laura	1	0	0	1
Bob	1	2	0	3
SUPONE INCREMENTO				
Martha	1	0	0	1
Anna	0	0	0	0
Maria	0	0	0	0
AGENTES TOXICOS				
Anna	0	0	0	0
Maria	0	0	0	0
Bob	1	1	0	2
TOTAL	17	23	1	41
%	41.46%	56.16%	2.44%	100

If we look at the remaining ten initial queries that led to a total of 24 subsequent queries—of which 23 are modified, unique queries, and only one is a repeat query (conducted by Anna regarding the GE free food guide)—we can see that 14 of the total 23 modified queries were performed by Bob alone, with the remaining nine queries

distributed among Maria (5), Laura (3), and Anna (1). That is, from a query modification point of view, Bob's depth of search behavior was deeper than that of the student participants and Daniel. The only exception is Anna, who, as further shown below, favored browse searches as opposed to search engine queries as her preferred approach to information seeking (see 7.1.3.4 for details), which resulted in a deeper search behavior than that of her classmates.¹⁹⁰

Of Bob's 14 subsequent queries, almost half of them (i.e. six) were carried out to seek information on the GE free food guide alone, three to conduct background research on GMOs and transgenic organisms, and five to obtain language usage information and/or confirm his tentative translation solutions regarding the expressions "armas predilectas" (2), "malas hierbas" (2), and "agentes tóxicos" (1). The fact that Bob conducted nine out of his 14 subsequent queries to research the afore-mentioned thematic needs shows that, unlike most of the student participants, who primarily sought linguistic information (except for Anna, who also conducted some background research), Bob concentrated mainly on searches aimed at acquiring knowledge on the topic dealt with in the source text. That is, Bob's high number of subsequent queries points to a deep and wide range of search behavior that mainly revolved around the search for background information.

Total Number of Pages Accessed

As discussed earlier, the continuum of depth and range of search behavior may not only be determined by the number of initial vs. subsequent queries (or the number of 'no queries') but also by the number of Web pages viewed during a search session. Table 55 provides an overview of the total number of queries performed and pages accessed by the participants to address their search needs via search engine queries (i.e. Table 55 excludes Web pages accessed via direct address searching as well as pages re-accessed for browse searching; see 7.1.3.4 for details on the latter). Table 55 thus illustrates a general information-search model, according to which a user carries out an initial query, examines the search result page(s), and decides whether to click on one or more result links and/or modify the initial query to obtain a different set of results. This general information-search model was expanded to accommodate the participants' range of

¹⁹⁰ As indicated previously, the amount of browse searching conducted via site queries (performed in Websites' internal search engines) as well as the internal and external links accessed provide an indication of the participants' depth of search behavior (along with the amount and type of query modifications as well as the overall time spent interacting with content).

search actions by taking into account (a) the site queries they conducted in the internal site engines of various Websites; (b) the internal links they clicked on to access within-site pages; and (c) the external links they clicked on to access pages in other related Websites.

Table 55. Overview of Total Pages Accessed (Task 1)

	Bob	Laura	Maria	Anna	Martha	TOTAL
Total number of queries	19	6	8	4	4	41
Total number of SERPs	14	4	3	1	1	23
Total number of result links	5	2	6	4	4	21
Total number of internal links	0	0	1	12	2	15
Total number of site queries	0	0	0	1	0	1
Total number of external links	0	0	0	0	0	0
Total number of pages accessed	19	6	10	18	7	60

Overall, Table 55 shows the participants' total number of queries (initial and/or subsequent); the total number of SERPs (search result pages) that were viewed but where no result links were clicked on (which in turn led to query reformulation, the end of the search, or a new search); the total number of result links, or Websites, that the participants decided to visit; the total number of site queries and internal links that the participants decided to perform and click on to access pages within Websites; and the total number of external links that the participants decided to follow in order to access/view pages in other related Websites.

In line with the data provided in previous tables, Table 55 shows that Bob conducted almost five times as many search engine queries as Anna and Martha, approximately three times as many queries as Laura, and above twice as many queries as Maria. More specifically, Bob's 19 search engine queries, which covered five of the seven common information needs that were queried by at least one participant, led him to visit five different Websites and view a total of 19 pages, i.e. on average he conducted 3.8 queries, visited one Website, and viewed 3.8 pages per search need. Anna conducted four queries, visited four Websites, and accessed a total of 18 pages to research two common information needs only. On average, she performed two queries, visited two Websites, and accessed nine pages per search need. Like Anna, Martha carried out a total of four search engine queries and visited four different Websites. Unlike Anna, however, she did so to research four common information needs (as opposed to two) for which she viewed a total of seven pages (compared to 18), i.e. on average she carried out one query, visited one Website, and accessed 1.7 pages per search need. Maria carried out

double the amount of Anna's and Martha's search engine queries, i.e. eight queries to research three common information needs for which she visited six different Websites and accessed a total of ten pages. This represents an average of 2.6 queries, 1.3 Websites, and 3.3 pages per search need. Finally, Laura had a total of six search engine queries, visited two different Websites, and accessed six pages to research three common information needs, i.e. an average of two queries, 0.6 Websites, and one page per search need.

These results show that, from the point of view of the average number of Websites visited per common information need queried, the range of search behavior in the case of Laura and Martha—i.e. the two native speakers of English who conducted at least one search engine query—is the most limited one of all participants (including Daniel, i.e. the third native speaker of English, who did not conduct any queries at all and viewed no Websites other than WordReference.com, most likely as a result of his self-declared high level of domain knowledge).¹⁹¹ They are followed by Maria, Bob, and Anna. The fact that from the perspective of visited Websites Anna's range of search behavior is wider than that of Bob comes as a surprise considering that Bob conducted far more queries than Anna. A closer look at their searching styles, however, suggests that Bob's range of search behavior could perhaps be taken to be wider than that of Anna. As we can see in Table 55, Bob examined a high number of search result pages (a total of 14) and, although he did not click on any result links, he pre-scanned a significant amount of Websites. Not clicking on any result links thus means that Bob was highly engaged in query reformulation (as well as in the construction of new queries), which, in turn, contributes to characterizing Bob by his deep searching style.

The same can be said for Anna, who favored browse searching as opposed to search engine queries. As mentioned earlier, the number of site queries performed along with the number of internal and external links accessed is taken here to provide an indication of a user's amount of browse searching, which, in turn (along with the overall time spent interacting with content), shows their depth of research. Anna, for example, performed one site query and followed a relatively high number (12) of internal links. Yet, as Table 56 shows, the number of queries, visited Websites, and browse searches

¹⁹¹ As White, Matteson, and Abels point out, “[i]n a person's zone of familiarity, he is likely to rely on internal knowledge and sources immediately accessible to him (local databases and other sources). The number of sources may be fewer ... because he can more readily identify where the information can be found” (2008: 594).

(i.e. via site queries and/or internal links) were mostly associated with one search need only, i.e. “guía roja y verde” and, to a much lesser extent, with the acronym OMG (i.e. the second search need that she decided to query).

Table 56. Distribution of Pages Accessed per Participant and Common Information Need (Task1)

Common Needs	Bob	Laura	Maria	Anna	Martha
ARMAS PREDILECTAS					
Total queries	3	0	0	0	0
Total SERPs	3	0	0	0	0
Total result links	0	0	0	0	0
Total internal links	0	0	0	0	0
Total external links	0	0	0	0	0
Total pages accessed	3	0	0	0	0
OMG					
Total queries	4	4	3	1	1
Total SERPs	1	4	0	0	1
Total result links	3	0	3	1	0
Total internal links	0	0	1	1	0
Total site queries	0	0	0	1	0
Total external links	0	0	0	0	0
Total pages accessed	4	4	4	3	1
TRANSGENICOS					
Total queries	0	0	0	0	1
Total SERPs	0	0	0	0	0
Total result links	0	0	0	0	1
Total internal links	0	0	0	0	0
Total external links	0	0	0	0	0
Total pages accessed	0	0	0	0	1
GUIA ROJA Y VERDE					
Total queries	7	1	4	3	1
Total SERPs	6	0	3	1	0
Total result links	1	1	1	3	1
Total internal links	0	0	0	11	2
Total external links	0	0	0	0	0
Total pages accessed	7	1	4	15	3
MALAS HIERBAS					
Total queries	3	1	1	0	0
Total SERPs	2	0	0	0	0
Total result links	1	1	2	0	0
Total internal links	0	0	0	0	0
Total external links	0	0	0	0	0
Total pages accessed	3	1	2	0	0
SUPONE INCREMENTO					
Total queries	0	0	0	0	1
Total SERPs	0	0	0	0	0
Total result links	0	0	0	0	2
Total internal links	0	0	0	0	0
Total external links	0	0	0	0	0
Total pages accessed	0	0	0	0	2
AGENTES TOXICOS					
Total queries	2	0	0	0	0
Total SERPs	2	0	0	0	0
Total result links	0	0	0	0	0
Total internal links	0	0	0	0	0
Total external links	0	0	0	0	0
Total pages accessed	2	0	0	0	0
TOTAL PAGES	19	6	10	18	7

Bob, in contrast, shows a more balanced depth of search behavior concerning all five common search needs that he queried in Google. While he accessed a total of seven pages for “guía roja y verde,” he viewed four pages for his combined search on GMOs and transgenic organisms, three for “armas predilectas” and “malas hierbas,” respectively, and two for “agentes tóxicos.” Similarly, Maria accessed the same number of pages (four) to research “guía roja y verde” and OMG (and two pages for “malas hierbas”), while Laura also viewed four pages for the latter but only one for the former (and one for “malas hierbas”). Martha, finally, viewed more pages for “guía roja y verde” (three) than for “supone incremento” (two), “transgénicos” (one), and OMG (one).

Query Construction, Query Modification, and Overall Query Effectiveness

Table 57 provides an overview of the participants’ actions and overall effectiveness in constructing and modifying their initial queries. More specifically, it shows each single query typed in Google (simply referred to as “query”) as well as the site queries (referred to as “site query”) typed in the internal search engines of the various Websites used, in particular WordReference.com (referred to as “WR”), Wikipedia.org (“WK”), and Greenpeace-sponsored sites (“GP”). The analysis of both search engine queries and site queries allows for a more detailed, chronological view of the participants’ query paths.

Table 57. Initial and Modified Queries per Common Information Need and Participant (Task 1)

	Initial Queries	Modified Queries			
ARMAS PREDILECTAS					
Bob	Type query: “armas predilectas”	Modify query: “armas predilectas” diccionario	Modify query: “armas predilectas” weapons		
OMG					
Martha	Click site link: Advanced Search	Type query: OMG			
Anna	Type site query (WR): OMG	Type query: OMG	Type site query (WK): GMO		
Maria	Type site query (WR): OMG	Type query: what is OMG	Modify query: que significa OMG en ingles	Modify query: OMG es	
Laura	Type site query (WR): OMG	Type query: los omg	Modify query: “los omg”	Modify query: un omg	Modify query: “un omg”

Bob	Type query: OMG site:es	Modify query: OMG transgenicos site:es	Modify query: “Genetically Modified Organism”	Modify query: “Genetically Modified food”	Type site query (GP): GMO	
TRANSGENICOS						
Martha	Type URL: rae.es/transgenicos	Type query: genetically modified food				
GUARAOIAY VERDE						
Martha	Type query: guia roja y verde	Click site link: <u>Advanced</u> <u>Search</u>	[Ctrl+V]: Guia roja y verde	Select option: Spanish		
Anna	Type query: “guia roja y verde”	Type site query (WR): roja	Type repeat query: “guia roja y verde”	Type site query (GP): guia roja y verde		
Maria	Type site query (WR): rojo	Type query: guia roja y verde	Modify query: guia roja y verde translate	Type site query (WR): guia roja y verde	Modify query: “guia roja y verde”	Modify query: “guia roja y verde” english
Laura	Type site query (WR): roja y verde	Type query: “roja y verde”		-		
Bob	Type query: “guia roja” site:es	Modify query: “guia roja” “guia verde” site:es	Modify query: “guia roja” “red book”	Modify query: “guia roja” “red book” “green book”	Modify query: “red book” “green book”	Modify query: “green book”
MALAS HIERBAS						
Maria	Type site query (WR): malas hierbas	Type query: “malas hierbas”				
Laura	Type query: “malas hierbas”					
Bob	Type query: “malas hierbes”	Click site link: <u>Advanced</u> <u>Search</u>	Select menu item: English	Click button: Advanced Search	Modify query: “malas hierbas” weed	
SUPONE INCREMENTO						
Martha	Access page: http://www.google.co.nz/advanced_search?hl=en	[Ctrl+V]: supone incremento	Select option: Spanish			
AGENTES TOXICOS						
Bob	Type query: “toxic agents”	Modify query: “toxic elements”	-		-	

As noted earlier, the seven common information needs that were researched via Google were initially queried a total of 17 times. In addition, on seven occasions, the student participants decided to perform site queries in dictionaries before carrying out queries in Google. In particular, Maria first consulted WordReference to look up the acronym OMG, the color red (in “guía roja y verde”), and the term “malas hierbas.” Similarly, Laura looked up OMG and the colors red and green, while Anna only searched for OMG, and Martha only for “transgénicos” (in RAE). Leaving these initial site queries aside and focusing on the initial search engine queries only, it is possible to observe that of the 17 initial queries, six are simple queries and eleven advanced queries. Of the eleven initial advanced queries, five were carried out by Bob alone (who did not have any simple queries at all), with the remaining six initial advanced queries distributed among Martha (two), Laura (two), Anna (one), and Maria (one).

Interestingly, the student participants did not modify any of their initial advanced queries at all. Except for one query formulated by Maria, in which she combined a phrase search with a single term, these initial advanced queries consisted exclusively of phrase searches only. They did not include any query modifiers (such as “define:” or “site:”) or combine more than one phrase search in the same query. Bob, in contrast, frequently combined phrase searches with single terms, additional phrase searches, and/or the “site:” query modifier to further constrain his searches to specific sites. While the student participants did not modify any of their initial *advanced* queries, they modified the initial *simple* queries on three occasions. These refer to Laura’s and Maria’s search for OMG as well as Maria’s search for “guía roja y verde” (see below). The three initial simple queries that were not modified are Martha’s and Anna’s queries for OMG, and Martha’s query for genetically modified food.

With regard to the three initial simple queries that were modified, and as Table 57 shows, Maria only constructed simple queries for OMG by formulating natural language questions (e.g. “what is OMG” or “que significa OMG en ingles”), switching between and/or combining both English and Spanish in the same query, and using the language identifier “es” (yet, without the “site:” modifier) in an attempt to constrain her searches to Spanish sites only (this represents the only case of failure, i.e. of deviation from the published rules of the search engine being used). Laura switched back and forth between simple queries and single phrase searches that combined the singular form of the acronym OMG with either the indefinite article (singular) or the definite

article (plural) in Spanish. Finally, concerning the GE free food guide, Maria transformed her initial simple query “guía roja y verde” into another simple query by adding a single term (“translate”), yet without specifying any particular language. Later, she nevertheless deleted the term (“translate”) and transformed her initial simple query into a single phrase search, which she then modified by adding a different query term (“English”).

Based on the above results, one may conclude that in most cases the student participants carried out search engine queries only when their dictionary searches failed to provide them with satisfactory answers.¹⁹² Overall, they constructed simple and broad queries. The lack of specification in constructing and modifying their queries suggests that their general query formulation abilities were not very effective for obtaining background information concerning the thematic search needs. Yet, their query statements were oftentimes successful in retrieving equivalents. In fact, the students’ simple query construction patterns and, in Maria’s case, modification patterns as well, show that these participants were mainly interested in retrieving equivalents in a quick and easy fashion.¹⁹³ Their generally short session lengths for the common information needs that they queried at least once—as well as the lexical items that they simply searched in either WordReference or RAE—support the claim that their search behaviors are characterized by shallow searching.¹⁹⁴ Although, as Nicholas et al. point out, this type of searching “might suggest an unsuccessful, uninformed, or lazy form of behavior ..., shallow search behavior probably suggests a horizontal, checking, comparing sort of behavior that is a result of fast and easy access to information, as well as a shortage of time and a huge digital choice” (2006: 210).

¹⁹² In their study of the information behaviors of 19 professional translators, White, Matteson, and Abels (2008: 591) found that these translators “use dictionaries intensely” and that “[w]hen the dictionaries do not provide acceptable answers, [they] move beyond them to different types of resources.”

¹⁹³ In their study of the revision processes and use of resources by a group of professional translators and translation trainees, Massey and Ehrenberger-Dow found that the students who researched a particular term online as part of the translation of an online news service article into their L2 were all “successful and very quick,” except for one student (2010a: 136). While the “successful students used internet search engines and simple string searches ..., the unsuccessful student was the only one who referred to in this case wholly inappropriate online bilingual dictionaries rather than the resources that the other students had accessed” (ibid.).

¹⁹⁴ Anna—at least in some cases—represents an exception to this. As I will discuss below, she conducted deeper searches for some of the thematic information needs.

In contrast, Bob almost never resorted to dictionaries,¹⁹⁵ mainly because he was not in much need of linguistic information, favoring search engine queries instead, which led him to browse search some of the Websites retrieved by Google. He systematically initiated all his searches by typing advanced queries directly in Google's Search box, and then followed result links and/or came back to the main SERPs to modify his advanced search queries until he found the desired information. His query construction and modification patterns suggest that he was mostly interested in acquiring background information on the topic dealt with in the source text. To do so, he combined two specific thematic keywords (OMG and "transgénicos") in the same query, resulting in two search sessions of a combined length of eight minutes and 30 seconds. The second search session on transgenic organisms evolved into a new browse search session for information on "cultivo" (i.e. the growing of crops) that lasted for an additional two minutes and 19 seconds. This sort of searching style is reminiscent of an "interactionistic" approach to information searching, which supposes that IS "is inherently an interactive process between humans and texts" and which emphasizes "the changing nature of information needs during the search process" (Vakkari 1999: 823). Vakkari states that various researchers have contributed to developing this interactionistic approach to information searching. For instance,

Bates (1989, pp. 409-410) describes IR as evolving searches. Every new piece of information the searcher encounters gives him new ideas and directions to follow, and consequently, a new conception of the query. She called this process berrypicking. Belkin (1993) also remarks that if an information seeker's knowledge changes by virtue of engagement with the text, it will be reflected in some change in the anomalous state of knowledge that led to that information seeking. Thus, it is evident that this will lead to a change in the search tactics by the seeker as well as in his criteria of assessing the relevance of the information carried by the texts (ibid.).

Engagement with the texts, or Website content, being explored is also visible in Anna's case. As shown in 7.1.3.1, she spent almost five minutes searching for information on transgenic organisms and slightly over eight minutes researching the title of the GE free food guide. In both cases, browse searching was involved, a type of search that, as further discussed in the following section, Bob also conducted in relation to the same thematic needs.

¹⁹⁵ The only exception to this concerns Bob's search on Merriam-Webster Online (i.e. an English monolingual dictionary) to confirm the meaning of a specific collocation (to free/liberate gases) that he had previously researched in documents retrieved by Google.

7.1.3.4 Browse Searches

In addition to the total pages accessed via search engine queries, Bob and Anna re-accessed some of the Websites they had already visited (as a result of the queries they had previously conducted) to browse for information concerning some of the thematic information needs. As these browse searches represent a different type of search, i.e. one that involves re-accessing information at a later point in time for additional or new research on specific search needs, they are treated separately from the browse searches conducted as a result of pages directly accessed by search engine queries.

Table 58. Overview of Browse Searches (Task 1)

	Bob	Anna	Total
TRANSGENICOS			
Pages re-accessed	0	1	1
Internal links	0	3	3
Site queries	0	0	0
External links	0	0	0
Total pages accessed	0	4	4
OMG			
Pages re-accessed	1	0	1
Internal links	7	0	7
Site queries	1	0	1
External links	0	0	0
Total pages accessed	9	0	9
GUIA ROJA Y VERDE			
Pages re-accessed	1	3	4
Internal links	4	11	15
Site queries	3	1	4
External links	0	0	0
Total pages accessed	8	15	23
MALAS HIERBAS			
Pages re-accessed	0	1	1
Internal links	0	3	3
Site queries	0	0	0
External links	0	0	0
Total pages accessed	0	4	4
CULTIVO			
Pages re-accessed	1	0	1
Internal links	0	0	0
Site queries	0	0	0
External links	2	0	2
Total pages accessed	3	0	3
TOTAL	20	23	43

Table 58 shows the additional browse searches that Bob and Anna conducted for the main thematic search needs. More specifically, they both re-accessed pages within Greenpeace.org to conduct further research on the GE free food guide. Anna, for instance, re-accessed a total of three Greenpeace pages, followed eleven internal links and conducted one site query to further research this need. Bob re-accessed one Greenpeace page, within which he conducted three site queries and followed four internal links. He did the same during the first search session for his combined search on OMG and transgenic organisms, i.e. he re-accessed a Greenpeace page, followed a number of internal links (seven) and performed one site query. During the second session, he re-accessed the Wikipedia entry on transgenic organisms, a search that resulted into a new browse search for “cultivo.” This time he followed two external links.

Anna also conducted research on transgenic organisms by re-accessing another Greenpeace.org page and following three internal links. She did the same for “malas hierbas,” i.e. she re-accessed another Greenpeace.org page, where she followed three internal links. Overall, Bob’s and Anna’s browse searches resulted in successful or highly successful search outcomes that they used for translation problem solving. As further discussed in the following section, Anna’s interactionistic, browse searching style allowed her to find a highly suitable title for the guide on genetically-modified organisms as well as to creatively resolve her syntactic problem regarding the development of resistance in weeds and insects (see more details below), among others. Although Bob did not manage to find a suitable translation for the title of the guide (and, hence, left it untranslated), his searching style, also characterized by an interactionistic approach to information searching, led him to acquire the necessary background information that in turn allowed for the identification of text type conventions as well as phraseological, terminological, and collocation-related information, thus resulting in a highly idiomatic translation.

To sum up, the above-mentioned browse searches also contribute to characterizing Bob’s and Anna’s search behaviors as both deeper and wider than that of the remaining participants. A deep and wide range of search behavior, in turn, seems to be facilitated by an interactionistic approach to information searching. In contrast, a shallow and limited type of search behavior is mostly characterized by a checking, comparing sort of search behavior that primarily involves easy, fast, and more or less cursory visits to a

few selected Websites. This type of search behavior, although perhaps unsuccessful for addressing certain types of search needs (in particular, of a thematic nature), nevertheless allowed the student participants to successfully retrieve equivalents on several occasions.

7.1.4 Search Outcomes

In the following, I will discuss the outcomes of the participants' search processes. Here, I am in particular interested in the solutions that the individual participants adopted for their identified search needs, the rationale for adopting that solution (and not another), and the Web pages that the adopted solutions correspond to. In addition, I will discuss the participants' perceptions of the success (or lack thereof) of their search processes and will contrast that self-assessment with the evaluation of the assessors. Finally, I will analyze the participants' perceptions of their degree of satisfaction with the adopted solutions, comparing this with their perceived degree of difficulty of the respective information needs.

In doing so, I am trying to answer part of the first research question regarding the participants' Web search tasks embedded in translation as well as the second and third research questions of the study. As shown in 5.2, the second question concerns the participants' perceptions of the three selected affective dimensions of Web searching (i.e. success, satisfaction, and difficulty), while the third question relates to the comparison of their perceptions of success for translation problem-solving with those of the translation assessors.

7.1.4.1 Overview of Adopted Solutions, Rationales, and Web Pages

An analysis of the type of Web resources providing the solutions adopted by the study's participants (see Table 59), shows (again) the strong reliance on 'classical' reference works, i.e. dictionaries and encyclopedias. Out of a total of 36 adopted pages, almost half (17) correspond to online dictionaries, namely WordReference and RAE. The encyclopedic pages (7) all refer to Wikipedia. The remaining twelve adopted pages correspond to a wide range of Websites that include search results pages, Greenpeace.org, other organizational Websites, academic and commercial sites, online journals, and online discussion fora.

The two adopted SERPs are all related to Bob's search processes, and seem to indicate that he used the result pages to confirm his preexisting, tentative translation solutions.

The solution rationales provided by Bob (see Table 60) supports this assumption, as he cites “frequency” as the reason for his adopted solutions from SERPs (see “malas hierbas” and “armas predilectas”).

Table 59. Distribution of Adopted Pages per Reported Information Need and Participant (Task 1)¹⁹⁶

Reported Needs	Encyclopedias	Dictionaries	Fora	Greenpeace	SERPs	.ac	.org	Journals	.com
OMG									
Martha	1	0	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	0	0	0
Maria	1	0	0	0	0	0	0	0	0
Bob	1	0	0	0	0	0	0	0	0
MALAS HIERBAS									
Anna	0	0	0	1	0	0	0	0	0
Maria	0	1	0	0	0	0	0	0	0
Laura	0	0	0	0	0	1	0	0	0
Bob	0	0	0	0	1	0	0	0	0
GUIA ROJA Y VERDE									
Martha	0	0	0	1	0	0	0	0	0
Anna	0	0	0	0	0	0	1	0	0
Bob	0	0	0	0	0	0	0	0	0
ALCANCE									
Maria	0	1	0	0	0	0	0	0	0
Laura	0	1	0	0	0	0	0	0	0
Daniel	0	1	0	0	0	0	0	0	0
TRANSGENICOS									
Martha	0	0	0	0	0	0	1	1	0
Anna	1	0	0	0	0	0	0	0	0
Maria		1	0	0	0	0	0	0	0
Bob	1	0	0	0	0	0	0	0	0
CULTIVO									
Laura	0	1	0	0	0	0	0	0	0
Bob	1	0	0	0	0	0	1	0	0
CONJUNTO									
Martha	0	1	0	0	0	0	0	0	0
Laura	0	1	0	0	0	0	0	0	0
SUPONE INCREMENTO									
Martha	0	0	0	0	0	0	0	0	2
Daniel	0	1	0	0	0	0	0	0	0
ARMAS PREDILECTAS									
Martha	0	1	0	0	0	0	0	0	0
Laura	0	1	0	0	0	0	0	0	0
Daniel	0	1	0	0	0	0	0	0	0

¹⁹⁶ The reported information needs include all the common needs as well as two individual needs reported by Maria (“seres vivos”) and Laura (“desnutrición”).

Bob	0	0	0	0	1	0	0	0	0
PASA POR									
Laura	0	1	0	0	0	0	0	0	0
IMPREVISIBLE									
Martha	0	1	0	0	0	0	0	0	0
REFORZAR									
Daniel	0	1	0	0	0	0	0	0	0
GANADERIA									
Daniel	0	1	0	0	0	0	0	0	0
SERES VIVOS									
Maria	0	0	1	0	0	0	0	0	0
DESNUTRICION									
Laura	0	1	0	0	0	0	0	0	0
TOTAL	7	17	1	2	2	1	3	1	2

The quantitative overview of the adopted pages also shows that dictionary sites were the preferred choice of all participants, except for Bob, when it came to solving problems of a general lexical nature, e.g. regarding the Spanish words “alcance,” “conjunto,” “imprevisible,” etc. For lexical problems of a more specialized, i.e. terminological, nature (such as “OMG” or “transgénico”), encyclopedic resources were more prominent. A closer look at the adopted pages in the qualitative Table 60 supports these quantitative trends, showing that WordReference is indeed the default online dictionary for those participants using this type of resource (Martha, however, favors the online version of the RAE dictionary).

Table 60. Adopted Solutions, Rationale, and Pages per Reported Information Need and Participant (Task 1)

Reported Needs	Adopted Solutions	Solution Rationale	Adopted Pages
OMG			
Martha	<i>GM food/cultivation</i>	<i>well because as per the first option OMG means one thing in English (oh my God!) but clearly something else in Spanish</i>	<i>es.wikipedia.org/wiki/Organismo_modificado_genéticamente</i>
Anna	<i>OMG</i>	<i>the Spanish version of GMO in Wikipedia is listed as 'Organismo modificado genéticamente'</i>	<i>On Wikipedia http://es.wikipedia.org/wiki/Organismo_modificado_gen%C3%A9ticamente; it is a text explaining in Spanish what OMG is</i>
Maria	<i>GMO</i>	<i>my research results helped me to find the right equivalent</i>	<i>http://es.wikipedia.org/wiki/Organismo_Modificado_Gen%C3%A9ticamente</i>
Bob	<i>genetically-modified organisms</i>	<i>made sense; quality of document found</i>	<i>Wikipedia, entry on genetically-modified organisms</i>
MALAS HIERBAS			

Anna	<i>development of "super- insects" (insects that developed resistance towards insecticide) and "superweeds" (weed that developed resistance towards herbicide)</i>	<i>from Greenpeace website, the word "superweed" is used, since the term "superbugs" (bacteria or virus that has developed resistance towards medications available to treat them), readers would the terms "super- insect" and "superweed" as insects and weed that developed resistance towards the chemicals used to eliminate their presence</i>	<i>it is from an article on the Greenpeace website, http://weblog.greenpeace.org/ge/archives/Superweeds.pdf; "superweed" was the term used by a Greenpeace article written in English talking about the need to end the usage of pesticides or herbicides</i>
Maria	"weeds"	<i>found in dictionary</i>	<i>http://www.wordreference.com/es/en/translation.asp?spen=hierba</i>
Laura	<i>I translated it as "weeds", keeping the speech marks to reflect the authors idea that classifying plants as "weeds" is subjective.</i>	<i>It worked with the translation.</i>	<i>google.com led me to http://www.unavarra.es/servicio/herbario/hm/concepto.htm</i>
Bob	<i>weed</i>	<i>Frequency</i>	<i>results lists of Google search</i>
GUIA ROJA Y VERDE			
Martha	<i>The yes and no guide to</i>	<i>To learn what this phrase means form its context in other texts</i>	<i>http://www.greenpeace.org/mexico/prensa/reports/gu-a-roja-y-verde-de-alimentos#</i>
Anna	<i>GM free Food Guide</i>	<i>I found the result on Greenpeace GE food guide and it corresponds to the client's needs</i>	<i>http://www.gefreefood.org.nz/</i>
Bob	<i>none found</i>	<i>not selected</i>	<i>none</i>
ALCANCE			
Maria	<i>implications</i>	<i>not sure i dont know what the correct word would be</i>	<i>http://www.wordreference.com/definicion/implication</i>
Laura	<i>scope</i>	<i>again, a useful resource</i>	<i>wordreference.com</i>
Daniel	<i>scope</i>	<i>fits meaning and is correct in English</i>	<i>WordReference online dictionary</i>
TRANSGENICOS			
Martha	<i>genetically modified food</i>	<i>to look for texts with this topic in English</i>	<i>http://www.scielo.cl/scielo.php?www.worldaidscampaign.org/es/</i>
Anna	<i>genetically- modified crops</i>	<i>because from the Wikipedia website, OMG was explained to be Genetically-modified organisms in English</i>	<i>http://es.wikipedia.org/wiki/Organismo_modificado_gen%C3%A9ticamente</i>
Maria	<i>genetically modified products</i>	<i>found in the dictionary</i>	<i>http://www.wordreference.com/es/en/translation.asp?spen=transgenico</i>
Bob	<i>transgenic organisms</i>	<i>appeared several times in "serious" sources</i>	<i>Wikipedia, entry on GM food</i>
CULTIVO			
Laura	<i>farming</i>	<i>because it seemed more appropriate than "cultivation" and "crop" didn't make sense.</i>	<i>wordreference.com</i>
Bob	<i>crop and "growing" and "cultivate"</i>	<i>parallel texts</i>	<i>various sources</i>
CONJUNTO			
Martha	<i>all</i>	<i>a Spanish-Spanish explanation</i>	<i>www.rae.es/conjunto</i>
Laura	<i>to all</i>	<i>it's a good bi-lingual and monolingual dictionary online</i>	<i>wordreference.com</i>
SUPONE INCREMENTO			

Martha	<i>indicates an increase</i>	<i>To try to find the exact same useage in a different circumstances</i>	www.lukor.com/not-neg/economia/0806/04153427.htm , www.monsanto.es
Daniel	<i>equates to</i>	<i>others didn't fit</i>	WordReference Spanish to English dictionary
ARMAS PREDILECTAS			
Martha	<i>preferred</i>	<i>To achieve the above [the meaning in Spanish so looked on the www.rae.es website]</i>	http://buscon.rae.es/draeI/SrvltConsulta?TIPO_BUS=3&LEMA=predilecta
Laura	<i>favourite</i>	<i>it makes sense in the TT</i>	wordreference.com
Daniel	<i>favourite</i>	<i>appropriate meaning in English</i>	WordReference dictionary
Bob	<i>weapons of choice</i>	<i>Frequency</i>	Google search results
PASA POR			
Laura	<i>involves</i>	<i>since I didn't think "pass for" would work for the TT, i chose to translate it as "involves"</i>	wordreference.com
IMPREVISIBLE			
Martha	<i>"unforseeable"</i>	<i>a Spanish-Spanish explanation</i>	www.rae.es/imprevisible
REFORZAR			
Daniel	<i>strengthen</i>	<i>appropriate for target text</i>	WordReference dictionary
GANADERIA			
Daniel	<i>cattle raising</i>	<i>appropriate meaning and register</i>	WordReference dictionary
SERES VIVOS			
Maria	<i>living organisms</i>	<i>i think it has the same meaning as the original</i>	http://forum.wordreference.com/showthread.php?t=1147639
DESNUTRICION			
Laura	<i>malnutrition</i>	<i>that is the correct term in English</i>	wordreference.com

A look at Websites other than WordReference, RAE, and Wikipedia shows that Web resources containing actual parallel texts (in either English or Spanish) were only used on seven occasions (in connection with “malas hierbas”, “supone incremento”, “guía roja y verde,” and “transgénicos”). Among the parallel texts accessed by Anna was a Web page authored by Greenpeace New Zealand that contained a reference to the English title of the Guía Roja y Verde (GE Free Food Guide). Interestingly, only Anna was able to find this particular Website, despite the fact that Martha and Bob both accessed Greenpeace Websites. However, these were the Website of Greenpeace Mexico (Martha) and the global Website Greenpeace.org (Bob).

7.1.4.2 Search Success

As part of the OSRs, participants were asked whether they considered their searches and the adopted solutions for their search needs as successful. In answering this question, participants had to chose from one of the three following options: “Yes,” “Not quite,” and “No.” These three answer options correspond to the assessment categories used in the evaluation of translation from a problem-solving perspective, namely “successful,”

“partially successful,” and “unsuccessful.” Note that there also was a fourth assessment category called “highly successful” (cf. 5.8.1).

Table 61. Degree of Search Success per Reported Information Need and Participant (Task 1)

Reported Needs	Adopted Solutions	Solutions in Target Text	No	Notquite	Yes
ARMAS PREDILECTAS					
Martha	<i>Preferred</i>	<i>Preferred</i>	0	0	1
Laura	<i>Favourite</i>	<i>Favourite</i>	0	0	1
Daniel	<i>Favourite</i>	<i>Favourite</i>	0	0	1
Bob	<i>weapons of choice</i>	<i>weapons of choice</i>	0	0	1
TRANSGENICOS					
Martha	<i>genetically modified food</i>	<i>genetically modified food/ genetically modified substances</i>	0	0	1
Anna	<i>genetically- modified crops</i>	<i>genetically- engineered crops / genetically- modified crops</i>	0	0	1
Maria	<i>genetically modified products</i>	<i>genetically modified products</i>	0	0	1
Bob	<i>transgenic organisms</i>	<i>transgenic organisms / genetically-modified crops</i>	0	0	1
GUIA ROJA Y VERDE					
Martha	<i>The yes and no guide to</i>	<i>The yes and no guide to</i>	0	0	1
Anna	<i>GM free Food Guide</i>	<i>GM- Free Food Guide</i>	0	1	
Bob	<i>none found</i>	[nothing]	1	0	
OMG					
Martha	<i>GM food/cultivation</i>	<i>GM food / GM products</i>	0	0	1
Anna	<i>OMG</i>	<i>just confirmation of SL</i>	0	0	1
Maria	<i>GMO</i>	<i>The GMO</i>	0	0	1
Bob	<i>genetically-modified organisms</i>	<i>genetically-modified organisms (GMOs)</i>	0	0	1
CULTIVO					
Laura	<i>Farming</i>	<i>Cultivation</i>	0	0	1
Bob	<i>crop and "growing" and "cultivate"</i>	<i>Cultivation</i>	0	0	1
CONJUNTO					
Martha	<i>All</i>	<i>all living beings</i>	0	0	1
Laura	<i>to all</i>	<i>to the environment</i>	0	0	1
ALCANCE					
Maria	<i>Implications</i>	<i>Implications</i>	1	0	0
Laura	<i>Scope</i>	<i>Scope</i>	0	0	1
Daniel	<i>Scope</i>	<i>Scope</i>	0	0	1
GANADERIA					
Daniel	<i>cattle raising</i>	<i>cattle-raising</i>	0	1	0
MALAS HIERBAS					
Anna	<i>development of "super- insects" and "superweeds"</i>	<i>development of 'super-insects' and 'superweeds'</i>	0	1	0
Maria	<i>"weeds"</i>	<i>"weeds"</i>	0	1	0
Laura	<i>"weeds"</i>	<i>"weeds"</i>	0	0	1
Bob	<i>Weed</i>	<i>Weeds</i>	0	0	1
SUPONE INCREMENTO					
Martha	<i>indicates an increase</i>	<i>results in</i>	0	1	0
Daniel	<i>equates to</i>	<i>equates to</i>	0	1	0

IMPREVISIBLE					
Martha	<i>Unforeseeable</i>	<i>Unforeseeable</i>	0	0	1
PASA POR					
Laura	<i>Involves</i>	<i>Involves</i>	0	1	0
REFORZAR					
Daniel	<i>Strengthen</i>	<i>Strengthen</i>	0	0	1
SERES VIVOS					
Maria	<i>living organisms</i>	<i>living organisms</i>	0	0	1
DESNUTRICION					
Laura	<i>Malnutrition</i>	<i>Malnutrition</i>	0	0	1
TOTAL			2	7	25
%			5.9%	20.6%	73.5%

The self-assessment was generally very positive. In 25 out of 34 instances (73.5%), participants considered their solutions successful. In seven cases (20.6%) they considered them not quite successful, and in only two cases (5.9%) did participants consider their search outcomes unsuccessful. As I will show later, these two cases (Bob's unsuccessful search for a translation of the guide's title, and Maria adopted solution for "alcance") were indeed considered unsuccessful by the assessors.

The common problems leading participants to doubt the success of their solutions are "guía roja y verde" (Anna), "malas hierbas" (Anna and Maria), "supone incremento" (Martha and Daniel), "ganadería" (Daniel), and "pasa por" (Laura). The reasons given for the self-assessment in the OSRs help to better understand the participants' self-doubts. Thus, Bob refers to his lack of socio-cultural knowledge with regard to finding a solution for "guía roja y verde." Here, he is possibly referring to the metaphoric use of the colors and their cultural function. Maria cites her lack of competence in English (as a non-native speaker) as a reason for what she perceived as an unsuccessful solution for "alcance," making it impossible for her to identify the correct usage of said term.¹⁹⁷

Anna doubts for "guía roja y verde" and "malas hierbas" (which she found both on Greenpeace-sponsored sites) related on the one hand to the fact that the color metaphor of the Spanish text would be lost, and on the other hand to the acceptability of her adaption of the term super weed to super bug. Interestingly, the assessors considered

¹⁹⁷ According to White, Matteson, and Abels (2008: 589), research on dictionary consultation "shows that non-native speaking adults ... make semantic errors such as selecting the incorrect sense of a word or latching on to only one word from the definition that does not completely express the definition of the word being looked up." Based on their findings of their interviews with 19 professional translators, the authors further state that "senior translators, who had training roles, report that new translators occasionally select the first sense listed for the headword in the dictionary, which may not be the correct one" (ibid.).

both of these solutions as highly successful, showing that Anna's doubts were unfounded.

Martha's and Daniel's doubts regarding their solutions for the expression "supone incremento" ("indicates an increase" and "equates to," respectively), seem to have resulted from the polysemy of the Spanish expression and their insecurity as to the usage of an English equivalent adequate for the target text context. The same seems to apply to Laura's solutions for "pasa por" and "supone." Daniel's doubts about his solution for "ganadería," finally, seem to be related to his decision to discard the search result "cattle farming" for the solution "cattle raising."

A look at the unreported problems, which—with the exception of Bob—have all been solved by recurring to WordReference, shows the limits of this particular resource. While most of the unreported problems have been solved successfully, an analysis of the unsuccessful solutions, e.g. Anna's translation of "constituir" as "setting up" (and not "represent," for example), Maria's translations of "suelo" as "ground" (not "soil") or "riesgos sanitarios" as "sanitary" (not "health") "risks," or Laura's translation of "ganadería" as "animal husbandry" (not "farming"), shows that uncritical reliance on solutions offered in bilingual dictionaries often leads to poor translation solutions. This fact—most likely due to an over-supply of (perhaps poorly contextualized) possible translation solutions—points out the importance of training translation students in the use of dictionaries in print, electronic, and online forms.¹⁹⁸

When comparing the participants' assessment of their own search success with the evaluation of the adopted solutions (see Table 62), we find that Martha's, Bob's, and (with one exception) Daniel's self-assessment exactly matches that of the assessors. The discrepancy in Daniel's case results from the fact that the assessors considered his solution for "ganadería" successful as opposed to Daniel's own assessment of it being "not quite successful."

¹⁹⁸ In this regard, and based on their findings of a focus group interview with 19 professional translators, White, Matteson, and Abels (2008: 587) report, "[d]ictionaries provide relatively few use examples in their entries ... and the translators note that they consult a wide variety of other tools beyond dictionaries to see the word and understand its use within a particular context. To augment dictionaries, [they] consult almanacs, the internet and web, magazines, newspapers, and technical journals."

Table 62. Comparison of Participants' and Assessors' Perceptions of Search Success per Reported Information Need (Task 1)

	Reported Needs	No		Not quite		Yes		Highly
		P.*	A.**	P.	A.	P.	A.	A.
Martha	<i>Guia roja y verde</i>	0	0	0	0	1	1	0
	<i>El cultivo de transgénicos supone incremento</i>	0	0	1	1	0	0	0
	<i>Los riesgos sanitarios a largo plazo de los OMG</i>	0	0	0	0	1	1	0
	<i>Son una de las armas predilectas</i>	0	0	0	0	1	1	0
	<i>Transgénico</i>	0	0	0	0	1	1	0
	<i>Los efectos sobre el conjunto de los seres vivos son irreversibles e imprevisibles</i>	0	0	0	0	1	1	0
Subtotal		0	0	1	1	5	5	0
Anna	<i>guia roja y verde</i>	0	0	1	0	0	0	1
	<i>desarrollo de resistencias en insectos y 'malas hierbas'</i>	0	0	1	0	0	0	1
	<i>OMG as the abbreviation of GMO</i>	0	0	0	0	1	1	0
	<i>transgenicos as genetically-engineered or genetically- modified</i>	0	0	0	0	1	1	0
Subtotal		0	0	2	0	2	2	2
Maria	<i>Transgénico</i>	0	0	0	1	1	0	0
	<i>"malas hierbas"</i>	0	1	1	0	0	0	0
	<i>seres vivos</i>	0	0	0	1	1	0	0
	<i>OMG</i>	0	1	0	0	1	0	0
	<i>Alcance</i>	1	0	0	1	0	0	0
Subtotal		1	2	1	3	3	0	0
Laura	<i>Conjunto</i>	0	0	0	0	1	0	0
	<i>Alcance</i>	0	0	0	0	1	1	0
	<i>"malas hierbas"</i>	0	0	0	1	1	0	0
	<i>Predilectas</i>	0	0	0	0	1	1	0
	<i>Cultivo</i>	0	0	0	1	1	0	0
	<i>Desnutricion</i>	0	0	0	0	1	1	0
	<i>pasa por</i>	0	0	1	0	0	1	0
Subtotal		0	0	1	2	6	4	0
Daniel	<i>Supone</i>	0	1	1	0	0	0	0
	<i>Alcance</i>	0	0	0	0	1	1	0
	<i>Refuerzan</i>	0	0	0	0	1	1	0
	<i>Predilicta</i>	0	0	0	0	1	1	0
	<i>Ganadería</i>	0	0	1	0	0	1	0
Subtotal		0	1	2	0	3	4	0
Bob	<i>OMG</i>	0	0	0	0	1	1	0
	<i>Transgenicos</i>	0	0	0	0	1	1	0
	<i>malas hierbas</i>	0	0	0	0	1	1	0
	<i>armas predilectas</i>	0	0	0	0	1	1	0
	<i>Guia Roja and Guia Verde</i>	1	1	0	0	0	0	0
	<i>Cultivo</i>	0	0	0	0	1	1	0
Subtotal		1	1	0	0	5	5	0
TOTAL		2	4	7	6	24	20	2

*Participant; **Assessors.

In the cases of Laura and, even more so, Anna and Maria, the discrepancies between self and external assessment are more numerous and more pronounced. Laura's assessment of the success of her searches matches that of the assessors in three out of seven cases. In one case (her solution for "pasa por"), the external assessment was more positive than her own. In two cases ("cultivo" and "malas hierbas"), the assessors found her solution not quite successful (as opposed to her assessment of it being a successful solution). In one case, finally, Laura's translation of "conjunto" as referring "to the environment," the self-assessment (successful) and the external assessment not successful are clearly at odds. Interestingly, in this last case, Laura's actual translation ("to the environment") and the reported adopted solution ("to all") do not match. Laura also changed her initial solution for "cultivo" from "farming" (a solution that she reported as her adopted outcome in the OSR and that would have been a well-suited translation indeed) to "cultivation," an option that Laura, in her OSR entry, had initially discarded as being "less appropriate" than "farming." A third case of major discrepancies between the reported adopted solutions and the solutions found in the target text relates to Martha's translation of "supone incremento." Here, she changed her initial solution "indicates an increase," which she considered not quite successful, to "results in," which, for the assessors, constituted a successful solution. In addition to these major differences between the reported adopted solutions and the final translation solutions, there were a number of terminological inconsistencies and spelling variations between the OSRs and the target texts. Examples include Anna's use of the unreported expression "genetically engineered crops" (in addition to the reported solution "genetically modified crops"), or missing or superfluous hyphens (see Daniel's spelling of "cattle-raising" as compared to the reported "cattle raising," or Anna's inclusion of the hyphen in GM-Free Food Guide in her translation, whereas her reported adopted solution did not contain a hyphen).

The remaining two participants, Maria and Anna, finally, show two very different assessment profiles. In Maria's case, all of her five self-assessments do not match that of the assessors. In four of these cases, the assessors considered her solutions less successful than Maria herself did. In the case of "alcance," which Maria considered as an unsuccessful solution, the assessors had a slightly better opinion, considering it "not quite" successful. While Maria's self-assessment seemed to have been overly optimistic, Anna's assessment of her own search success is overly pessimistic. In two out of four

cases (“guía roja y verde” and “desarrollo de resistencias en insectos y ‘malas hierbas’”), the assessors considered solutions that Anna herself found “not quite” successful as “highly successful” (the solution to the former problem meets the requirements of the translation brief, while the solutions to the latter problem are very creative and grounded in the literature). These were indeed the two solutions found in the above-cited Greenpeace-related sites. In the two additional cases (“OMG” and “transgénicos”), the assessors agreed with Anna’s self-assessment (successful).

As we have seen above, a number of unsuccessful solutions results from the consultation of online dictionaries. This seems to be particularly the case with regard to polysemous words (e.g. “suponer,” “alcance,” and “pasar por”) and also for unreported regular words (e.g. “constituir” and “sanitario”). As mentioned before, it is often the abundance of choice in dictionary entries that causes users to select inappropriate solutions. Here, translator training would benefit from emphasizing more strongly the need for cross-checking dictionary search results, both within the dictionary accessed itself and within selected parallel texts.

While dictionary access among the student participants was mainly motivated by the need for linguistic information, thematic searches—primarily conducted by Bob and Anna—led mostly to interactions with the texts being ‘consumed’ via browse searching. Here, searches for the information needs “OMG” and “transgénicos” were conducted jointly or led to the same resources. Furthermore, access to appropriate parallel texts and the information provided within these texts seemed to have contributed to the quality of translation solutions (see, for example, expressions such as “transgenic organisms,” or “genetic pollution,” “soil contamination,” etc.). Successful solutions also seem to be linked to search engine queries, as in Bob’s case, and the use of predictable sources, such as Greenpeace sites and encyclopedias. The positive effects of a ‘deep’ and ‘wide’ type of searching style are particularly visible in the case of Anna.

Unlike Bob and Anna, however, the other four participants conducted no or little background research. Martha did some background research, for example, with regard to the title of the text, but only did so in Spanish. Maria did no background research, instead relying almost exclusively on dictionary resources. Laura as well as Daniel did not carry out thematic searches either. A look at some of their translation solutions (e.g. the translation of the text title in both cases, Laura’s translation solutions for “ganadería” or “cultivo” mentioned above, as well as Daniel’s translation of “tóxicos”

as “poisons” and his use of the expression “genetic contamination” instead of the more typical “genetic pollution”) indicated that a more thorough browsing of English parallel texts would have contributed to a higher amount of successful and/or highly successful solutions for these participants. Nevertheless, their generally “shallow” and “checking” type of searching style enabled them to successfully retrieve some equivalents in a quick and easy manner, i.e. through short, straight-to-the-point, and oftentimes cursory visits to selected Web pages.

7.1.4.3 Search Satisfaction and Difficulty

To identify the participants’ degree of satisfaction with their adopted solutions on the one hand and the perceived degree of difficulty of their searches on the other hand, the participants were asked to rank both aspects on a scale from 1 to 5 (with 5 indicating the highest level of both categories, i.e. “very satisfied” and “very difficult” in the tables below). I will report on the findings regarding these two aspects from both a reported search need perspective and a participant perspective.

With regard to the information needs encountered by more than one participant, the expression “guía roja y verde” was considered to represent, on average, the highest degree of difficulty (3.67). Corresponding to the high degree of search difficulty associated with this information need, the average degree of satisfaction among three participants reporting this need (Martha, Anna, and Bob), was the lowest for all search needs reported by more than one participant. A similar correlation between the degree of satisfaction and degree of difficulty can be found with regard to the information need “alcance,” which showed the second lowest average satisfaction degree of 3.33 and the second highest average difficulty score of 3. With regard to the other common needs, we can see a pattern in which the lower the difficulty score is, the higher the degree of satisfaction is. Thus, with regard to the ‘least difficult’ information need “armas predilectas” (average difficulty score of 1.25), all four participants that reported this need (Martha, Laura, Daniel, and Bob) reported a satisfaction level of 5 for their adopted solutions. Similar results can be found with regard to the information needs “OMG” (average degree of difficulty score of 5; average degree of satisfaction score of 2), “conjunto” (4.5 and 1.5), “transgénicos” (4 and 2), and “supone incremento” (4 and 2). The two remaining problems that were reported by at least by two participants, “malas hierbas” (3.75 and 2.25) and “cultivo” (3.5 and 2.5) resemble the values of the two needs—“guía roja y verde” and “alcance”—mentioned at the beginning of this

discussion. The average degree of satisfaction is 4.03 and the average degree of difficulty is 2.21.

Table 63. Degrees of Satisfaction and Difficulty per Reported Information Need (Task 1)

Reported Needs	Adopted Solutions	Satisfaction	Difficulty
OMG			
Martha	<i>GM food/cultivation</i>	5	1
Anna	<i>OMG</i>	5	2
Maria	<i>GMO</i>	5	4
Fred	<i>genetically-modified organisms</i>	5	1
Subaverage		5	2.0
MALAS HIERBAS			
Anna	<i>development of "super- insects" and "superweeds"</i>	2	3
Maria	<i>"weeds"</i>	4	3
Laura	<i>"weeds"</i>	4	2
Fred	<i>Weeds</i>	5	1
Subaverage		3.75	2.25
GUIA ROJA Y VERDE			
Martha	<i>The yes and no guide to</i>	5	2
Anna	<i>GM free Food Guide</i>	3	4
Fred	<i>none found</i>	1	5
Subaverage		3.0	3.67
ALCANCE			
Maria	<i>Implications</i>	1	5
Laura	<i>Scope</i>	4	2
Daniel	<i>Scope</i>	5	2
Subaverage		3.33	3
TRANSGENICOS			
Martha	<i>genetically modified food</i>	4	2
Anna	<i>genetically- modified crops</i>	4	2
Maria	<i>genetically modified products</i>	4	3
Fred	<i>transgenic organisms</i>	4	1
Subaverage		4	2
CULTIVO			
Laura	<i>Farming</i>	4	2
Fred	<i>crop and "growing" and "cultivate"</i>	3	3
Subaverage		3.5	2.5
CONJUNTO			
Martha	<i>All</i>	5	1
Laura	<i>to all</i>	4	2
Subaverage		4.5	1.5
SUPONE INCREMENTO			
Martha	<i>indicates an increase</i>	5	2
Daniel	<i>equates to</i>	3	2
Subaverage		4	2
ARMAS PREDILECTAS			
Martha	<i>Preferred</i>	5	1

Laura	<i>Favourite</i>	5	1
Daniel	<i>Favourite</i>	5	2
Fred	<i>weapons of choice</i>	5	1
Subaverage		5	1.25
PASA POR			
Laura	<i>Involves</i>	2	4
IMPREVISIBLE			
Martha	<i>"unforseeable"</i>	5	1
REFORZAR			
Daniel	<i>Strengthen</i>	5	2
GANADERIA			
Daniel	<i>cattle raising</i>	3	2
SERES VIVOS			
Maria	<i>living organisms</i>	3	3
DESNUTRICION			
Laura	<i>Malnutrition</i>	5	1
AVERAGE		4.03	2.21

Seen from the point of view of the individual participants, Martha shows the highest average degree of satisfaction with her adopted solutions (4.86). She also shows the lowest average score for the perceived level of difficulty of her problems or search needs (1.43), which again supports the correlation between perceived ease of problem and search satisfaction. Daniel, Laura, and Bob all show an average degree of difficulty score of 2, yet their levels of satisfaction range from 4.2 (Daniel) to 4 (Laura) to 3.83 (Bob). Anna's level of satisfaction with her solution (3.5) is closer to the perceived level of difficulty of her problems (2.75). Maria is the only participant for whom the level of satisfaction (3.4) is lower than the perceived level of difficulty (3.6).

Table 64. Degrees of Satisfaction and Difficulty per Participant (Task 1)

	Reported Needs	Satisfaction	Difficulty
Martha	<i>Guia roja y verde</i>	5	2
	<i>El cultivo de transgénicos supone incremento</i>	5	2
	<i>Los riesgos sanitarios a largo plazo de los OMG</i>	5	1
	<i>Son una de las armas predilectas</i>	5	1
	<i>Transgénico</i>	4	2
	<i>Irreversible</i>	5	1
	<i>Imprevisibles</i>	5	1
Subaverage		4.857	1.429
Anna	<i>guia roja y verde</i>	3	4
	<i>desarrollo de resistencias en insectos y 'malas hierbas'</i>	2	3
	<i>OMG as the abbreviation of GMO in Spanish</i>	5	2
	<i>transgenicos as genetically- engineered or genetically- modified</i>	4	2
Subaverage		3.50	2.75
Maria	<i>Transgénico</i>	4	3
	<i>"malas hierbas"</i>	4	3

	<i>seres vivos</i>	3	3
	<i>OMG</i>	5	4
	<i>Alcance</i>	1	5
Subaverage		3.40	3.6
Laura	<i>Conjunto</i>	4	2
	<i>Alcance</i>	4	2
	<i>"malas hierbas"</i>	4	2
	<i>Predilectas</i>	5	1
	<i>Cultivo</i>	4	2
	<i>Desnutricion</i>	5	1
	<i>pasa por</i>	2	4
Subaverage		4	2
Daniel	<i>Supone</i>	3	2
	<i>Alcance</i>	5	2
	<i>Refuerzan</i>	5	2
	<i>Predelicta</i>	5	2
	<i>Ganadería</i>	3	2
Subaverage		4.2	2
Bob	<i>OMG</i>	5	1
	<i>Transgenicos</i>	4	1
	<i>malas hierbas</i>	5	1
	<i>armas predilectas</i>	5	1
	<i>Guia Roja and Guia Verde</i>	1	5
	<i>Cultivo</i>	3	3
Subaverage		3.83	2.00
AVERAGE		4.03	2.21

It should also be pointed out that the interviews show that the student participants, except for Maria (see below), mostly associated their overall perceptions of search success and satisfaction with the finding of the ‘correct’ equivalent.¹⁹⁹ In Martha’s case, however, search success and satisfaction are more linked to the confirmation of her own tentative solutions than the finding of ‘correct’ equivalents.

Vanessa: So, and what type of searches do you think make you feel more satisfied, when do you say, “Ah, I found what I looked for.” And what type of things make you feel like it was a successful search ...?

Martha: I guess it’s when I find a parallel text that actually reinforces what I had already thought.

Vanessa: When you find something that confirms your initial thoughts?

Martha: Yeah, to do with how I was going to translate it, and it just verifies that the term does exist and it sounds right in the context.

¹⁹⁹ Interestingly, White, Matteson, and Abels state that, in the search for information, dictionary users emphasize precision, “i.e. finding the exact word without other options” (2008: 597).

For Anna, search success and satisfaction is not so much related to the confirmation of her own tentative translation solutions but to the finding of ‘exact matches:’

Vanessa: Okay, ... What do you think, or what is for you, a successful online search? What do you associate with success?

Anna: Finding an exact correct, like exact corresponding term. That would be something that I would consider successful. Yeah for me it was just like, “Uh, oh, this is it, okay.” So yeah for me it would be like, oh ‘cause it’s easy and it’s there straight away instead of me having to go through, “(noise made) That’s not it.”

Similarly, Laura associates search success with the finding of equivalents, and highlights the importance of these fitting the textual context:

Vanessa: ... Alright what is for you a successful search on the Web? When do you think, when do you say, “Okay, this was successful.” You know? What kind of things do you associate with that?

Laura: Just if I find something that I think is the equivalent or, and it sounds like something, like sounds natural and also correct and appropriate for the context.

Vanessa: Okay...

Laura: And it’s not too difficult as well...

As it can be seen, Laura not only associates search success with the finding of equivalents but also with the degree of search difficulty (see below). For Maria, however, time is the only criterion upon which she bases her perception of search success:

Vanessa: ... That’s interesting ‘cause one of the questions that I had is “what is for you a successful search?”

Maria: It’s quick.

Vanessa: When it’s quick ... And when is it an easy, when is it an easy search as opposed to difficult?

Maria: It’s when I find the answer it didn’t take me long. Because eventually I probably will find the answer but it might take me ages and then I do not consider as successful.

Vanessa: So that frustrates you, somehow?

Maria: Oh, it’s just like such a waste of time. (laughter)

Vanessa: But if you find what you were looking for, even if it took you a long time?

Maria: Well if it takes me like forty minutes to find the right answer, and if the text is two hundred words, particularly, then no.

Maria's perception of both search success and search difficulty is thus primarily linked to fast and easy access to information. Time is also a factor that affects the easy/difficult rating of the remaining translation students. Martha, for example, states that time affects said rating and that she usually checks one or two sites only before trying a different search route. Nevertheless, for her search success ultimately involves finding the information she was looking for:

Vanessa: Do you think speed, time is an issue as well, the faster you find something...?

Martha: Oh it's definitely, that would definitely affect my easy/hard rating but ultimately whether it gives me the satisfaction, you know whether I find it easily or whether it takes me a long time to find it, ultimately if I find the answer the satisfaction should be the same.

Vanessa: Yeah, so, okay yeah it might help, but it's not a decisive factor or anything, how quickly you find things?

Martha: No, that's right.

[...]

Martha: I don't normally check many sites, if, it's like I choose maybe one or two options that come up in Google and then if it didn't answer the question then I'll try something completely different.

Vanessa: (laughter) Yeah.

Martha: I don't know if you had noticed that but I mean I don't know if the others check ten sites, I normally don't, I just check...

Vanessa: Check, sorry, like check?

Martha: ... I just check maybe one or two and think, "Okay."

For Anna, fast and easy access to information seems to have a stronger impact on her perception of search success than that of Martha (and Laura):

Vanessa: So that's, so success, let's say, okay you've found an exact correspondence and then what do you associate with easiness of the search?

Anna: Yeah, I think easiness of a search would be like I search for it and it would be within like the first two or three entries that I go for.

Vanessa: So like quick...

Anna: Yeah, it's quick.

Vanessa: ... So time would be a factor for you?

Anna: Yeah I think for me time is always a factor for everything, I'm like, "Oh, do I have enough time for this? No, I have to quick."

Vanessa: So ... easy online search for you is like, “Yeah, first hit or second hit, I don’t have to research a lot, that’s it.”?

Anna: Yeah, I mean if I really have to go in to the second page of the search results I think for me this is like a total failure.

Laura, finally, also considers that fast access to information affects her perceptions of search success and difficulty. In addition, she associates the latter with the type of information she needs to search for, i.e. for her, the less complicated “words” are the easier searches become:

Vanessa: And that it’s not too difficult to research, okay, ... so, what is for you an easy search? When do you say, “Ah, that was easy to research.”

Laura: Probably the easiest ones are just words that I didn’t know in Spanish, but they are not really complicated words ...

Vanessa: Like more general rather than specialised ... Do you associate by any chance things like, okay how quick or how fast you managed to search something, that is, time, or how many searches you had to do to find an answer, do you somehow consider that related to your notion of success?

Laura: I suppose if it’s like a long drawn out search and then I’m still, like the cook top one, that was, I spent quite a lot of time on that but I still, even when I wrote whatever I wrote at the end I still, it’s like, “Oh, this is probably not right.”

Overall, the students’ perceptions of search success, satisfaction, and difficulty seem to match their Web searching styles, described above as a checking, comparing type of search behavior aimed primarily at retrieving equivalents in a fast and easy fashion.

7.2 Second Embedding Task

In this final section, I will analyze the Web search behaviors of the four student participants (Martha, Anna, Maria, and Laura) for the second embedding task, i.e. the translation of a second text from Spanish into English. As described previously, the second text is an informative popular science text. More specifically, it represents a section from a press release, issued by the Spanish research council, announcing the discovery of two new enzymes that show promise in the treatment of AIDS. The second text is 177 words long, i.e. 55 words shorter than the source text of the first embedding task (232 words). From the comparison of the two tasks I expect to gain a better understanding on how different text types and degrees of specialization affect the participants’ online search behaviors.

As with the previous task, the data analysis will follow a four-step path of looking at (a) the participants' search needs, (b) their search processes, (c) search goals, and (d) search outcomes.

7.2.1 Search Needs

As represented in Table 65, embedding Task 2 produced a total of 70 individual instances of information needs (tokens) among the four participants. Thirty-one of these needs were reported, while 39 were unreported. The longer text of the first embedding task produced a total of 66 search needs instances for the four participants, indicating a higher degree of difficulty of the second text (see below).

Table 65. Reported vs. Unreported Information Needs per Participant (Task 2)

	Reported Information Needs	Unreported Information Needs	Total
Martha ²⁰⁰	7	0	7
Anna	8	13	21
Maria	8	15	23
Laura	8	11	19
TOTAL	31	39	70

Comparing the number of information needs of tasks 1 and 2, a couple of differences become visible.²⁰¹ First, we notice that Maria's information needs decrease in Task 2 (by six needs), while Laura's needs increase by a total of eight. The number of needs for Martha and Anna remain the same (in Martha's case) or almost the same (for Anna) as in Task 1. Correspondingly, Maria's share of the total needs decrease from 43.9% to 32.9%, while Laura's share increases from 16.7% to 27.1%. The percentages for Martha (10% in Task 2, 10.6% in Task 1) and Anna (30% in Task 1, 28.8% in Task 2) are very similar.

A second observation concerns the number of reported versus unreported needs. For Task 2, the number of reported needs (31 out of 70, or 44.3%) was higher than for Task 1, where only 34.8% (23 out of 66) of the information needs were reported. As discussed with regard to the unreported needs of Task 1, the lack of reporting seems to be related to the concept of unproblematic processing. In Task 2, we see similar numbers of reported needs as in Task 1, which, along with the fact that five of the

²⁰⁰ In her OSR, Martha reported two separate needs in one of her search tasks. These were counted as two separate information needs, thus bringing her total number of information needs to seven.

²⁰¹ Data from Task 1 used for comparison purposes only includes the data obtained from the four student participants.

reported needs were common to all four participants, seems to indicate that primarily only really problematic items in the traditional sense were reported (an assumption supported by the interviews). Nevertheless, for Task 2, more than half of the information needs remained unreported. Here, it is also noteworthy that Laura, who in Task 1 had four unreported needs out of a total of eleven information needs, had a total of eleven unreported needs (and eight reported ones) for Task 2.

Table 66. Reported vs. Unreported Information Needs per Participant – Task Comparison

	Task 1				Task 2			
	Reported Needs	Unreported Needs	TOTAL	%	Reported Needs	Unreported Needs	TOTAL	%
Martha	7	0	7	10.6%	7	0	7	10%
Anna	4	15	19	28.8%	8	13	21	30%
Maria	5	24	29	43.9%	8	15	23	32.9%
Laura	7	4	11	16.7%	8	11	19	27.1%
TOTAL	23	43	66		31	39	70	
%	34.8%	65.2%		100%	44.3%	55.7%		100%

Furthermore, taking into account the number of information needs shared by the participants, the total number of discrete types of information needs is 35 (see Table 67), and the average number of needs instances per need type is 2. In comparison, in Task 1 there were 34 information need types among the four student participants, which generated 66 instances, for an average number of needs instances per need type of 1.94. The slightly higher numbers for Task 2 becomes prominent when considering the fact that the source text of Task 2 has about 24% fewer words than that of Task 1. A similar interpretation applies to the average number of needs per participant, which was 17.5 for Task 2, and 16.5 for Task 1.

7.2.1.1 Individual vs. Common Information Needs

Comparing the needs common to at least two of the four participants with the needs unique to individual participants, we see that more than half the needs of Task 2 were common needs. More precisely, 19 out of the 35 information types (54.3%) were needs shared by two or more of the participants, while 16 needs were of an individual nature (45.7%). In Task 1, the majority of the needs had been individual ones (58.8% vs. 41.2%). This can perhaps be explained by the fact that the second task was more challenging, i.e. had a more specialized topic, than text 1.

Table 67. Individual vs. Common Information Needs – Task Comparison

	Task 1		Task 2	
	N.	%	N.	%
Individual	20	58.8%	16	45.7%
Common	14	41.2%	19	54.3%
TOTAL	34	100%	35	100%
Instances	66		70	
Needs per participant	1.94		2.0	

As Table 68 shows, the individual needs are mostly those of the two non-native English speakers among the participants, Maria and Anna, with eight and seven needs, respectively. Laura had only one individual need, and Martha had none. While Maria’s share of the individual needs in Task 2 is still 50%, it should be remembered that her share in Task 1 was 75% (15 out of 20 individual needs).

Table 68. Individual Information Needs per Participant²⁰² (Task 2)

	Search Need	Need Rationale
Anna	<i>asi como</i>	
	<i>CSIC translation</i>	<i>not sure whether to translate it as Spanish national Research Council or Spanish Council for Scientific Research</i>
	<i>Discovery of two new enzymes with possible applications to AIDS treatment by CSIC Scientist</i>	
	<i>Manuel Ferrer</i>	
	<i>Obtencion</i>	
	<i>pertenecientes</i>	
	<i>Suponer</i>	
Maria	<i>at a fewer cost</i>	
	<i>cida [sic] (SIDA)</i>	
	<i>Clinico</i>	
	<i>Costoso</i>	
	<i>Emplear</i>	
	<i>Etapa</i>	
	<i>Presentar Scientist</i>	
Laura	<i>por ello</i>	

Similar to Task 1, the vast majority of the individual information needs concerns general lexical items such as “así como” (as well as), “por ello” (therefore, consequently), or “costoso” (costly, expensive). The fact that Maria’s individual needs also contain English search terms (“at a fewer cost” and “scientist”) indicates that, like

²⁰² All individual needs, except for Anna’s need “CSIC translation,” were unreported.

in Task 1, individual searches seem to serve the purpose of confirming the participants' tentative solutions (including matters of spelling and usage). The only exceptions to this among the individual needs are Anna's searches regarding the (official) English translation of the *Spanish Consejo Superior de Investigaciones Científicas* (CSIC) and her rather expansive search need described as "Discovery of two new enzymes with possible applications to AIDS treatment by CSIC Scientist" (which is her translation of the text title). While in the former case, Anna was interested in finding a suitable equivalent, in the latter (as she stated in her interview) she aimed at obtaining background information on the text topic.

7.2.1.2 Types of Common Information Needs

Whereas the (mostly unreported) individual needs concern source-text elements of a mostly general lexical nature, the list of the common needs in Table 69 paints a different picture. Of the 19 common needs, only three—"posee eficacia" (to be effective), "aplicable a" (applicable to, can be used for/to), and "llevar a cabo" (to carry out)—can be considered as belonging to a more general vocabulary. The other 16 items represent terminological and/or thematic needs, which seems to confirm that degree of specialization of Task 2 is higher than that of Task 1.

Five of the 19 common information needs are shared by all four participants. These are "beta-lactámicos," "Catálisis y Petroleoquímica," "CSIC," "enantiómeros," and "solketal" (see English translations below). Six of the information needs are shared by three of the participants. In four of the six cases, these three participants were Anna, Maria, and Laura. The remaining two needs were shared by Martha, Anna, and Laura. The remaining eight common information needs, finally, were shared by two participants. In five of these eight cases these two participants were, again, Maria and Laura. Anna and Laura shared a further two needs, and Anna and Maria one (see below for a more detailed description).

The total number of instances generated by the 19 types of common information needs is 54. Thus, the average number of instances per common need type is 2.84, and thus higher than the average for Task 1 (1.78). When looking at the total number of common information needs per participant, we can see that Laura shared all but one ("llevar a cabo") of the 19 common information needs. Maria shared 15 information needs, and Anna 14. Martha had by far the lowest number of common information needs (seven).

A comparison with the common needs per participant in task 1—ten for Laura, 14 for Maria, 15 for Anna, and seven for Martha—shows that the increase in needs instances results from Laura’s higher numbers.

Table 69. Frequency and Distribution of Common Information Needs per Participant (Task 2)

Common Needs	Martha	Anna	Maria	Laura	No. of Occurrences	% of Common Needs	% of Total Needs
<i>beta-lactámicos</i>	1	1	1	1	4	7.4%	5.7%
<i>Catálisis y Petroleoquímica</i>	1	1	1	1	4	7.4%	5.7%
<i>CSIC</i>	1	1	1	1	4	7.4%	5.7%
<i>enantiómeros</i>	1	1	1	1	4	7.4%	5.7%
<i>solketal</i>	1	1	1	1	4	7.4%	5.7%
<i>alcoholes primarios</i>	0	1	1	1	3	5.6%	4.3%
<i>enzima</i>	0	1	1	1	3	5.6%	4.3%
<i>posee eficacia</i>	0	1	1	1	3	5.6%	4.3%
<i>mezclas racémicas</i>	1	1	0	1	3	5.6%	4.3%
<i>enantioméricamente puros</i>	0	1	1	1	3	5.6%	4.3%
<i>tratamientos anti-sida</i>	1	1	0	1	3	5.6%	4.3%
<i>aplicable a</i>	0	1	0	1	2	3.7%	2.9%
<i>enantiómero "R"</i>	0	0	1	1	2	3.7%	2.9%
<i>fármaco</i>	0	0	1	1	2	3.7%	2.9%
<i>investigador</i>	0	0	1	1	2	3.7%	2.9%
<i>Llevar a cabo</i>	0	1	1	0	2	3.7%	2.9%
<i>separación de los enantiómeros</i>	0	0	1	1	2	3.7%	2.9%
<i>síntesis</i>	0	0	1	1	2	3.7%	2.9%
<i>de interés farmacéutico</i>	0	1	0	1	2	3.7%	2.9%
TOTAL	7	14	15	18	54	100.0%	77.1%

In the following, I will discuss the common information needs according to their level of frequency, starting with the needs shared by all four participants.

As briefly mentioned above, five of the 19 common information needs are shared by all four participants. These are “beta-lactámicos,” “Catálisis y Petroleoquímica,” “CSIC,” “enantiómeros,” and “solketal.” The three specialized terms in this group— “[antibióticos] beta-lactámicos” (beta-lactam antibiotics, e.g. penicillin), “enantiómeros” (enantiomers, a specific type of isomeric molecules) and “solketal” (solketal, a form of glycerol)—reflect the thematic core of the text to be translated. The other two most frequent information needs— “[Instituto de] Catálisis y Petroleoquímica” and “CSIC”—reflect both the technical nature and the cultural context of the source text, which prompted the participants to search not only for equivalent specialized terms for “catálisis” and “petroleoquímica” but also for background information on the

research institute mentioned as well as the Spanish Research Council and the (official) translation of the names of both institutions into English. The search rationales given by the participants in their OSRs support these assumptions. Maria, for example, explained that for the information need “Instituto de Catálisis y Petroleoquímica” she “needed to find the equivalent in English.” Laura’s rationales reflect the technical nature of her needs in particular and of the common information needs in general. Regarding the information need “solketal,” for example, she writes: “[A]nother technical term that I wasn’t familiar with.”

Table 70. Common Information Needs per Participant - High Level of Frequency (Task 2)

	Search Need	Need Rationale
BETA-LACTAMICOS		
Martha	<i>antibióticos beta-lactámicos</i>	<i>not sure how to translate lactámicos</i>
Anna	<i>Antibiótico betalactámicoz</i>	<i>not sure what it is</i>
Maria	<i>antibióticos beta-lactámicos</i>	<i>i have no idea what it means</i>
Laura	<i>beta-lactámicos</i>	<i>didn't know the term</i>
CATALISIS Y PETROLEOQUIMICA		
Martha	<i>Catálisis y Petroleoquímica</i>	<i>Not familiar with the terms, well Catálisis more than anything</i>
Anna	<i>Catalisis + petroleoquimica</i>	[Unreported]
Maria	<i>Instituto de Catálisis y Petroleoquímica</i>	<i>i needed to find the equivalent in English</i>
Laura	<i>petroleochemic + catalisis</i>	[Unreported]
CSIC		
Martha	<i>(CSIC)</i>	<i>Not familiar with the terms, well Catálisis more than anything</i>
Anna	<i>CSIC</i>	<i>not sure what CSIC is and what is its equivalent in English</i>
Maria	<i>CSIC</i>	<i>I do not know what the transation of this abbreviation into English is</i>
Laura	<i>CSIC</i>	<i>the name of an institution is often different in various languages and so acronyms have to be modified eg. UN</i>
ENANTIOMEROS		
Martha	<i>enantiómeros de un fármaco</i>	<i>enantiómeros is not known to me and the use of farmaco is also not quite clear. -i think it means drug</i>
Anna	<i>Enantiomeros</i>	<i>not sure what it is in English</i>
Maria	<i>Enantiómeros</i>	<i>I have never seen that word before</i>
Laura	<i>Enantiómeros</i>	<i>another term i didn't know</i>
SOLKETAL		
Martha	<i>Solketal</i>	<i>Was not sure if this word was the same in English as it is a scientific word</i>
Anna	<i>Solketal</i>	<i>not sure if it should have a capital letter as it is a name</i>
Maria	<i>Solketal</i>	<i>i wanted to check if the spelling in English would be the same</i>
Laura	<i>Solketal</i>	<i>another technical term i wasn't familiar with</i>

The information needs common to all participants generated 20 needs instances, of which only two (Anna’s and Laura’s need “Catálisis y Petroleoquímica”) were unreported.

The second group contains common information needs that were shared by three of the four participants. As mentioned above, Laura was involved in all six information needs, sharing four of them with Anna and Maria, and two with Martha and Anna. As Table 60 shows, the six information needs generated a total of 18 need instances, of which eleven were unreported. The more general nature of the unreported needs—“alcoholes primarios” (primary alcohols), “enzima” (enzyme), “posee eficacia” (to be effective), and “tratamientos anti-sida” (anti-AIDS treatment)—again seems to support the assumption that the participants tend not to report on searches that involve unproblematic processing and that primarily aim at confirming preexisting solutions.

Table 71. Common Information Needs per Participant - Medium Level of Frequency (Task 2)

	Search Need	Need Rationale
ALCOHOLES PRIMARIOS		
Anna	<i>alcoholes primarios</i>	[Unreported]
Maria	<i>alcoholes primarios</i>	<i>its a term from chemistry</i>
Laura	<i>primary alcohol</i>	[Unreported]
ENZIMA		
Anna	<i>Enzima</i>	[Unreported]
Maria	<i>enzima (enzymes for cancer treatment)</i>	[Unreported]
Laura	<i>aids enzymes</i>	[Unreported]
POSEE EFICACIA		
Anna	<i>eficacia</i>	[Unreported]
Maria	<i>Eficacia</i>	[Unreported]
Laura	<i>posee eficacia</i>	[Unreported]
MEZCLAS RACEMICAS		
Martha	<i>Racémicas</i>	<i>Not familiar with it</i>
Anna	<i>mezclas racemica</i>	<i>not sure what it is in English</i>
Laura	<i>Racémicas</i>	<i>technical term i didn't know</i>
ENANTIOMERICAMENTE PUROS		
Anna	<i>enantiomericamente puro</i>	<i>not sure if it should be translated as pure enantiometrically or enantiometrically pure</i>
Maria	<i>Enantiomericamente</i>	[Unreported]
Laura	<i>enantioméricamente (fármacos enantioméricamente puros)</i>	<i>had already come across the term enantiomero but not in adverb form</i>
TRATAMIENTOS ANTI-SIDA		
Martha	<i>antiAIDS</i>	<i>Just wanted to check the correct useage of this term and if it requires a hyphen or not</i>
Anna	<i>anti-AIDS treatment/AIDS treatment</i>	[Unreported]
Laura	<i>effective in anti-aids treatment</i>	[Unreported]

The only exceptions here (i.e. technical terms that were not reported) seem to be Maria's search for the adverb "enantioméricamente [puro]" and the search need "enzima." The latter seems to have triggered more thematically oriented searches, as both Laura's and Maria's search needs show.²⁰³ Laura was interested in "aids enzymes," thus searching for English texts dealing with this topic. Maria's search need was also of a thematic nature, however, as her screen recording shows, she was interested in information about enzymes for cancer treatment (and not in the treatment of AIDS) and spent about five minutes researching the wrong topic.

Table 72 shows the third group of information needs, those common to at least two participants. These eight needs generated a total of 16 instances of which ten were unreported. Again, the unreported problems—mostly attributed to Laura (7) and Maria (6), with Anna sharing three of the problems—are more general and more lexical in nature. They include the needs "aplicable a," "fármaco" (drug, medicine), "investigador" (researcher), "llevar a cabo," "separación de [los enantiómeros]" (separation of enantiomers), and "de interés farmacéutico" (for pharmaceutical purposes).

As I have mentioned above, Maria and Laura had the highest number of common information needs. Nevertheless, the nature of their needs is rather different and seems to indicate two very different styles and levels of needs analysis. A closer look at the information needs "síntesis" and "separación de los enantiómeros," which were shared only by Maria and Laura, illustrates this. The term "síntesis," for example, appears in two slightly different contexts in the source text. Its first appearance is as part of the construction "síntesis de nuevos antibióticos beta-lactámicos" (which is the source text section that produced Maria's need). The second time that the term appears, and which prompted Laura's search need, is part of the expression "etapas de síntesis." While Maria, who described her information need as "sintesis [sic] of new antibiotics," performs a rather short search (lasting 58 seconds)—possibly concerning the correct spelling of the English "synthesis," which in turn led her to a brief attempt at finding background information—²⁰⁴ Laura's need "etapas de síntesis" (stages of synthesis) is

²⁰³ Let us remember at this point that for information needs that were not reported in the OSRs, I recorded the search item that was first entered by the participants in their Web searches. I also added contextual information within brackets where appropriate.

²⁰⁴ As I will further discuss in 7.2.3.3, on a number of occasions Maria conducted searches related to cancer and cancer treatment (as opposed to the treatment of AIDS discussed in the source text).

researched within the larger context of the previous search need (“separation of enantiomers”). Based on her research (which lasted for 3 minutes), she eventually changed her initial translation (create/development [of new antibiotics]) to the more technical term “synthesize.”

Table 72. Common Information Needs per Participant - Low Level of Frequency (Task 2)

	Search Need	Need Rationale
APLICABLE A		
Anna	<i>Aplicable</i>	[Unreported]
Laura	<i>Aplicable</i>	[Unreported]
ENANTIOMERO "R"		
Maria	<i>enantiómero "R"</i>	<i>i needed to find the equivalent in English</i>
Laura	<i>sólo el enantiómero "R" posee</i>	<i>the fact that the St has the R in quotation marks suggests it is a loan word, so wanted to check</i>
FARMACO		
Maria	<i>Farmaco</i>	[Unreported]
Laura	<i>Farmaco</i>	[Unreported]
INVESTIGADOR		
Maria	<i>Investigador</i>	[Unreported]
Laura	<i>Investigador</i>	[Unreported]
LLEVAR A CABO		
Anna	<i>llevar a cabo</i>	<i>not sure how this collocation is translated</i>
Maria	<i>llevar a cabo</i>	<i>I forgot what it means</i>
SEPARACION DE LOS ENANTIOMEROS		
Maria	<i>Separacion</i>	[Unreported]
Laura	<i>seperating enantiomer medicine</i>	[Unreported]
SINTESIS		
Maria	<i>sintesis [sic] of new antibiotics</i>	[Unreported]
Laura	<i>etapas de sintesis</i>	[Unreported]
DE INTERES FARMACEUTICO		
Anna	<i>de interes farmaceutico</i>	[Unreported]
Laura	<i>de interes farmaceutico</i>	<i>wasn't sure if the same wording would be used in English</i>

These different foci—Maria’s micro-lexical one and Laura’s macro-thematic one—are also reflected in these two participants’ respective descriptions of another of their shared search needs. Maria only identifies “separación” as her search need, which indicates that she is looking for its meaning and a confirmation of the acceptability of the English equivalent “separation.” While Maria’s search need is thus limited to a single lexical item, whose meaning is rather apparent given the similarities between the Spanish and English terms, Laura’s search need for the same source text unit is much more comprehensive. Her stated search need—“seperating [sic.] enantiomer medicine”—reflects the syntax of her initial Google search for this need and indicates that her

interest lies in the process of separating enantiomers as applied in the field of medicine. Thus, Laura places the search need “separación de los enantiómeros” within the larger thematic context of Task 2. As I will show in the Search Outcomes section (see also 6.2.2), Laura clearly produced the best translation of all four participants, a result to which her more in-depth style of (thematic) searching likely contributed.

7.2.2 Search Goals

In the following, I will, like in Task 1, analyze the participants’ search goals in relation to their reported and unreported common information needs. In particular, I will examine the nature (comprehension goals, production goals, or both) and type (e.g. source-text definitions, target-text equivalents, resolution of acronyms, etc.) of their specified search goals as well as their initial search actions taken to meet these goals.

7.2.2.1 Nature and Types of Information Goals

Looking at the general nature of the information goals identified by the participants of Task 2, some significant differences to Task 1 become apparent. As Table 73 shows, none of the reported search goals for Task 2 was for comprehension purposes only. Twenty-one goals were related to the production of the target text, and nine goals had dual, comprehension and production, purposes. Out of the 54 common need search goals, 24 were unreported. Excluding these unreported search goals, a total of 70% of the reported search goals concerned text production purposes. In comparison, the production-oriented search goals for Task 1 only amounted to 32% of the common reported search goals. For Task 2, the remaining 30% of the common reported search goals concerned both questions of source text comprehension and target text production, while, as mentioned, there were no comprehension-only search goals reported. For Task 1, comprehension problems had made up half of all reported search goals (50%), and combined comprehension-production search goals made up only slightly more than 18% of the reported search goals.

As we can see in Table 73, the five information needs shared by all four participants generated two-thirds (16 out of 24) of the reported search goals. The high number of solely production-related search goals for the technical terms “beta-lactámicos” (3), “enantiómeros” (3), and “solketal” (4) indicates the challenges that specialized text production poses not only for non-native speakers but also for native speakers, as demonstrated by the fact that Martha and Laura shared these search goals as well. The

proper names “[Instituto de] Catálisis y Petroleoquímica” and “CSIC” generated two thirds (6 out of 9) of the combined comprehension-production search goals, a fact that is also reflected in the above-mentioned search needs, which included both thematic and linguistic elements.

Table 73. Distribution of Information Goals per Common Information Need (Task 2)

Common Needs	Comprehension	Production	Both	Unreported	TOTAL
<i>beta-lactámicos</i>	0	3	1	0	4
<i>Catálisis y Petroleoquímica</i>	0	0	2	2	4
<i>CSIC</i>	0	0	4	0	4
<i>enantiómeros</i>	0	3	1	0	4
<i>solketal</i>	0	4	0	0	4
<i>alcoholes primarios</i>	0	0	1	2	3
<i>enzima</i>	0	0	0	3	3
<i>posee eficacia</i>	0	0	0	3	3
<i>mezclas racémicas</i>	0	3	0	0	3
<i>tratamientos anti-sida</i>	0	1	0	2	3
<i>enantioméricamente puros</i>	0	2	0	1	3
<i>aplicable a</i>	0	0	0	2	2
<i>enantiómero "R"</i>	0	2	0	0	2
<i>fármaco</i>	0	0	0	2	2
<i>investigador</i>	0	0	0	2	2
<i>llevar a cabo</i>	0	2	0	0	2
<i>separación de los enantiómeros</i>	0	0	0	2	2
<i>síntesis</i>	0	0	0	2	2
<i>de interés farmacéutico</i>	0	1	0	1	2
TOTAL	0	21	9	24	54
%	0.0%	38.9%	16.7%	44.4%	100.0%

The high number of target text-oriented search goals can be explained as representing a necessary shift (when compared to Task 1) to problems resulting from the production of specialized texts. Nevertheless, the fact that a rather specialized source text like the one for Task 2 does not seem to have generated comprehension-only (reported) search goals is surprising. It is quite possible—and in line with the participants’ tendency not to report many of these problems mentioned above—that many of the 24 unreported problems focused on matters of source text comprehension. In addition, the nine search goals in the “Both” category do comprise comprehension problems as well. Yet, the fact that they always appear in combination with matters of target text production seems to indicate a more holistic approach of the participants to their information need analyses, which, in turn, might indicate an evolution of their translation skills.

Table 74. Distribution of Information Goals per Participant (Task 2)

	Comprehension	Production	Both	Unreported	Total
Martha	0	5	2	0	7
Anna	0	6	1	7	14
Maria	0	4	4	7	15
Laura	0	6	2	10	18
TOTAL	0	21	9	24	54
%	0.0%	38.9%	16.7%	44.4%	100%

Examining the different information goals from the point of view of the individual participants, we can see that the 30 reported goals are fairly evenly distributed among the participants. The production goals range from four (Maria) to six (Anna and Laura), and the category “Both” shows values of one (Anna), two (Martha and Laura), and four (for Maria). The similarity in the participants’ goals categories is only disrupted by the “Unreported” column. Here, Laura shows the highest number (ten) of unreported goals, while Anna and Maria each had seven unreported goals. Martha, as mentioned earlier, has no unreported problems at all.

A more detailed look at the descriptions of the individual search goals (see Table 75) supports the previous analysis of the five main common needs, i.e. the needs shared by all four participants. The technical terms “beta-lactámicos,” “enantiómeros,” and “solketal” generated ten production-related searches and two searches aimed at satisfying both comprehension and production needs, highlighting the increased difficulty of producing specialized target texts. This production-oriented focus is also reflected in the search goals for other technical terms such as “mezclas racémicas,” “fármacos enantioméricamente puros,” or “enantiómero ‘R.’”

The two search needs “[Instituto de] Catálisis y Petroleoquímica” and “CSIC” are related to broader search goals, including both source-text comprehension and target-text production goals. In particular, the two needs generated six search goals belonging to the “Both” category and two unreported goals. Anna’s explanation of her search goal for CSIC highlights the intercultural nature of this information need. She stated that she was looking for “background information on the institute and also an English translation.”

Table 75. Information Goals per Common Information Need and Participant (Task 2)

	Common Needs	Search Goal(s)	Coding
BETA-LACTAMICOS			
Martha	<i>antibióticos beta-lactámicos</i>	<i>Parallel texts which would have the term in English</i>	Equivalent
Anna	<i>Antibiótico betalactámico</i>	<i>the English equivalent of this term</i>	Equivalent
Maria	<i>antibióticos beta-lactámicos</i>	<i>explanation, equivalent in English</i>	Definition + equivalent
Laura	<i>beta-lactámicos</i>	<i>english equivalent</i>	Equivalent
CATALISIS Y PETROLEOQUIMICA			
Martha	<i>Catálisis y Petroleoquímica + (CSIC)</i>	<i>their meaning in Spanish and also parallel texts in English usins CSIC</i>	Contextual meaning + equivalent
Anna	<i>Catalisis + petroleoquímica</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>Instituto de Catálisis y Petroleoquímica</i>	<i>their website and its English version</i>	Thematic + equivalent
Laura	<i>petroleochemic + catalisis</i>	[Unreported]	<i>Definition and/or equivalent</i>
CSIC			
Martha	<i>CSIC</i>	<i>their meaning in Spanish and also parallel texts in English usins CSIC</i>	Acronym resolution + equivalent
Anna	<i>CSIC</i>	<i>a background information on the institute and also an English translation</i>	Thematic + equivalent
Maria	<i>CSIC</i>	<i>CSIC website, its English version</i>	Thematic + equivalent
Laura	<i>CSIC</i>	<i>what CSIC stands for(not crime scene investigators co-op i guess), and what would be meaningful to a British reader</i>	Acronym resolution + equivalent
ENANTIOMEROS			
Martha	<i>enantiómeros de un fármaco</i>	<i>parallel texts that would reveal the correct term in English</i>	Equivalent
Anna	<i>Enantiomeros</i>	<i>the English equivalent of this word</i>	Equivalent
Maria	<i>Enantiómeros</i>	<i>translation into English</i>	Equivalent
Laura	<i>Enantiómeros</i>	<i>english equivalent and meaning</i>	Definition + equivalent
SOLKETAL			
Martha	<i>Solketal</i>	<i>To see if it is used in English or if not what the equivalent would be</i>	Equivalent
Anna	<i>Solketal</i>	<i>examples of Solketal being used in context</i>	Spelling
Maria	<i>Solketal</i>	<i>how it is spelled in English</i>	Spelling
Laura	<i>Solketal</i>	<i>eng equivalent, usages</i>	Usage + equivalent
ALCOHOLES PRIMARIOS			
Anna	<i>alcoholes primarios</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>alcoholes primarios</i>	<i>explanation and translation into English</i>	Definition + equivalent
Laura	<i>primary alcohol</i>	[Unreported]	<i>Definition and/or equivalent</i>
ENZIMA			
Anna	<i>Enzima</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>enzima (enzymes for cancer treatment)</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>aids enzymes</i>	[Unreported]	<i>Definition and/or equivalent</i>
POSEE EFICACIA			

Anna	<i>Eficacia</i>	[Unreported]	<i>Definition and/or equivalent</i>
Maria	<i>Eficacia</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>posee eficacia</i>	[Unreported]	<i>Definition and/or equivalent</i>
MEZCLAS RACEMICAS			
Martha	<i>Racémicas</i>	<i>as in the previous example parallel texts etc</i>	Equivalent
Anna	<i>mezclas racemica</i>	<i>English equivalent of the term</i>	Equivalent
Laura	<i>Racémicas</i>	<i>eng equivalent, usages</i>	Usage + equivalent
ENANTIOMERICAMENTE PUROS			
Anna	<i>enantiomericamente puro</i>	<i>which term is correct</i>	Syntax (word order)
Maria	<i>enantiomericamente</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>enantioméricamente</i>	<i>wanted to see if it could be used as such in English</i>	Usage
TRATAMIENTOS ANTI-SIDA			
Martha	<i>antiAIDS</i>	<i>useage in English documents</i>	Usage
Anna	<i>anti-AIDS treatment/AIDS treatment</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>effective in anti-aids treatment</i>	[Unreported])	<i>Definition and/or equivalent</i>
APLICABLE A			
Anna	<i>Aplicable</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>Aplicable</i>	[Unreported]	<i>Definition and/or equivalent</i>
ENANTIOMERO "R"			
Maria	<i>enantiómero "R"</i>	<i>Translation</i>	Equivalent
Laura	<i>sólo el enantiómero "R" posee</i>	<i>usage in English</i>	Usage
FARMACO			
Maria	<i>Farmaco</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>Farmaco</i>	[Unreported]	<i>Definition and/or equivalent</i>
INVESTIGADOR			
Maria	<i>Investigador</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>Investigador</i>	[Unreported]	<i>Definition and/or equivalent</i>
LLEVAR A CABO			
Anna	<i>llevar a cabo</i>	<i>an english equivalent</i>	Equivalent
Maria	<i>llevar a cabo</i>	<i>dictionary translations</i>	Equivalent
SEPARACION DE LOS ENANTIOMEROS			
Maria	<i>Separacion</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>seperating enantiomer medicine</i>	[Unreported]	<i>Definition and/or equivalent</i>
SINTESIS			
Maria	<i>sintesis [sic] of new antibiotics</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>(etapas de) sintesis</i>	[Unreported]	<i>Definition and/or equivalent</i>
DE INTERES FARMACEUTICO			
Anna	<i>de interes farmaceutico (Unreported)</i>	[Unreported]	<i>Definition and/or equivalent</i>
Laura	<i>de interes farmaceutico</i>	<i>english equivalent</i>	Equivalent

7.2.2.2 Information Goals and Initial Search Actions

An analysis of the initial search actions taken by the participants to fulfill their informational goals (see Table 76) shows that direct address searches account for exactly half of the initial actions (27 out of the 54). A total of twenty-three of these initial direct address searches were carried out in WordReference (WR), while Wikipedia (WK) accounted for three initial searches and the online dictionary TheFreeDictionary.com (FD) for one. Comparing the initial search actions of Task 2 with those of Task 1 (cf. Table 47), a major shift away from direct address searches becomes apparent. While in Task 1, almost three quarters (74.6%) of all initial search actions were direct address searches, this number fell to 50% for Task 2. Instead, for Task 2, the four participants carried out a total of 26 out of 54 initial search actions (or 48.15%) in the form of search engine queries (exclusively using Google’s New Zealand site). The remaining one initial search action was a browse search, carried out by Anna on the BBC News Website (compared to three browse searches in Task 1). Unlike for Task 1, where we saw one navigational query, this type of search was not carried out as an initial search action in Task 2.

Table 76. Distribution of Initial Search Actions per Task

	Search Needs	Search Goals	Direct Address Searches	Navigational Queries	Search Engine Queries	Browse Searches
Task 1	TOTAL	59	44	1	11	3
	%	100.0%	74.6%	1.7%	18.6%	5.1%
Task 2	TOTAL	54	27	0	26	1
	%	100.0%	50%	0.0%	48.15%	1.85%

The increased importance of search engine searches—a fact also confirmed by the distribution of the sites adopted for the participants’ search outcomes (see section 7.2.4)—correlates with the larger number of text production-oriented search goals described above. This is supported by the participants’ search goal explanations. Martha, for example, stated that she was looking for “parallel texts that would reveal the correct term in English,” and hence initiated her search process with a Google query. The same is true for Anna, who was looking for “examples of Solketal being used in context.” Out of the 20 initial search actions for the five most frequent common needs, 13 led to initial searches using search engines (all Google), while seven initial searches were direct address searches (five in WordReference.com, one in TheFreeDictionary.com, and one in Wikipedia.org). As in Task 1, the preferred site for direct address searches was

WordReference, which saw 23 of the 27 initial direct search actions (three more were carried out in Wikipedia, one in TheFreeDictionary.com).

Table 77. Distribution of Initial Search Actions per Common Information Need, Participant, and Information Goal(s) (Task 2)

Search Needs	Search Goal(s)	Direct Address Searches	Navigational Queries	Search Engine Queries	Browse Searches
BETA-LACTAMICOS					
Martha	Equivalent			Google (NZ)	
Anna	Equivalent			Google (NZ)	
Maria	Definition + equivalent	WordReference			
Laura	Equivalent			Google (NZ)	
CATALISIS Y PETROLEOQUIMICA					
Martha	Contextual meaning + equivalent			Google (NZ)	
Anna	<i>Definition and/or equivalent</i>	WordReference			-
Maria	Thematic + equivalent	WordReference			
Laura	<i>Definition and/or equivalent</i>			Google (NZ)	
CSIC					
Martha	Acronym resolution + equivalent			Google (NZ)	
Anna	Thematic + equivalent			Google (NZ)	
Maria	Thematic + equivalent			Google (NZ)	
Laura	Acronym resolution + equivalent			Google (NZ)	
ENANTIOMEROS					
Martha	Equivalent			Google (NZ)	
Anna	Equivalent	Free Dictionary			
Maria	Equivalent	WordReference			
Laura	Definition + equivalent	WordReference			
SOLKETAL					
Martha	Equivalent			Google (NZ)	
Anna	Spelling			Google (NZ)	
Maria	Spelling	Wikipedia			
Laura	Equivalent			Google (NZ)	
ALCOHOLES PRIMARIOS					
Anna	<i>Definition and/or equivalent</i>	Wikipedia			
Maria	Definition + equivalent	WordReference			
Laura	<i>Definition and/or equivalent</i>			Google (NZ)	
ENZIMA					
Anna	<i>Definition and/or equivalent</i>	WordReference			
Maria	<i>Definition and/or equivalent</i>	WordReference			
Laura	<i>Definition and/or equivalent</i>			Google (NZ)	-
POSEE EFICACIA					
Anna	<i>Definition and/or equivalent</i>	WordReference			

Maria	<i>Definition and/or equivalent</i>	WordReference			
Laura	<i>Definition and/or equivalent</i>			Google (NZ)	
MEZCLAS RACEMICAS					
Martha	Equivalent			Google (NZ)	
Anna	Equivalent	WordReference			
Laura	Usage + equivalent			Google (NZ)	
ENANTIOMERICAMENTE PUROS					
Anna	Syntax (word order)			Google (NZ)	
Maria	<i>Definition and/or equivalent</i>	WordReference			
Laura	Usage			Google (NZ)	
TRATAMIENTOS ANTI-SIDA					
Martha	Usage			Google (NZ)	
Anna	<i>Definition and/or equivalent</i>				BBC News
Laura	<i>Definition and/or equivalent</i>			Google (NZ)	
APLICABLE A					
Anna	<i>Definition and/or equivalent</i>	WordReference			
Laura	<i>Definition and/or equivalent</i>	WordReference			
ENANTIOMERO "R"					
Maria	Equivalent	Wikipedia			
Laura	Usage			Google (NZ)	
FARMACO					
Maria	<i>Definition and/or equivalent</i>	WordReference			
Laura	<i>Definition and/or equivalent</i>	WordReference			
INVESTIGADOR					
Maria	<i>Definition and/or equivalent</i>	WordReference			
Laura	<i>Definition and/or equivalent</i>	WordReference			
LLEVAR A CABO					
Anna	Equivalent	WordReference			
Maria	Equivalent	WordReference			
SEPARACION DE LOS ENANTIOMEROS					
Maria	<i>Definition and/or equivalent</i>	WordReference			
Laura	<i>Definition and/or equivalent</i>			Google (NZ)	
SINTESIS					
Maria	<i>Definition and/or equivalent</i>			Google (NZ)	
Laura	<i>Definition and/or equivalent</i>	WordReference			
DE INTERES FARMACEUTICO					
Anna	<i>Definition and/or equivalent</i>	WordReference			
Laura	Equivalent			Google (NZ)	
TOTAL	54	27	0	26	1
%	100.0%	50%	0.0%	48.15%	1.85%

A look at the participants' individual search actions for Task 2 paints a different picture to that of Task 1. Whereas the results for Task 1 show that there was little or no variation of initial search action across the participants of the study,²⁰⁵ the results for Task 2 show increased variation for almost all participants (possibly as a result of their translation learning experience). This is particularly true for Anna, who shared a total of 14 information needs, of which six were initially looked up in WordReference, one each in TheFreeDictionary.com and Wikipedia, one on the BBC News site, and five in Google. She is followed by Maria, who shared 15 information needs, of which eleven were initially searched in WordReference, three in Wikipedia, and one in Google. Laura and Martha show less variation across their initial search actions than the two non-native speakers of English. More specifically, Laura initially searched 13 of her 18 shared information needs in Google and five in WordReference, while Martha systematically queried all her information needs (seven) in Google. This suggests that both Martha and Laura used several sources of information retrieved via Google based on their different search needs (see 7.2.3.3 and 7.2.4.1 for details on the type of pages accessed). This is also the case with Anna, who accessed various sources of information according to various search goals. Maria, however, continued to restrict most of her initial searches to WordReference. That is, for task two there is increased variation across the participants' initial search actions, except for Martha, and increased variation of sources of information, except for Maria. The increased variation of sources is particularly visible in Anna's case. These findings, in turn, suggest that questions characteristics had a bigger impact on the participants' initial choice of search actions (except for Martha) as well as their selection of information sources (except for Maria) for Task 2 than for Task 1.

7.2.3 Search Processes

In this section, I will first describe the participants' search session lengths per common information need, and will then examine their adopted approaches to Web searching, i.e. their direct address searches, search engine queries, and browse searches.²⁰⁶ In particular, I will analyze the participants' direct address searches in relation to their use

²⁰⁵ Bob almost always used search engine queries, while the student participants as well as Daniel initially performed direct address searches.

²⁰⁶ As in Task 1, the number of navigational queries in Task 2 is very low and hence excluded from the data analysis. These queries concern the participants' simple searches aimed at yielding the CSIC site and Anna's basic query for arriving at the BBC News site.

of reference works as these searches continued to systematically involve known dictionaries and encyclopedias for information acquisition. I will describe the participants' query behaviors based on the notions of query complexity, query length, query type, and query effectiveness. The latter will be described in connection with the participants' query construction and query modifications behaviors. In addition, I will provide an overview of the total number of pages that the participants accessed to research the common information needs. Finally, with regard to browse searches, I will describe these for all the participants, except for Laura, who did not conduct this type of search.

Like in Task 1, this multi-faceted analysis of the participants' online search behaviors is expected to shed some light on several qualitative IS&R patterns concerning the participants' range and depth of search behavior as well as their degree of repetitive behavior embedded in Task 2.

7.2.3.1 Search Sessions

The average time spent by the participants of Task 2 to search their common information needs and the average number of actions taken during said searches reflects the more challenging nature of Task 2. On average, participants spent one minute and 51 seconds on each information need, carrying out 15.6 actions during that time (i.e. each action lasted for an average of 7.1 seconds). For Task 1, the average session lengths for the four participants of Task 2 were 59 seconds, and the average number of actions carried out during that time was 7.1 (i.e. each action lasted for an average of 8.3 seconds).

For Task 2, two information needs—the word combinations “fármacos enantioméricamente puros” and “separación de los enantiómeros”—generated searches whose average lengths was above three minutes. This compares to one search need (“guía roja y verde”) in Task 1. Seven sessions in Task 2 lasted for between two and three minutes (none for Task 1), and nine between one and two minutes (five for Task 1). The main differences in the session lengths are with regard to short sessions, i.e. those lasting less than one minute. In Task 2, there were only four out of 19 average session lengths below one minute, while for Task 1 the majority of sessions (ten out of 16) lasted less than one minute. As I will show below, the overall increase in session lengths for Task 2 can be explained by the more specialized nature of Task 2.

Table 78. Ranking of Common Information Needs per Session Length, with Online Actions and Occurrences (Task 2)

#	Common Needs	Average Time	Average No. of Action	No. of Occurrences
1	<i>enantioméricamente puros</i>	0:03:31	27.7	3
2	<i>separación de los enantiómeros</i>	0:03:08	16.0	2
3	<i>CSIC</i>	0:02:53	38.3	4
4	<i>Enantiómeros</i>	0:02:37	15.5	4
5	<i>Fármaco</i>	0:02:23	18.5	2
6	<i>Enzima</i>	0:02:22	18.0	3
7	<i>enantiómero "R"</i>	0:02:01	18.0	2
8	<i>síntesis*</i>	0:01:59	18.5	2
9	<i>de interés farmacéutico</i>	0:01:51	15.0	2
10	<i>Catálisis y Petroleoquímica</i>	0:01:47	13.0	4
11	<i>beta-lactámicos</i>	0:01:38	12.3	4
12	<i>tratamientos anti-sida</i>	0:01:37	12.3	3
13	<i>mezclas racémicas</i>	0:01:30	14.3	3
14	<i>alcoholes primaries</i>	0:01:29	14.0	3
15	<i>Solketal</i>	0:01:13	13.3	4
16	<i>llevar a cabo</i>	0:01:11	9.0	2
17	<i>aplicable a</i>	0:00:51	10.0	2
18	<i>posee eficacia</i>	0:00:38	6.3	3
19	<i>Investigador</i>	0:00:29	6.0	2
AVERAGE		0:01:51	15.6	54

As mentioned above, the information need with the highest average session length is “fármacos enantioméricamente puros” (three minutes and 31 seconds). Nevertheless, a closer look at the individual scores for this search need shows that Anna alone spent a total of more than eight minutes searching for this needs, thus carrying out 57 search actions. The information need that generated the highest average number of search actions (38.3) is the acronym CSIC. Here, again, it is Anna, whose total of 70 actions—distributed over five different search sessions (see below)—skew the results. It should be noted, though, that the second and third search sessions that Anna conducted to research this acronym also included search actions aimed at addressing one of her individual information needs, in particular that concerning the selection between two translation variants (cf. Table 39). In addition to these two search sessions, she dedicated a third one to address the latter need independently.

The total times spent by the individual participants on each information need and the number of actions carried out during that time highlight the individual ‘problem zones,’ i.e. the information needs that prompted the longest searches for each individual

participant. As previously mentioned, Anna, who spent the most time of all participants on her searches (39 minutes and eight seconds),²⁰⁷ spent a significant amount of time on the information need “fármacos enantioméricamente puros” (8 min. 2 sec.; 57 actions) and “CSIC” (4 min. 13 sec.; 70 actions). Maria, whose overall session time of 33 minutes and 32 seconds was the second longest, spent most of her time on searching the information needs “CSIC” (6 min. 44 sec.; 39 actions) and “enzima” (6 min. 21 sec.; 40 actions).²⁰⁸ By comparison, the other two participants who researched “enzima” (Laura and Anna) only spent 20 and 16 seconds, respectively, on said information need.

Laura, who spent a total of 25 minutes and 39 seconds carrying online search actions, did not show any of the long searches seen with the other three participants. Only two of her information needs exceed the three-minute mark. These are “separación de los enantiómeros” (4 min. 40 sec.; 23 actions) and “síntesis” (3 min. 1 sec.; 26 actions). Martha, finally, who spent the least amount of time on her search sessions (17 minutes and 50 seconds), spent almost eight (uninterrupted) minutes researching the information need “enantiómeros” (7 min. 57 sec.; 30 actions). Martha’s second longest search session was for the information need “Catálisis y Petroleoquímica” (2 min. 40 sec.; 10 actions).

Among the eight time-intensive information needs mentioned above, only one (CSIC) appeared twice, a fact that shows the wide spread of needs associated with Task 2 and the different text sections providing ‘difficulties’ for the individual participants. Yet, despite these individual differences, we can also see that the thematic and terminological needs were at the centre of the research of all participants. The four information needs identified earlier as being of a more general lexical nature—“llevar a cabo,” “aplicable a,” “posee eficacia,” and “investigador”—represent the four least time-consuming information needs—averaging only between 29 seconds and one minute eleven seconds.

²⁰⁷ The total search session times for the participants do not necessarily coincide with the total research times specified in 6.3.1.2. While the latter includes time spent carrying out online search actions as well as time spent in the translation window to acquire contextual information, the former only includes time spent performing online search actions.

²⁰⁸ As I will explain in the discussion of the participants’ search paths (see section 7.1.3.1), Maria, in her search for “enzima,” spent almost five minutes looking for the use of enzymes in the treatment of cancer (instead of AIDS). She also spent about 90 seconds looking for the wrong acronym (“SCIC” instead of “CSIC”).

Table 79. Search Sessions, Session Length, and Online Actions per Common Information Need and Participant (Task 2)

Common Needs		No. of Sessions	Total Time	Total Actions
BETA-LACTAMICOS		1		
Martha	<i>antibióticos beta-lactámicos</i>	1	0:02:28	10
Anna	<i>Antibiótico betalactámico</i>	1	0:00:38	6
Maria	<i>antibióticos beta-lactámicos</i>	1	0:02:42	29
Laura	<i>beta-lactámicos</i>	1	0:00:44	4
Subaverage			0:01:38	12.25
CATALISIS Y PETROLEOQUIMICA				
Martha	<i>Catálisis y Petroleoquímica + (CSIC)</i>	1	0:02:40	10
Anna	<i>Catalisis + petroleoquímica</i>	1	0:01:38	19
Maria	<i>Instituto de Catálisis y Petroleoquímica</i>	1	0:01:43	13
Laura	<i>petroleochemic + catalisis</i>	2	0:01:08	10
Subaverage			0:01:47	13
CSIC				
Martha	<i>(CSIC)</i>	0	0:00:00	0
Anna	<i>CSIC</i>	5	0:04:13	70
Maria	<i>CSIC</i>	1	0:06:44	39
Laura	<i>CSIC</i>	1	0:00:34	6
Subaverage			0:02:53	38.33
ENANTIOMEROS				
Martha	<i>enantiómeros de un fármaco</i>	1	0:07:57	30
Anna	<i>Enantiomeros</i>	1	0:00:48	14
Maria	<i>Enantiómeros</i>	1	0:00:45	7
Laura	<i>Enantiómeros</i>	1	0:00:56	11
Subaverage			0:02:37	15.5
SOLKETAL				
Martha	<i>Solketal</i>	1	0:00:27	7
Anna	<i>Solketal</i>	1	0:00:30	7
Maria	<i>Solketal</i>	1	0:00:20	3
Laura	<i>Solketal</i>	2	0:03:36	36
Subaverage			0:01:13	13.25
ALCOHOLES PRIMARIOS				
Anna	<i>alcoholes primaries</i>	1	0:00:22	5
Maria	<i>alcoholes primaries</i>	1	0:03:25	29
Laura	<i>primary alcohol</i>	1	0:00:41	8
Subaverage			0:01:29	14
ENZIMA				
Anna	<i>Enzima</i>	1	0:00:16	6
Maria	<i>Enzima</i>	2	0:06:21	40
Laura	<i>aids enzymes</i>	1	0:00:29	8
Subaverage			0:02:22	18
POSEE EFICACIA				
Anna	<i>Eficacia</i>	1	0:00:09	3
Maria	<i>Eficacia</i>	1	0:00:13	6
Laura	<i>posee eficacia</i>	1	0:01:33	10

Subaverage			0:00:38	6.33
MEZCLAS RACEMICAS				
Martha	<i>Racémicas</i>	2	0:03:02	23
Anna	<i>mezclas racemica</i>	1	0:01:01	17
Laura	<i>Racémicas</i>	1	0:00:27	3
Subaverage			0:01:30	14.33
ENANTIOMERICAMENTE PUROS				
Anna	<i>enantiomericamente puro</i>	2	0:08:02	57
Maria	<i>enantiomericamente</i>	1	0:00:24	8
Laura	<i>Enantioméricamente</i>	2	0:02:08	18
Subaverage			0:03:31	27.67
TRATAMIENTOS ANTI-SIDA				
Martha	<i>antiAIDS</i>	1	0:01:16	16
Anna	<i>anti-AIDS treatment/AIDS treatment</i>	2	0:01:58	10
Laura	<i>effective in anti-aids treatment</i>	1	0:00:55	11
Subaverage			0:01:37	12.33
APLICABLE A				
Anna	<i>medication applicable to aids</i>	2	0:01:28	14
Laura	<i>Applicable</i>	1	0:00:13	6
Subaverage			0:00:51	10
ENANTIOMERO "R"				
Maria	<i>enantiómero "R"</i>	1	0:02:06	26
Laura	<i>sólo el enantiómero "R" posee</i>	1	0:01:56	10
Subaverage			0:02:01	18
FARMACO				
Maria	<i>Farmaco</i>	3	0:03:22	24
Laura	<i>Farmaco</i>	2	0:01:24	13
Subaverage			0:02:23	18.5
INVESTIGADOR				
Maria	<i>Investigador</i>	1	0:00:23	6
Laura	<i>Investigador</i>	1	0:00:35	6
Subaverage			0:00:29	6
LLEVAR A CABO				
Anna	<i>llevar a cabo</i>	1	0:01:55	12
Maria	<i>llevar a cabo</i>	1	0:00:26	6
Subaverage			0:01:11	9
SEPARACION DE LOS ENANTIOMEROS				
Maria	<i>Separacion</i>	1	0:01:36	9
Laura	<i>seperating enantiomer medicine</i>	3	0:04:40	23
Subaverage			0:03:08	16
SINTESIS				
Maria	<i>sintesis [sic] of new antibiotics</i>	1	0:00:58	11
Laura	<i>etapas de sintesis</i>	2	0:03:01	26
Subaverage			0:01:59	18.5
DE INTERES FARMACEUTICO				
Anna	<i>de interes farmaceutico</i>	1	0:03:20	23
Laura	<i>de interes farmaceutico</i>	1	0:00:21	7
Subaverage			0:01:51	15

7.2.3.2 Direct Address Searches

A comparison of the participants' direct address searches throughout their entire search processes (as opposed to only their initial search actions) between tasks 1 and 2 shows that while the number of direct address searches is lower for Task 2 (44 as compared to 54 in Task 1, the reason being the higher number of search engine searches in Task 2), participants accessed a wider range of reference works in Task 2. Here, participants used the online dictionaries WordReference (WR), Merriam Webster (M-W), and TheFreeFictionary.com (FD), as well as the online encyclopedia Wikipedia (WK). The online dictionary of the Real Academia Española (RAE), which was the only reference work next to WordReference in Task 1, was not used at all for direct address searches in Task 2.

Table 80. Reference Works per Common Information Need and Participant (Task 2)

Common Needs	Dictionaries			Encyclopedias	TOTAL
	WR	FD	M-W	Wikipedia	
BETA-LACTAMICOS					
Martha	0	0	0	0	0
Anna	0	0	0	0	0
Maria	1	0	0	0	1
Laura	0	0	0	0	0
CATALISIS Y PETROLEOQUIMICA					
Martha	0	0	0	0	0
Anna	1	0	0	0	1
Maria	0	0	0	0	0
Laura	0	0	1	0	1
CSIC					
Martha	0	0	0	0	0
Anna	0	0	0	0	0
Maria	0	0	0	0	0
Laura	0	0	0	0	0
ENANTIOMEROS					
Martha	0	0	0	0	0
Anna	0	1	0	0	1
Maria	1	0	0	0	1
Laura	1	0	0	0	1
SOLKETAL					
Martha	0	1	0	0	1
Anna	0	0	0	0	0
Maria	0	0	0	1	1
Laura	0	0	1	0	1
ALCOHOLES PRIMARIOS					
Anna	0	0	0	1	1
Maria	2	0	0	0	2

Laura	1	0	0	0	1
ENZIMA					
Anna	1	0	0	0	1
Maria	2	0	0	0	2
Laura	0	0	0	0	0
POSEE EFICACIA					
Anna	1	0	0	0	1
Maria	1	0	0	0	1
Laura	1	0	0	0	1
MEZCLAS RACEMICAS					
Martha	0	0	0	0	0
Anna	1	1	0	1	3
Laura	0	0	0	0	0
ENANTIOMERICAMENTE PUROS					
Anna	0	0	0	0	0
Maria	1	0	0	1	2
Laura	0	0	0	1	1
TRATAMIENTOS ANTI-SIDA					
Martha	0	0	0	0	0
Anna	0	0	0	0	0
Laura	1	0	0	0	1
APLICABLE A					
Anna	2	0	0	0	2
Laura	1	0	0	0	1
ENANTIOMERO "R"					
Maria	0	0	0	2	2
Laura	0	0	0	0	0
FARMACO					
Maria	3	0	0	0	3
Laura	1	0	1	0	2
INVESTIGADOR					
Maria	2	0	0	0	2
Laura	1	0	0	0	1
LLEVAR A CABO					
Anna	1	0	0	0	1
Maria	1	0	0	0	1
SEPARACION DE LOS ENANTIOMEROS					
Maria	1	0	0	0	1
Laura	0	0	0	0	0
SINTESIS					
Maria	0	0	0	0	0
Laura	1	0	0	0	1
DE INTERES FARMACEUTICO					
Anna	1	0	0	0	1
Laura	0	0	0	0	0
TOTAL	31	3	3	7	44
%	70.5%	6.8%	6.8%	15.9%	100%

The vast majority of direct address searches were still carried out in WordReference, also its total percentage of 77.5% is below that for Task 1 (91%). Wikipedia, which was not accessed via direct address searches in Task 1, had the second highest number of direct address searches (seven, or 15.9%), which indicates a greater need for thematic knowledge for Task 2. Merriam Webster’s online dictionary and TheFreeDictionary.com, which both did not appear in Task 1, both had three direct address searches (6.8% each). It is thus interesting to note that the participants’ individual needs for Task 2 were all researched in WordReference only, a fact that again indicates the more general, lexical nature of these needs.

Table 81. Reference Works per Participant (Task 2)

Common Needs	Dictionaries			Encyclopedias	TOTAL
	WR	FD	M-W	Wikipedia	
Martha	0	1	0	0	1
Anna	8	2	0	2	12
Maria	15	0	0	4	19
Laura	8	0	3	1	12
Total	31	3	3	7	44

Table 81 shows the distribution of reference materials accessed via direct address searches per participant. Martha (one search only in TheFreeDictionary.com) and Maria (a total of 19 searches) form the two ends of the direct search spectrum, with Anna and Laura both having carried out twelve direct address searches. Here, the preference of the participants for WordReference is still very visible, with Maria accessing the site 15 times and Anna and Laura accessing it eight times each. Maria also accessed Wikipedia most often (four times), while Laura is the only one using Merriam Webster’s online dictionary (three times).

7.2.3.3 Search Engine Queries

As indicated earlier, I will, in the following, examine the participants’ use of search engines, i.e. I will be analyzing their search behaviors at the level of the query. Here, I will be looking at query complexity (simple vs. advanced queries), query length (number of terms in a query, excluding articles, prepositions, and punctuation), and query type (initial vs. subsequent queries, with the latter being further classified into modified queries, repeat queries, and unique queries). Finally, I will discuss the participants’ query (re-)formulation patterns, which will allow for an overview of their

query construction and query modification behaviors from the perspective of query effectiveness.

Query Complexity

The analysis of the complexity of the search engine queries carried out shows that 80.2% (73 out of 91) of all Google searches were implemented as simple queries. Advanced queries only account for 18 of the total search engine searches. In Task 1, the number of advanced queries had been higher (13) than that of the simple queries (9). The overall number of search engine queries in Task 1 was, however, rather small (22).

A look at the query behavior of the individual participants shows that Anna carried out 14 of the 18 advanced searches in Task 2 alone, with Martha and Laura conducting two advanced searches each. Maria, who had the highest number of direct access searches, did not carry out any advanced search engine queries at all.

Table 82. Query Complexity per Participant – Task Comparison

	Task 1			Task 2		
	Simple	Advanced	Total	Simple	Advanced	Total
Martha	1	3	4	14	2	16
Anna	1	3	4	7	14	21
Maria	5	3	8	23	0	23
Laura	2	4	6	29	2	31
TOTAL	9	13	22	73	18	91

A look at the total number of queries carried out per common information need shows that six of the total of 19 common needs generated the highest number of search engine queries, ranging from seven to twelve queries. These six needs include, with the exception of “Catálisis y Petroleoquímica,” the needs shared by all participants, i.e. the needs that occurred with the highest level of frequency. These are “beta-lactámicos,” “CSIC,” “enantiómeros,” and “solketal.” For the remaining common information needs, the same correlation can be identified, i.e. the less specialized the nature of the needs and the lower their frequency of occurrence, the lower the total number of search engine queries.

Table 83. Query Complexity per Common Information Need and Participant (Task 2)

	Simple Queries	Advanced Queries	Total
BETA-LACTAMICOS			
Martha	3	0	3
Anna	1	0	1
Maria	5	0	5

Laura	1	0	1
CATALISIS Y PETROLEOQUIMICA			
Martha	1	0	1
Anna	0	0	0
Maria	1	0	1
Laura	2	0	2
CSIC			
Martha	0	0	0
Anna	2	1	3
Maria	3	0	3
Laura	1	0	1
ENANTIOMEROS			
Martha	4	2	6
Anna	0	1	1
Maria	1	0	1
Laura	1	0	1
SOLKETAL			
Martha	1	0	1
Anna	1	0	1
Maria	0	0	0
Laura	5	0	5
ALCOHOLES PRIMARIOS			
Anna	0	0	0
Maria	3	0	3
Laura	1	0	1
ENZIMA			
Anna	0	0	0
Maria	2	0	2
Laura	1	0	1
POSEE EFICACIA			
Anna	0	0	0
Maria	0	0	0
Laura	2	0	2
MEZCLAS RACEMICAS			
Martha	3	0	3
Anna	0	0	0
Laura	1	0	1
ENANTIOMERICAMENTE PUROS			
Anna	2	6	8
Maria	0	0	0
Laura	2	2	4
TRATAMIENTOS ANTI-SIDA			
Martha	2	0	2
Anna	0	1	1
Laura	1	0	1
APLICABLE A			
Anna	1	1	2
Laura	0	0	0
ENANTIOMERO "R"			

Maria	2	0	2
Laura	2	0	2
FARMACO			
Maria	2	0	2
Laura	0	0	0
INVESTIGADOR			
Maria	0	0	0
Laura	0	0	0
LLEVAR A CABO			
Anna	0	2	2
Maria	0	0	0
SEPARACION DE LOS ENANTIOMEROS			
Maria	2	0	2
Laura	3	0	3
SINTESIS			
Maria	2	0	2
Laura	5	0	5
DE INTERES FARMACEUTICO			
Anna	0	2	2
Laura	1	0	1
TOTAL	73	18	91
%	80.22%	19.78%	100%

It should also be noted that, unlike in Task 1, for which Bob and Anna conducted a number of site queries using the internal search engines of specialized Websites, the participants of Task 2 did not conduct any such queries on Websites that were immediately accessed via Google. Nevertheless, Anna and Maria conducted a number of site queries on Websites that were later re-accessed for additional or new research in the form of browse searching (see 7.2.3.4 for more details).

Query Length

Analyzing the lengths of the simple queries, we see that queries with three search terms have the highest frequency (22). This is followed by queries containing one (21), two (19), and four (13) words. Three queries are longer than four words (one has 5 words, and two have six words). These three long queries were all carried out by Maria and concerned the Spanish names of the research institute and the Spanish Research Council mentioned in the text. The average number of words per query for Task 2 is 2.38, which is lower than the 2.44 word average for Task 1. Task 1 had, however, only a small number of basic searches (nine). The on-average shortest query carried out by at least two participants was the one for “enantiómeros” (1.67 words), while the longest ones were the ones for “separación de los enantiómeros,” “aplicable a,” “enzima,” and “alcohols primaries” (with three words each).

The three information needs that generated the highest number of simple queries are “beta-lactámicos” (ten), “solketal” (seven), and “síntesis” (seven). The first, which was researched by all four participants, was also the information need that generated the overall highest number of search terms (20).

Table 84. Simple Query Length per Common Information Need and Participant (Task 2)

Common Needs	No. of Terms in Simple Queries						Total No. of Queries	Total No. of Terms	Average No. of Terms per Query
	1	2	3	4	5	6			
BETA-LACTAMICOS									
Martha	0	2	1	0	0	0	3	7	2.33
Anna	1	0	0	0	0	0	1	1	1
Maria	0	4	1	0	0	0	5	11	2.2
Laura	1	0	0	0	0	0	1	1	1
Subtotal	2	6	2	0	0	0	10	20	2.00
CATALISIS Y PETROLEOQUIMICA									
Martha	0	0	0	1	0	0	1	4	4
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	1	0	1	5	5
Laura	2	0	0	0	0	0	2	2	1
Subtotal	2	0	0	1	1	0	4	11	2.75
CSIC									
Martha	0	0	0	0	0	0	0	0	0
Anna	1	1	0	0	0	0	2	3	1.5
Maria	1	0	0	0	0	2	3	13	4.33
Laura	1	0	0	0	0	0	1	1	1
Subtotal	3	1	0	0	0	2	6	17	2.83
ENANTIOMEROS									
Martha	2	1	1	0	0	0	4	7	2
Anna	0	0	0	0	0	0	0	0	0
Maria	0	1	0	0	0	0	1	2	2
Laura	1	0	0	0	0	0	1	1	1
Subtotal	3	2	1	0	0	0	6	10	1.67
SOLKETAL									
Martha	1	0	0	0	0	0	1	1	1
Anna	1	0	0	0	0	0	1	1	1
Maria	0	0	0	0	0	0	0	0	0
Laura	1	0	2	2	0	0	5	15	3.00
Subtotal	3	0	2	2	0	0	7	17	2.43
ALCOHOLES PRIMARIOS									
Anna	0	0	0	0	0	0	0	0	0
Maria	0	1	1	1	0	0	3	9	3
Laura	0	0	1	0	0	0	1	3	3
Subtotal	0	1	2	1	0	0	4	12	3
ENZIMA									
Anna	0	0	0	0	0	0	0	0	0

Maria	0	0	1	1	0	0	2	7	3.5
Laura	0	1	0	0	0	0	1	2	2
Subtotal	0	1	1	1	0	0	3	9	3
POSEE EFICACIA									
Anna	0	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	0
Laura	0	1	1	0	0	0	2	5	2.5
Subtotal	0	1	1	0	0	0	2	5	2.5
MEZCLAS RACEMICAS									
Martha	2	1	0	0	0	0	3	4	1
Anna	0	0	0	0	0	0	0	0	0
Laura	0	0	1	0	0	0	1	3	3
Subtotal	2	1	1	0	0	0	4	7	2
ENANTIOMERICAMENTE PUROS									
Anna	1	0	0	1	0	0	2	5	2.5
Maria	0	0	0	0	0	0	0	0	0
Laura	0	1	1	0	0	0	2	5	2.5
Subtotal	1	1	1	1	0	0	4	10	2.5
TRATAMIENTOS ANTI-SIDA									
Martha	2	0	0	0	0	0	2	2	0
Anna	0	0	0	0	0	0	0	0	0
Laura	0	0	1	0	0	0	1	3	3
Subtotal	2	0	1	0	0	0	3	5	2
APLICABLE A									
Anna	0	0	1	0	0	0	1	3	3
Laura	0	0	0	0	0	0	0	0	0
Subtotal	0	0	1	0	0	0	1	3	3
ENANTIOMERO "R"									
Maria	1	1	0	0	0	0	2	3	1.5
Laura	1	0	1	0	0	0	2	4	2
Subtotal	2	1	1	0	0	0	4	7	1.75
FARMACO									
Maria	0	0	2	0	0	0	2	6	3
Laura	0	0	0	0	0	0	0	0	0
Subtotal	0	0	2	0	0	0	2	6	3
SEPARACION DE LOS ENANTIOMEROS									
Maria	0	1	1	0	0	0	2	5	3
Laura	0	0	2	1	0	0	3	10	3.33
Subtotal	0	1	3	1	0	0	5	15	3
SINTESIS									
Maria	0	0	1	1	0	0	2	7	3.5
Laura	1	2	2	0	0	0	5	11	2.2
Subtotal	1	2	3	1	0	0	7	18	2.57
DE INTERES FARMACEUTICO									
Anna	0	0	0	0	0	0	0	0	0
Laura	0	1	0	0	0	0	1	2	2
TOTAL	0	1	0	0	0	0	1	2	2
TOTAL TERMS	21	19	22	8	1	2	73	174	2.38

With regard to the lengths of the 18 advanced queries, we see that, like in Task 1, queries with one term (or phrase) are still the most frequent ones (14 out of 18, compared to 10 out of 12 in Task 1). Advanced queries with more than one search term were also rare in Task 2, with only two search queries containing two terms, one query containing four terms, and one query containing six terms. In Task 1, there were only two queries containing two terms, and no queries longer than that, which is the reason why the average length of the advanced queries is longer in Task 2 (1.56) than in Task 1 (1.23). As previously explained, the lower averages (compared to the average of the simple searches) result from treating phrase search as constituting one search term.

Table 85. Advanced Query Length per Common Information Need and Participant (Task 2)

Common Needs	No. of Terms per Search						Total No. of Searches	Total No. of Terms	Average No. of Terms per Search
	1	2	3	4	5	6			
CSIC									
Martha	0	0	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	1	1	1
Maria	0	0	0	0	0	0	0	0	0
Laura	0	0	0	0	0	0	0	0	0
Subtotal	1	0	0	0	0	0	1	1	1
ENANTIOMEROS									
Martha	0	0	0	1	0	1	2	10	5
Anna	1	0	0	0	0	0	1	1	1
Maria	0	0	0	0	0	0	0	0	0
Laura	0	0	0	0	0	0	0	0	0
Subtotal	1	0	0	1	0	1	3	11	3.67
ENANTIOMERICAMENTE PUROS									
Anna	4	2	0	0	0	0	6	8	1.33
Maria	0	0	0	0	0	0	0	0	0
Laura	2	0	0	0	0	0	2	2	1
Subtotal	6	2	0	0	0	0	8	10	1.25
TRATAMIENTOS ANTI-SIDA									
Martha	0	0	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	1	1	1
Laura	0	0	0	0	0	0	0	0	0
Subtotal	1	0	0	0	0	0	1	1	1
APLICABLE A									
Anna	1	0	0	0	0	0	1	1	1
Laura	0	0	0	0	0	0	0	0	0
Subtotal	1	0	0	0	0	0	1	1	1
LLEVAR A CABO									
Anna	2	0	0	0	0	0	2	2	1
Maria	0	0	0	0	0	0	0	0	0
Subtotal	2	0	0	0	0	0	2	2	1
DE INTERES FARMACEUTICO									
Anna	2	0	0	0	0	0	2	2	1
Laura	0	0	0	0	0	0	0	0	0
Subtotal	2	0	0	0	0	0	2	2	1
TOTAL	14	2	0	1	0	1	18	28	1.56

Query Types

As Table 86 shows, the query modification behavior of the four participants in Task 2 is more active than it was in Task 1. There are a total of 91 queries, out of which 44 were initial searches only, i.e. they did not lead to any query modification or repetition. In 46 cases, initial queries were further modified, and in one case an initial query was repeated.

Table 86. Query Type per Participant (Task 2)

Common Needs	Initial Queries	Modified Queries	Repeat Queries	TOTAL
Martha	6	10	0	16
Anna	12	9	0	21
Maria	11	12	0	23
Laura	15	15	1	31
TOTAL	44	46	1	91
AVERAGE	11	11.5	0.25	22.75

When comparing the types of queries across the two tasks, it is important to note again that the number of search engine queries was much higher in Task 2 (91) than in Task 1 (22). Nevertheless, while in Task 1 the majority of the queries were initial queries only (12 out of 22, or 54.55%), in Task 2 the majority of search engine queries were modified queries (46 out of 91, or 50.55%). This compares to 44 initial queries in Task 2 (48.35%). In addition, in both tasks, there was one repeat query each. It should also be noted that the information needs “CSCI,” “solketal,” and “enantiómero ‘R’” produced identical queries by the participants researching this term, most likely due to their name-like character.

Analyzing the query types per participant, we can see that on average participants carried out 11 initial queries and 11.25 modified queries. Anna and Maria are very close to these averages, while Martha only had six initial queries and Laura 15 initial and 15 modified queries. The total number of queries also shows the significant difference between the two native English speakers in the group. While Laura has a total of 31 queries, Martha only has 16. Both numbers are, however, a direct consequence of the number of common needs. While Laura shared 18 of the 19 common needs (including linguistic and extra-linguistic needs), Martha only shared seven common needs (almost entirely of a linguistic nature).

A look at the number of modified queries identifies information needs for which the participants seem to have struggled to construct a satisfying query. Here, the

information needs vary according to participant. Martha, for example, carried out five modified queries in relation to her search need “enantiómeros.” Similarly, Anna created six modified queries in her attempt to research the information need “[fármacos] enantioméricamente puros.” For Maria, the information need “[antibióticos] beta-lactámicos” was the one making the highest number of query modifications necessary (six). In Laura’s case, finally, the information need “[etapas de] síntesis” proved most demanding, prompting her to conduct a total of four modified queries. All these needs reflect, to a lesser or greater extent, the thematic core of the text.

Table 87. Query Type per Common Information Need and Participant (Task 2)

Common Needs	Initial Query	Modified Queries	Repeat Queries	Total
BETA-LACTAMICOS				
Martha	1	2	0	3
Anna	1	0	0	1
Maria	1	4	0	5
Laura	1	0	0	1
CATALISIS Y PETROLEOQUIMICA				
Martha	1	0	0	1
Anna	0	0	0	0
Maria	1	0	0	1
Laura	1	1	0	2
CSIC				
Anna	3	0	0	3
Maria	1	2	0	3
Laura	1	0	0	1
ENANTIOMEROS				
Martha	1	5	0	6
Anna	1	0	0	1
Maria	1	0	0	1
Laura	1	0	0	1
SOLKETAL				
Martha	1	0	0	1
Anna	1	0	0	1
Maria	0	0	0	0
Laura	1	3	1	5
ALCOHOLES PRIMARIOS				
Anna	0	0	0	0
Maria	2	1	0	3
Laura	1	0	0	1
ENZIMA				
Anna	0	0	0	0
Maria	1	1	0	2
Laura	1	0	0	1
POSEE EFICACIA				
Anna	0	0	0	0

Maria	0	0	0	0
Laura	1	1	0	2
MEZCLAS RACEMICAS				
Martha	1	2	0	3
Anna	0	0	0	0
Laura	1	0	0	1
ENANTIOMERICAMENTE PUROS				
Anna	2	6	0	8
Maria	0	0	0	0
Laura	1	3	0	4
TRATAMIENTOS ANTI-SIDA				
Martha	1	1	0	2
Anna	1	0	0	1
Laura	1	0	0	1
APLICABLE A				
Anna	1	1	0	2
Laura	0	0	0	0
ENANTIOMERO "R"				
Maria	1	1	0	2
Laura	1	1	0	2
FARMACO				
Maria	1	1	0	2
Laura	0	0	0	0
INVESTIGADOR				
Maria	0	0	0	0
Laura	0	0	0	0
LLEVAR A CABO				
Anna	1	1	0	2
Maria	0	0	0	0
SEPARACION DE LOS ENANTIOMEROS				
Maria	1	1	0	2
Laura	1	2	0	3
SINTESIS				
Maria	1	1	0	2
Laura	1	4	0	5
DE INTERES FARMACEUTICO				
Anna	1	1	0	2
Laura	1	0	0	1
TOTAL	44	46	1	91
%	48.35%	50.55%	1%	100%

Total Number of Pages Accessed

The types of queries and their distribution discussed above show that the range of searching of all four participants was considerable and far broader than in Task 1. To see whether the same can be said about the depth of research, i.e. the level of

engagement with the Websites accessed, I will, in the following, analyze the number of pages accessed and the types of actions carried out with regard to said pages.

As Table 88 shows, the four participants accessed a total of 134 pages. This is more than three times the number of pages accessed for Task 1 (42), and shows that the higher degree of specialization of Task 2 and the participants' lack of knowledge led to more intensive searching by all four participants. It may also show a higher awareness on the part of the participants on the complexity of translation, consistent with their learning progress.

Almost half of the 134 pages accessed were SERPs (64 out of 134, or 47.8%). In these cases, participants scanned the results but did not use any of the links provided on the search result pages. In Task 1, SERPs were only the third most frequent type of pages accessed, or rather viewed (nine out of 41) by the student participants, and their share of the total pages accessed was thus considerably lower (22%). In Task 2, 39 Web pages (29.1%) were accessed via a result link on one of the SERPs, which was the most frequent type of access in Task 1 (16 pages, or 39%). Another 31 pages (23.1%) were accessed through internal links on a Website (as compared to 15 pages, or 36.6% in Task 1). While this seems to indicate that the searching in Task 1 was more active than in Task 2, it is important to remember that, first, the total number of pages accessed was very low, and, second, Anna alone accounted for twelve out of the 15 internal links. With regard to the lower percentage of result links accessed in Task 2, this seems to be related to the higher number of confirmation-oriented, terminological searches.

On average, each participant accessed 33.5 pages, almost three times as many pages as in Task 1 (10.5). This number again underlines the broader range of searching in Task 2. Similarly, the average number of pages accessed per common search need type was much higher in Task 2 (7.1) than in Task 1 (2.6). A look at the average number of pages accessed per common need occurrence (as opposed to common need type) is rather telling about the difference in search range and depth between Task 1 and Task 2. In Task 1 (and excluding Bob and Daniel), the 14 common needs occurred 48 times. With a total number of pages accessed of 42 in Task 1 (which excludes the 19 pages accessed by Bob alone), the average number of pages accessed per common information need instances is actually less than 1 (0.87 to be precise). In Task 2, however, this number is much higher. With a total of 134 pages accessed and 54 needs occurrences, the participants' accessed on average 2.5 pages per needs occurrence.

Table 88. Overview of Total Pages Accessed (Task 2)

	Martha	Anna	Maria	Laura	TOTAL
Total number of queries	16	21	23	31	91
Total number of SERPs	4	7	9	19	39
Total number of result links	15	15	21	13	64
Total number of internal links	5	16	8	2	31
Total number of site queries	0	0	0	0	0
Total number of external links	0	0	0	0	0
Total number of pages accessed	24	38	38	34	134

Table 88 also reveals individual searching styles. Martha, Anna, and Maria all make heavy use of the results listed on the SERPs that their searches generated. Martha clicked on 15 links on a total of four SEPRs, Anna on 15 for seven SERPs, and Maria on 21 links coming from 9 SERPs. Laura, however, only clicked on 13 result links from her 19 SERPs. The very high number of SERPs that were viewed but not further used by Laura seems to confirm the earlier assumption that Laura's search behavior in Task 2 is strongly characterized by confirmation purposes.

Overall, there seems to be a higher degree of the participants' engagement with the query results in Task 2 as compared to Task 1, especially on the part of Anna and Laura. This would also be supported by the broader use of internal links by all participants as opposed to Task 1, where almost all the internal links resulted from Anna's browse searching. In Task 2, again, Anna's behavior stands out, although not as prominently as in Task 1. More than half of the internal links (16 out of 31) were followed by Anna, which clearly indicates her preference for browsing. Anna's screen recording shows that her browsing was, in general, rather highly directed. She focused on the acquisition of background information from the CSIC Website and, in addition, on finding (on the Websites of CSIC and of BBC News) press releases in English that were similar to the source text. As her query containing her English translation of the press release title indicates, she seemed to have been looking for the actual English translation of the Spanish press release, as well (cf. 7.2.1.1).

Maria also performed most of her browsing on the CSIC Website (following four out of her eight internal links), but her video recording shows that her browsing style was mostly undirected. Martha accessed a total of five internal links (two in relation to CSIC's research institute mentioned in the text and three concerning the term "mezclas racémicas"), and Laura a total of two internal links (one in connection with "enantiómeros" and one with "[etapas] de síntesis"). Despite the increase in the absolute

number of pages accessed via internal links in Task 2, their relative decrease when compared to Task 1 as well as the complete absence of external links and site queries show that the participants have, in general, not moved towards a searching behavior that is characterized by a more in-depth thematically-oriented style. As further discussed below, Laura and Anna might be considered the only exceptions to this.

The distribution of the total pages accessed over the common information needs in Table 89 shows that almost half of all pages accessed (64 out of 134, or 47.8%) were related to the five information needs shared by all four participants. In contrast, the three information needs reflecting general lexical problems only led to a total of six pages accessed. The analysis of the total pages accessed by the four participants also confirms the individual ‘problem zones’ indicated above in relation to the session lengths and total number of actions (and which were also reflected in the participants’ modified queries). Thus, for Anna, the two most time consuming information needs—“*fármacos enantioméricamente puros*” (8 min. 2 sec.; 57 actions) and “*CSIC*” (4 min. 13 sec.; 70 actions)—led her to access eleven and 15 pages, respectively. Maria accessed nine pages related to her information need “*CSIC*” (6 min. 44 sec.; 39 actions) and seven pages for “*enzima*” (6 min. 21 sec.; 40 actions) but invested a considerable amount of time researching these needs in relation to cancer instead of AIDS.

Laura accessed the highest number of pages for her search need “[*etapas de*] *síntesis*,” which accounts for her second longest search session (3 min. 1 sec.; 26 actions). Her information need with the longest search session—“*separación de los enantiómeros*” (4 min. 40 sec.; 23 actions) led to four pages accessed, and thus one less than the information need “*solketal*.” Similarly, Martha’s highest number of pages accessed was in relation to her most time intensive information need, “*enantiómeros*” (7 min. 57 sec.; 30 actions). The second highest number of pages was for “*mezclas racémicas*” (six pages), while the need with the second longest session length, “*Catálisis y Petroleoquímica*” (2 min. 40 sec.; 10 actions), only led to three pages accessed.

Table 89. Distribution of Pages Accessed per Common Information Need and Participant (Task 2)

	Martha	Anna	Maria	Laura
BETA-LACTAMICOS				
Total queries	3	1	5	1
Total SERPs	1	0	2	0
Total result links	2	1	3	1
Total internal links	0	1	0	0

Total external links	0	0	0	0
Total pages accessed	3	2	5	1
CATALISIS Y PETROLEOQUIMICA				
Total queries	1	0	1	2
Total SERPs	0	0	0	2
Total result links	1	0	1	0
Total internal links	2	0	2	0
Total external links	0	0	0	0
Total pages accessed	3	0	3	2
CSIC				
Total queries	0	3	3	1
Total SERPs	0	0	1	1
Total result links	0	3	4	0
Total internal links	0	12	4	0
Total external links	0	0	0	0
Total pages accessed	0	15	9	1
ENANTIOMEROS				
Total queries	6	1	1	1
Total SERPs	3	0	0	0
Total result links	5	1	1	1
Total internal links	0	1	0	1
Total external links	0	0	0	0
Total pages accessed	8	2	1	2
SOLKETAL				
Total queries	1	1	0	5
Total SERPs	0	0	0	4
Total result links	1	1	0	1
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	1	1	0	5
ALCOHOLES PRIMARIOS				
Total queries	0	0	3	1
Total SERPs	0	0	1	0
Total result links	0	0	3	1
Total internal links	0	0	1	0
Total external links	0	0	0	0
Total pages accessed	0	0	5	1
ENZIMA				
Total queries	0	0	2	1
Total SERPs	0	0	0	0
Total result links	0	0	6	1
Total internal links	0	0	1	0
Total external links	0	0	0	0
Total pages accessed	0	0	7	1
POSEE EFICACIA				
Total queries	0	0	0	2
Total SERPs	0	0	0	2
Total result links	0	0	0	0
Total internal links	0	0	0	0

Total external links	0	0	0	0
Total pages accessed	0	0	0	2
MEZCLAS RACEMICAS				
Total queries	3	0	0	1
Total SERPs	0	0	0	1
Total result links	3	0	0	0
Total internal links	3	0	0	0
Total external links	0	0	0	0
Total pages accessed	6	0	0	1
APLICABLE A				
Total queries	0	2	0	0
Total SERPs	0	2	0	0
Total result links	0	0	0	0
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	0	2	0	0
ENANTIOMERO "R"				
Total queries	0	0	2	2
Total SERPs	0	0	1	1
Total result links	0	0	1	1
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	0	0	2	2
ENANTIOMERICAMENTE PUROS				
Total queries	0	8	0	4
Total SERPs	0	2	0	4
Total result links	0	7	0	0
Total internal links	0	2	0	0
Total external links	0	0	0	0
Total pages accessed	0	11	0	4
LLEVAR A CABO				
Total queries	0	2	0	0
Total SERPs	0	1	0	0
Total result links	0	1	0	0
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	0	2	0	0
TRATAMIENTOS ANTI-SIDA				
Total queries	2	1	0	1
Total SERPs	0	1	0	1
Total result links	3	0	0	0
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	3	1	0	1
SEPARACION DE LOS ENANTIOMEROS				
Total queries	0	0	2	3
Total SERPs	0	0	2	0
Total result links	0	0	0	4
Total internal links	0	0	0	0

Total external links	0	0	0	0
Total pages accessed	0	0	2	4
FARMACO				
Total queries	0	0	2	0
Total SERPs	0	0	1	0
Total result links	0	0	1	0
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	0	0	2	0
SINTESIS				
Total queries	0	0	2	5
Total SERPs	0	0	1	3
Total result links	0	0	1	2
Total internal links	0	0	0	1
Total external links	0	0	0	0
Total pages accessed	0	0	2	6
DE INTERES FARMACEUTICO				
Total queries	0	2	0	1
Total SERPs	0	1	0	0
Total result links	0	1	0	1
Total internal links	0	0	0	0
Total external links	0	0	0	0
Total pages accessed	0	2	0	1
TOTAL	24	38	38	34

Query Construction, Query Modification, and Overall Query Effectiveness

Appendix E shows the details of the search paths of the individual participants for all search engines queries, including the site queries carried out using the site search engines of the Websites accessed as a result of search engine query (e.g. site queries conducted in WordReference and Wikipedia). As in Task 1, the analysis of both search engine queries and site queries in Task 2 allows for a more detailed, chronological view of the participants' query paths. Unlike in Task 1, however, where very few search engine queries were conducted and modified, Task 2 involved a large number of queries and a considerable amount of query refinement. To better understand the participants' search query paths, Appendix E includes not only their initial and subsequent queries but also the result links they accessed.

What we can observe here is, first, the fact that even if not accessed directly but via a prior Google search, reference sites (above all WordReference and Wikipedia) are still a primary source of information. The strong reliance on these reference sites seems to serve as a barrier to the use of more specialized lexical sources. Thus, understandably, subject area specific glossaries or specialized terminological databases do not appear at

all in the search paths of the participants (as shown in 6.1.2.1 and 6.1.2.2, the student participants had not received any training on translation resources prior to the study).²⁰⁹ The dominance of WordReference and Wikipedia over other possible resources shows the overall lack of knowledge regarding the different types of online resources available. With regard to Wikipedia, we can note that, while the students sometimes used this resource for acquiring extra-linguistic knowledge, they mostly used it as a kind of bilingual corpus, often switching between the Spanish and English versions of the article retrieved (see, for example, Martha's search path for "antibióticos beta-lactámicos," Anna's search path for "enantiómeros," or Maria's search path for "alcoholes primarios").²¹⁰ The Web thus becomes a kind of metadictionary and, on occasions, a parallel, aligned corpus. This notion of the Web-as-dictionary is most visible in Maria's query statements, which involve the combination of search terms in the source language with the explicit name of the target language in the same query [see, for example, her query for the information need "antibióticos beta-lactámicos" (beta-lactámicos english)].²¹¹ This type of query behavior is very much in line with the one she displayed in Task 1. Furthermore, similar to Task 1, there is a clear trend among the participants to click one of the first three (sometimes five) search results listed on the SERPs. Results that are further down the list of the search results page tend to be ignored.

Two possible other uses of search engine queries and results—the identification of suitable parallel texts and the confirmation of tentative translation solutions—are present in Task 2 (unlike in Task 1), yet they are rather rare and often unsuccessful. With regard to the search for parallel texts containing the query "beta-lactámicos," for example, both Martha and Maria clicked on search result links leading them to a potential parallel text (here, again, the search results that they clicked on are listed first). In both cases, they modified their queries after having accessed the parallel text,

²⁰⁹ As discussed in 5.5.3, I made no attempt to influence students' Web search behaviors until the end of the course, when the study's research goals had been accomplished.

²¹⁰ In contrast, the professional translators in the observational study carried out by the National Research Council of Canada and the Université du Québec en Outaouais never used Wikipedia to find a solution to a terminology problem but only to occasionally obtain background information on a specific concept (Désilets 2010: n.p.).

²¹¹ Bob, however, like the the professional translators in the observational study mentioned above, primarily used Google "to mine the web-as-a-corpus" (Désilets 2010: n.p.). Furthermore, like the five professional translators in Désilets, Barrière and Qurion's (2007) study, Bob spent considerable time in evaluating and analyzing search results from Google in order to obtain an overview of the different types of translation information found and their respective contexts of usage and quality (cf. 7.1.3.3).

indicating that it was not suitable for their needs. This pattern—activation of first search link, brief scanning of the document accessed, and modification of query—is a rather typical one (also in Task 1) and seems to reflect the rather unplanned search statements among the participants. The second application, i.e. the confirmation of tentative solutions, becomes visible in Laura’s search behavior (see, for example, her query for “CSIC”). She uses this technique often and to a rather positive effect (see the Search Outcomes section below). Furthermore, Laura creates rather long queries, i.e. queries containing a relatively high number of individual search terms. What she seems to be doing—see, for example her queries for “solketal” (solketal enantiomers primary alcohols)—is to use key terms from the source text as lexical filters, thereby reducing the body of search results to documents dealing with all these terms and, most likely, with the same topic as the source text.²¹² The case of the “solketal” search reveals a clear contrast between Laura and the other three participants. While these latter only queried the correct spelling of the term (i.e. whether it should be capitalized or not), Laura’s queries signal a move towards a more in-depth, interactionistic researching style on her part, similar to Bob’s and Anna’s in Task 1.

While Laura’s style of searching is almost exclusively characterized by the use of key words as lexical filters, Anna—who along with Laura carried out the greatest amount of background research of all participants—shows a more browsing-dominated approach concerning a number of search needs (see, for example, “CSIC” and “fármacos enantioméricamente puros”). Maria also combined browse searches with search engine queries (the latter being most dominant). However, a closer look at her search paths shows that her searching became significantly side-tracked on two occasions. First, the misspelling of her query “SCIC” (instead of “CSIC”) led her to an unrelated Website, a mistake that contributed to the significant session lengths for this need mentioned above. Second, in her searches for both “enzimas” and “síntesis,” Maria looked for these terms in relation to “cancer” (instead of AIDS). As her search path for “enzima” shows, she accessed a total of seven cancer-related sites before abandoning said search.

In addition, many of her search paths show that, like in Task 1, she was primarily interested in retrieving equivalents only. Her search path for “alcoholes primarios,” for instance, shows that she first attempted to research this term in WordReference, which

²¹² See also her search patch for “etapas de síntesis” in Appendix E.

produced unsatisfactory results. Subsequently, she tried a different (and, to my mind, potentially successful) search path involving a simple query in Google aimed at searching for “science dictionaries” from Spanish into English. As a result for this query, she clicked on the first result link, which actually took her back to the WordReference site. She eventually clicked on another result link (this time, the 6th one listed on the SERP), which took her to the *lexicool.site*. Although this site provides access to science, biology, and chemistry dictionaries as well as glossaries, she did not access any of these resources and instead modified her initial simple query, which led her to access the Wikipedia site. Here, she clicked on the English version of the article retrieved. This type of behavior, i.e. using Wikipedia as a bilingual dictionary, was also displayed by Anna and never or almost never by Martha and Laura.²¹³ Nevertheless, Martha’s search paths show that, like Maria, she was mostly interested in retrieving linguistic information.

As I mentioned earlier, almost half of the 54 queries were carried out in reference sites (22 in WR, one in FD, and three in WK). In seven out of these 26 cases, no additional search actions were needed. These instances refer to the more general terms “investigador” (2), “eficacia” (2), and “aplicable” (1), and the (slightly) more technical terms “enzima” (1) and “solketal” (1). The participants’ general preference for known reference sites such as WordReference or Wikipedia is underlined by two more phenomena. First, in several instances the first result link to be accessed was a page from the Wikipedia site (see, for example, Martha’s, Anna’s, and Laura’s searches for “solketal”), and second, in several cases an initial search in an online dictionary was followed by a search in Wikipedia (see, for example, Anna’s search for “mezclas racémicas,” Laura’s search for “enantiómeros,” or Maria’s search for “enantioméricamente puros”).

Overall, the results discussed above portrait a broad spectrum of online search behaviors for the four participants. On the one side of this spectrum we find the rather undirected, shallow searching style of Maria. On the other side we find Laura, who displayed a more mature approach that is characterized by a more critical hypothesis-driven and a context-oriented search style. Compared to Task 1, Laura’s search behavior clearly

²¹³ It should also be noted that, in contrast to the native speakers Laura and Martha, Anna and Maria continued to show an iterative type of search behavior characterized by repeat searches spread over multiple sessions (see, for example, Maria’s search path for “fármaco,” a term she looked up three times in WordReference in separate sessions).

evolved, exhibiting a type of ‘interactionistic’ style similar to that of Bob. In my opinion, this evolution can be partly attributed to a learning effect, i.e. her better understanding of the translation process. The two other participants of the study, Martha and Anna, fall within these two poles, with Martha tending to focus more on linguistic phenomena and Anna showing signs of an approach similar to, yet perhaps not as consistent as Laura’s.

7.2.3.4 Browse Searches

In addition to the total pages accessed via search engine queries, all the student participants, except for Laura, re-accessed some of the Websites they had already visited (as a result of the queries they had previously conducted) to browse for information concerning some of the thematic information needs. As explained in 7.3.1.4, these browse searches represent a different type of search, i.e. one that involves re-accessing information at a later point in time for additional or new research on specific search needs, and hence are treated separately from the browse searches conducted as a result of pages directly accessed by search engine queries.

Table 90. Overview of Browse Searches (Task 2)

	Martha	Anna	Maria	Total
CSIC				
Pages re-accessed	0	4	0	4
Internal Links	0	4	0	4
Site Query	0	4	0	4
External Links	0	0	0	0
Total pages accessed	0	12	0	12
SOLKETAL				
Pages re-accessed	0	0	1	1
Internal Links	0	0	0	0
Site Query	0	0	1	1
External Links	0	0	0	0
Total pages accessed	0	0	2	2
ALCOHOLES PRIMARIOS				
Pages re-accessed	0	1	0	1
Internal Links	0	1	0	1
Site Query	0	1	0	1
External Links	0	0	0	0
Total pages accessed	0	3	0	3
MEZCLAS RACEMICAS				
Pages re-accessed	1	1	0	2
Internal Links	1	2	0	3
Site Query	0	1	0	1
External Links	0	0	0	0

Total pages accessed	2	4	0	6
ENANTIOMERICAMENTE PUROS				
Pages re-accessed	0	0	1	1
Internal Links	0	0	0	0
Site Query	0	0	1	1
External Links	0	0	0	0
Total pages accessed	0	0	2	2
TRATAMIENTOS ANTI-SIDA				
Pages re-accessed	0	1	0	1
Internal Links	0	1	0	1
Site Query	0	2	0	2
External Links	0	0	0	0
Total pages accessed	0	4	0	4
ENANTIOMERO "R"				
Pages re-accessed	0	0	1	1
Internal Links	0	0	2	2
Site Query	0	0	2	2
External Links	0	0	0	0
Total pages accessed	0	0	5	5
TOTAL	2	23	9	34

As Table 90 shows, this type of browse searching led participants to access a total of 34 pages. This is eleven more than in Task 1, where Anna was the only one of the student participants carrying out browse searches (Bob also carried out browse searches in Task 1). In Task 2, Anna accessed by far the most pages via browse searching, indicating clearly her desire to gather background knowledge on the topic dealt with in Task 2. Her 23 pages accessed is exactly the same number as for Task 1, but while these 23 pages were spread over five information needs in Task 1, there were only four for Task 2. The remaining eleven pages accessed as a result of browse searching belong to Maria (nine) and Martha (two). As mentioned above, Laura did not conduct any browse searches at all, focusing rather strongly on query modification as a means of securing background knowledge instead. The information need that generated most browse searches was the acronym "CSIC" with twelve pages accessed exclusively by Anna.

7.2.4 Search Outcomes

In this section I will discuss the outcomes of the participants' search processes for Task 2. In particular, I will look at the solutions that the individual participants adopted for their identified search needs, the rationale for adopting that solution (and not another), and the Web pages that the adopted solutions correspond to. I will also discuss the participants' perceptions of the success (or lack thereof) of their search processes and will contrast their self-assessment with the evaluation of the assessors. Finally, I will

examine the participants' perceptions of their degree of satisfaction with the adopted solutions, comparing this with their perceived degree of difficulty of the respective information needs.

7.2.4.1 Overview of Adopted Solutions, Rationales, and Web Pages

Despite participants' frequent visits to dictionary sites during their search processes, the analysis of the Websites adopted shows a clear trend away from the dominance of dictionaries as sources of outcomes in Task 1. While in Task 1, twelve out of the 26 pages adopted by the four student participants were from online dictionaries (WordReference and RAE), in Task 2 only five out of the total 31 adopted pages were dictionaries. All participants adopted one solution from a dictionary site, except for Maria who had two. The most frequent type of site adopted by the participants were encyclopedias, or Wikipedia, to be more precise, which led to a total of nine adopted solutions, three each for Martha, Anna, and Maria. In Task 1, only four out of 26 solutions were adopted from Wikipedia.

The homepage of the institution that issued the source text for Task 2 was also frequently used for the participants' solutions. In particular, six solutions were adopted from the CSIC Website, two each by Martha and Maria, and one each by Anna and Laura. By comparison, the site of the authoring institution of the source text in Task 1, Greenpeace, was only used in two cases. A further six solutions were based on the information provided on SERPs, but in this case only Anna and Laura (three each) used this type of resource. In task one, only Bob, but none of the student participants adopted solutions from SERPs. Furthermore, Martha, Maria, and Laura each adopted one solution from commercial Websites. Laura, finally, was the only participant to adopt solutions (two) found in online editions of academic journals.

Overall, the four participants used less resource types for Task 2 (six) than for Task 1 (eight). The types of resources used in Task 1 but not in Task 2 were online discussion fora, academic Websites (.ac.), and non-profit sites (.org). As mentioned above, the only resource type in Task 2 that was not used by the four participants in Task 1 concerns SERPs.

Table 91. Distribution of Adopted Pages per Reported Information Need and Participant (Task 2)

Reported Needs	Encyclopedias	Dictionaries	Fora	CSIC	SERPs	.ac	.org	Journals	.com
BETA-LACTAMICOS									

Martha	1	0	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	0	0	0
Maria	1	0	0	0	0	0	0	0	0
Laura	0	0	0	0	0	0	0	0	1
CATALISIS Y PETROLEOQUIMICA									
Martha	0	0	0	1	0	0	0	0	0
Maria	0	0	0	1	0	0	0	0	0
CSIC									
Martha	0	0	0	1	0	0	0	0	0
Anna	0	0	0	1	0	0	0	0	0
Maria	0	0	0	1	0	0	0	0	0
Laura	0	0	0	1	0	0	0	0	0
ENANTIOMEROS									
Martha	1	0	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	0	0	0
Maria	0	0	0	0	0	0	0	0	1
Laura	0	1	0	0	0	0	0	0	0
SOLKETAL									
Martha	1	0	0	0	0	0	0	0	0
Anna	0	0	0	0	1	0	0	0	0
Maria	1	0	0	0	0	0	0	0	0
Laura	0	0	0	0	0	0	0	1	0
ALCOHOLES PRIMARIOS									
Maria	1	0	0	0	0	0	0	0	0
MEZCLAS RACEMICAS									
Martha	0	1	0	0	0	0	0	0	0
Anna	1	0	0	0	0	0	0	0	0
Laura	0	0	0	0	1	0	0	0	0
ENANTIOMERO "R"									
Maria	0	1	0	0	0	0	0	0	0
Laura	0	0	0	0	1	0	0	0	0
ENANTIOMERICAMENTE PUROS									
Anna	0	0	0	0	1	0	0	0	0
Laura	0	0	0	0	1	0	0	0	0
LLEVAR A CABO									
Anna	0	1	0	0	0	0	0	0	0
Maria	0	1	0	0	0	0	0	0	0
TRATAMIENTOS ANTI-SIDA									
Martha	0	0	0	0	0	0	0	0	1
DE INTERES FARMACEUTICO									
Laura	0	0	0	0	0	0	0	1	0
CSIC TRANSLATION									
Anna	0	0	0	0	1	0	0	0	0
TOTAL	9	5	0	6	6	0	0	2	3

The individual solutions and the rationale for the selected Websites given by the individual students (see Table 92) confirms a trend already visible in Task 1, i.e. that participants solved terminological needs—such as “beta-lactámicos,” “enantiómeros,” or “mezclas racémicas” primarily via Wikipedia. Anna, for example, states that her search need “enantiómeros” “was in the English version of the Wikipedia search.” A second way of deciding what possible solution to employ can be seen in the behavior of Laura. Unlike the other three participants, Laura frequently based her selection of solutions on Google searches and the resulting SERPs (see, for example, her searches for “solketal,” “alcoholes primarios,” and “mezclas racémicas”). Laura’s choice of outcomes seems to indicate that many of her searches were guided by hypotheses as to what results to expect, i.e. she used Web resources in general and SERPs in particular for verification purposes. Anna, in some cases (“CSIC,” “solketal,” and “fármacos enantioméricamente puros”), shows a similar approach. In general, however, and like Martha, she relies primarily on Wikipedia for her final solutions.

For Maria, finally, Wikipedia is also the most frequent resource, but she also adopted solutions from two online dictionaries. Her rationales indicate a less critical approach to the possible quality of the information source or the exact nature of the information need. Regarding her search for the correct spelling of “solketal,” for example, she states, “I saw it spelled the same” and regarding her (unsuccessful) solution “enantiomorph ‘R’” she explains: “I found the term in a dictionary.” While Maria’s information search and evaluation behavior can be considered rather shallow, Laura shows a very different approach to not only finding but also choosing among solutions. She often based her decisions on having found the solutions in relevant parallel texts and/or in similar contexts, stating, for example, that her solution “beta-lactamic ... seem[ed] like a logical equivalent and [was] used in parallel texts.” The source from which she adopted this solution was the SERP excerpt of a scientific article. Furthermore, her rationale for her translation of “CSIC” shows that in her decision-making process the translation brief played an important role as well. She states: “The CSIC website gives this as their english [sic.] name, and it is clearer and more relevant to an english [sic.] reader than Superior Council of Scientific Research (Consejo Superior de Investigaciones Científicas).”

The frequency with which a given search term appears, a strategy also used by Bob in Task 1, was given only once as a rationale for adopting a specific solution. This

concerns Anna's choice of translation for CSIC. She explains that her solution for "CSIC, which she translated as "Spanish National Research Council," "[had] more hits on Google with 457,000 hits compared to 52,300 for 'Spanish Council for Scientific Research.'"

Table 92. Adopted Solutions, Rationales, and Pages per Reported Information Need and Participant (Task 2)

Reported Needs	Adopted Solutions	Solution Rationale	Adopted Links
BETA-LACTAMICOS			
Martha	<i>b-lactam antibiotics</i>	<i>To try and find a specific match</i>	http://es.wikipedia.org/wiki/Antibiotico_beta_lactamico
Anna	<i>Beta-lactam antibiotic</i>	<i>it was the English version of the same entry in Wikipedia</i>	http://en.wikipedia.org/wiki/Beta-lactam_antibiotic ; <i>Beta-lactam antibiotic</i>
Maria	<i>beta-lactam antibiotics</i>	<i>it was the only thing that sounded similar</i>	http://en.wikipedia.org/wiki/Beta-lactam_antibiotic
Laura	<i>beta-lactamic</i>	<i>seems like a logical equivalent and used in parallel texts</i>	http://www.blackwellpublishing.com/eccmid16/abstract.asp?id=50874 , <i>beta-lactamic antibiotic on the electrophysical</i>
CATALISIS Y PETROLEOQUIMICA			
Martha	<i>CSIC + Instituto de Catálisis y Petrolequímica</i>	<i>hoping to find something with an appropriate translation in English</i>	http://www.icp.csic.es/index.en.html
Maria	<i>institute of catalysis and petroleochemistry</i>	<i>it was on their website</i>	http://www.icp.csic.es/index.en.html
CSIC			
Anna	<i>Spanish National Research Council</i>	<i>it was on the English version of the website</i>	http://www.csic.es/quien_somos.do ; <i>The CSIC (a State Agency) is the Spanish National Research Council</i>
Maria	<i>The Spanish National Research Council</i>	<i>I found it on their website</i>	http://www.postgrado.csic.es/JA-E-Int/summary.htm
Laura	<i>Spanish National Research Council</i>	<i>The CSIC website gives this as their english name, and it is clearer and more relevant to an english reader than Superior Council of Scientific Research (Consejo Superior de Investigaciones Cientificas)</i>	<i>top of page</i> www.csic.es
ENANTIOMEROS			
Martha	<i>enantiomers from a drug</i>	[no rationale provided]	http://en.wikipedia.org/wiki/Enantiomer
Anna	<i>Enantiomer</i>	<i>- it was in the English version of the Wikipedia search</i>	http://en.wikipedia.org/wiki/Enantiomer ;
Maria	<i>Enantiomers</i>	<i>it sounds almost the same</i>	http://www.proz.com/kudoz/english_to_spanish/chemistry%3B_chem_sci_eng/1993700-resolved_enantiomers.html
Laura	<i>Enantiomers</i>	<i>so similar and used in same context</i>	http://dictionary.reference.com/browse/enantiomer , <i>either of a pair of optical isomers that are mirror images of each other.</i>
SOLKETAL			
Martha	<i>Solketal</i>	<i>To see if any texts in English came up</i>	http://en.wikipedia.org/wiki/Solketal
Anna	<i>Solketal</i>	<i>all the search results in Google showed the name with a capital S</i>	http://www.google.co.nz/search?hl=en&q=solketal&meta=;

			<i>Solketal is a protected form of glycerol with an isopropylidene group bound to</i>
Maria	<i>Solketal</i>	<i>i saw it spelled the same</i>	http://en.wikipedia.org/wiki/Solketal
Laura	<i>Solketal</i>	<i>the term doesn't vary, used in same contexts</i>	<i>used for the conversion of primary alcohols and C3-synthons as solketal and glycidol,</i> http://www.springerlink.com/content/m47r107133011815/
ALCOHOLES PRIMARIOS			
Maria	<i>primary alcohols</i>	<i>it appears to be the correct term</i>	http://en.wikipedia.org/wiki/Alcohol Primary alcohol (1°)- Have general formulas RCH ₂ OH Secondary alcohol (2°)-
MEZCLAS RACEMICAS			
Martha	<i>racemic mixtures</i>	<i>Looking for parallel texts</i>	http://es.thefreedictionary.com/racemic
Anna	<i>Racemic mixture</i>	<i>it was on the Wikipedia page and in the right context</i>	http://en.wikipedia.org/wiki/Racemic ; a racemic mixture, or racemate, is one that has equal amounts of left- and right-handed enantiomers of a chiral molecule
Laura	<i>Racemic</i>	<i>similar and used in same contexts</i>	Flurbiprofen is a racemic mixture of S(+) and R(-) enantiomers, http://www.google.co.nz/search?hl=en&q=racemic+mixture+of+enantiomers&meta=
ENANTIOMERO "R"			
Maria	<i>enantiomorph "R"</i>	<i>i found the term in a dictionary</i>	http://www.wordmagicsoft.com/dictionary/es-en/enantiomorfo.php
Laura	<i>R-enantiomer</i>	<i>it is in common use in parallel texts</i>	The R-enantiomer of citalopram counteracts escitalopram-induced ... http://www.google.co.nz/search?q=%22R%22+enantiomer&hl=en&start=10&sa=N
ENANTIOMERICAMENTE PUROS			
Anna	<i>enantiomerically pure</i>	<i>by putting them in quotation marks and search the term through Google, i was able to find that it is written as "enantiomerically pure"</i>	http://www.google.co.nz/search?hl=en&q=%22enantiomerically+pure%22%2C+medication&meta= ; Synthesis and pharmacological evaluation of enantiomerically pure 4-deoxy-4-
Laura	<i>Enantiomerically</i>	<i>works in english too as seen in context</i>	conversion of a symmetrical ketone to an enantiomerically pure lactam is, http://www.google.co.nz/search?
TRATAMIENTOS ANTI-SIDA			
Martha	<i>antiAIDS</i>	<i>as above because AIDS is always written in caps in English but this word looks a little strange.</i>	http://mondediplo.com/2003/12/19aids
LLEVAR A CABO			
Anna	<i>carry out</i>	<i>it was a match to what I was</i>	http://es.thefreedictionary.com/ll

		<i>looking for</i>	<i>evar+a+cabo; llevar a cabo accomplish, to carry out</i>
Maria	<i>to carry out</i>	<i>after performing the search I have remembered that it means "to carry out"</i>	<i>http://forum.wordreference.com/s/howthread.php?t=252831 To carry out no less that 70% of the production...</i>
DE INTERES FARMACEUTICO			
Laura	<i>of pharmaceutical interest</i>	<i>it is used commonly in parallel texts i found</i>	<i>Enantiomeric separation of acidic compounds of pharmaceutical interest , http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=</i>
CSIC TRANSLATION			
Anna	<i>Spanish National Research Council</i>	<i>it has more hits on Google with 457,000 hits compared to 52,300 for "Spanish Council for Scientific Research"</i>	<i>www.google.co.nz; Results 1 - 10 of about 457,000 for "Spanish National Research Council"</i>

7.2.4.2 Search Success

In Task 2, the participants' assessment of the successfulness of their queries is highly positive. Out of the 31 solutions, 26 (83.9%) were considered successful by the four participants. In Task 1, this number had been 73.5%. The remaining five solutions in Task 2 were considered to be "not quite" successful (16.1% as compared to 20.6% in Task 1). None of the solutions for Task 2 was considered unsuccessful by the participants (as opposed to 5.9% in Task 1). All five solutions that were considered "not quite" successful are related to Martha and Maria. Both shared doubts about their solutions for the information need "antibióticos beta-lactámicos." In addition, Martha had doubts about her solutions for "enantiómeros de un fármaco" and "mezclas racémicas," while Maria was not entirely content with her solution for "CSIC." Unlike Martha and Maria, both Anna and Laura considered all their solutions successful.

Table 93. Degree of Search Success per Reported Information Need and Participant (Task 2)

Reported Needs	Adopted Solutions	Solutions in Target Text	No	Not quite	Yes
BETA-LACTAMICOS					
Martha	<i>b-lactam antibiotics</i>	<i>B-lactam antibiotics</i>	0	1	0
Anna	<i>Beta-lactam antibiotic</i>	<i>Beta-lactam antibiotics</i>	0	0	1
Maria	<i>beta-lactam antibiotics</i>	<i>beta-lactam antibiotics</i>	0	1	0
Laura	<i>beta-lactamic</i>	<i>beta-lactamic antibiotics</i>	0	0	1
CSIC					
Martha	<i>CSIC + Instituto de Catálisis y Petroleoquímica</i>	<i>Institute of Catalysis and Petrochemistry (ICP)</i> [omits CSIC]	0	0	1
Anna	<i>Spanish National Research Council</i>	<i>CSIC + the Spanish National Research Council (CSIC)</i> [No Spanish]	0	0	1

Maria	<i>The Spanish National Research Council</i>	<i>The Spanish National Research Council + CSIC</i>	0	1	0
Laura	<i>Spanish National Research Council</i>	<i>Spanish National Research Council (CSIC)</i>	0	0	1
ENANTIOMEROS					
Martha	<i>enantiomers from a drug</i>	<i>enantiomers for a drug + in a drug</i>	0	1	0
Anna	<i>Enantiomer</i>	<i>enantiomers of a medication</i>	0	0	1
Maria	<i>Enantiomers</i>	<i>enantiomers of a medicine</i>	0	0	1
Laura	<i>Enantiomers</i>	<i>enantiomers of a drug</i>	0	0	1
SOLKETAL					
Martha	<i>Solketal</i>	<i>Solketal</i>	0	0	1
Anna	<i>Solketal</i>	<i>Solketal</i>	0	0	1
Maria	<i>Solketal</i>	<i>Solketal</i>	0	0	1
Laura	<i>Solketal</i>	<i>Solketal</i>	0	0	1
ALCOHOLES PRIMARIOS					
Maria	<i>primary alcohols</i>	<i>primary alcohols</i>	0	0	1
MEZCLAS RACEMICAS					
Martha	<i>racemic mixtures</i>	<i>racemic mixtures</i>	0	1	0
Anna	<i>Racemic mixture</i>	<i>racemic mixtures</i>	0	0	1
Laura	<i>Racemic</i>	<i>racemic mixtures</i>	0	0	1
ENANTIOMERO "R"					
Maria	<i>enantiomorph "R"</i>	<i>enantiomorph "R"</i>	0	0	1
Laura	<i>R-enantiomer</i>	<i>R-enantiomer</i>	0	0	1
ENANTIOMERICAMENTE PUROS					
Anna	<i>enantiometrically pure</i>	<i>enantiomerically pure medication</i>	0	0	1
Laura	<i>enantiomerically</i>	<i>enantiomerically pure drugs</i>	0	0	1
LLEVAR A CABO					
Anna	<i>carry out</i>	<i>carried out</i>	0	0	1
Maria	<i>to carry out</i>	<i>carried out</i>	0	0	1
TRATAMIENTOS ANTI-SIDA					
Martha	<i>antiAIDS</i>	<i>antiAIDS treatment</i>	0	0	1
DE INTERES FARMACEUTICO					
Laura	<i>of pharmaceutical interest</i>	<i>of pharmaceutical interest</i>	0	0	1
CSIC TRANSLATION					
Anna	<i>Spanish National Research Council</i>	<i>CSIC + the Spanish National Research Council</i>	0	0	1
TOTAL			0	5	26
%			0%	16.1%	83.9%

A comparison of the participants' self-assessment of their solutions with the opinion of the assessors shows that Anna's and Laura's confidence in their adopted solutions was well justified. In all 16 cases (eight for each of them), the assessors agreed with the students' self-assessment. Moreover, Laura's translation of the press release title, in which she replaced the culturally-specific item "CSIC" with the more general adjective "Spanish" to indicate the provenance of the scientist featured in the press release, was

considered highly successful by the assessors.²¹⁴ This decision reflected the translation brief demands, i.e. the needs and expectations of the target text addressee (i.e. the British public), or, as Laura mentions in her OSR, “what would be meaningful to a British reader.”

In general, Anna’s and Laura’s self-assessment is in line with their rating of their satisfaction with their adopted solutions and the difficulty of the reported problems (see below). Both the high level of confidence and the high quality of their solutions seem to be clearly a reflection of the extensive background research that both students carried out. In Martha’s and Maria’s cases, there is less confidence in the adopted solutions and also more discrepancy between self and external assessment. Martha had considered four out of her seven reported solutions as “not quite” successful and three as successful. In three cases, her assessment matches that of the external assessors, but in four it does not. In two of these instances—“CSIC,” which she omitted in her translation, and the missing hyphen in “anti-AIDS,” the external assessment was more negative than her own. Nevertheless, in the two remaining instances (“antibióticos beta-lactámicos” and “[mezclas] racémicas”), the assessors were more satisfied with Martha’s solutions than she was herself. This type of ‘understatement’ is even more prominent in Maria’s case. She had considered three of her eight solutions as “not quite” successful, and in all three cases the assessors considered her solutions successful. Of the remaining five solutions, which Maria had all considered successful, the assessors confirmed her assessment in four cases. Only in one case (a spelling error in her translation of “Instituto de Catálisis y Petroleoquímica”) were the assessors less satisfied than Maria herself.

Table 94. Comparison of Participants’ and Assessors’ Perceptions of Search Success per Reported Information Need (Task 2)

	Reported Needs	No		Not quite		Yes		Highly
		P.*	A.**	P.	A.	P.	A.	A.
Martha	<i>antibióticos beta-lactámicos</i>	0	0	1	0	0	1	0
	<i>CSIC</i>	0	1	0	0	1	0	0
	<i>enantiómeros de un fármaco</i>	0	0	1	1	0	0	0
	<i>Solketal</i>	0	0	0	0	1	1	0
	<i>Catálisis y Petroleoquímica</i>	0	0	0	0	1	1	0
	<i>Racémicas</i>	0	0	1	0	0	1	0
	<i>antiAIDS</i>	0	0	1	0	0	1	0

²¹⁴ In addition, Laura adopted the appropriate style for news headlines.

Anna	<i>Antibiótico betalactámico</i>	0	0	0	0	1	1	0
	<i>CSIC (acronym)</i>	0	0	0	0	1	1	0
	<i>Enantiómeros</i>	0	0	0	0	1	1	0
	<i>Solketal</i>	0	0	0	0	1	1	0
	<i>mezcla racémica</i>	0	0	0	0	1	1	0
	<i>enantiométricamente puro</i>	0	0	0	0	1	1	0
	<i>llevar a cabo</i>	0	0	0	0	1	1	0
	<i>CSIC translation</i>	0	0	0	0	1	1	0
Maria	<i>enantiómero "R"</i>	0	0	1	0	0	1	0
	<i>alcoholes primaries</i>	0	0	0	0	1	1	0
	<i>antibióticos beta-lactámicos</i>	0	0	1	0	0	1	0
	<i>CSIC</i>	0	0	1	0	0	1	0
	<i>Enantiómeros</i>	0	0	0	0	1	1	0
	<i>Solketal</i>	0	0	0	0	1	1	0
	<i>Instituto de Catálisis y Petroleoquímica</i>	0	0	0	1	1	0	0
	<i>llevar a cabo</i>	0	0	0	0	1	1	0
Laura	<i>beta-lactámicos</i>	0	0	0	0	1	1	0
	<i>CSIC</i>					1	0	1
	<i>Enantiómeros</i>	0	0	0	0	1	1	0
	<i>Solketal</i>	0	0	0	0	1	1	0
	<i>Racémicas</i>	0	0	0	0	1	1	0
	<i>sólo el enantiómero "R" posee</i>	0	0	0	0	1	1	0
	<i>enantioméricamente (fármacos enantioméricamente puros)</i>	0	0	0	0	1	1	0
	<i>de interes farmaceutico</i>	0	0	0	0	1	1	0
TOTAL	0	1	7	2	24	27	1	

*Participant; **Assessors.

7.2.4.3 Search Satisfaction and Difficulty

The participants' assessment of the degrees of difficulty of the information needs researched and of their own satisfaction with the adopted solutions shows that overall the four participants were more satisfied with the solutions for Task 2 (perhaps as a result of increased self-confidence) than with the ones for Task 1, and that they found the information needs researched to be less difficult than those of Task 1 (see Table 95 for a comparison).

Table 95 also shows that the increase in overall satisfaction and the decrease in the average degree of difficulty are attributed to Anna and Laura. In both categories, Anna and Laura show significant differences to Task 1. This is most visible in the case of Anna, who was "very satisfied" (score of 5) with every single one of her eight reported

adopted solutions in Task 2. She also reported that all her needs were very easy to research (score of 1). Laura’s values are nearly identical to those of Anna. She also reported eight search needs and adopted solutions, and for seven of them she assessed the degree of satisfaction as very high and the degree of difficulty as very easy. The only slight exception here is the information need “solketal,” which she rated 4 for satisfaction and 2 for difficulty.

Table 95. Degrees of Satisfaction and Difficulty per Participant – Task Comparison

	Degree of Satisfaction		Degree of Difficulty	
	Task 1	Task 2	Task 1	Task 2
Martha	4.86	4.14	1.43	1.71
Anna	3.50	5	2.75	1
Maria	3.40	3.5	3.6	4
Laura	4	4.86	2	1.14
AVERAGE	3.94	4.37	2.45	2

While both Anna and Laura were more satisfied with their solutions for Task 2 and found the search needs less difficult to research than in Task 1, Martha and, above all, Maria show different developments. In Martha’s case, however, the degree of satisfaction is still very high (average of 4.14, as compared to 4.86 in Task 1), and her assessment of the degree of difficulty of the search needs in Task 2 is still below 2 (1.71, as compared to 1.43). While Martha seemed to be slightly less confident in her solutions for Task 2, Maria’s self-assessment actually shows a slight increase in her degree of satisfaction (3.5, as compared to 3.4 in Task 1). Yet, she found the search needs in Task 2 more difficult than in Task 1 (as compared to 3.6 in Task 1). The values for Task 2 clearly show the differences between Maria on the one hand and Martha, Anna, and Laura on the other hand when it comes to assessing the difficulty of Task 2.

As Table 96 shows, the information needs that were considered to pose the biggest challenge to the four participants and that were shared by at least two participants are “enantiómeros”, “Catálisis y Petroleoquímica,” and “enantiómero ‘R,’” all having an average difficulty score of three. The least difficult information needs were “llevar a cabo” and “fármacos enantioméricamente puros” with a score of one (in both cases, though, these needs were only reported by two of the four participants). Conversely, these two needs also resulted in the highest degrees of satisfaction among the participants who reported them (average of 5). Two information needs reported by all four participants, “CSIC” and “solketal,” also received high satisfaction scores (average of 4.5).

Table 96. Degrees of Satisfaction and Difficulty per Reported Information Need (Task 2)

Reported Needs	Adopted Solutions	Satisfaction	Difficulty
BETA-LACTAMICOS			
Martha	<i>b-lactam antibiotics</i>	3	2
Anna	<i>Beta-lactam antibiotic</i>	5	1
Maria	<i>beta-lactam antibiotics</i>	2	5
Laura	<i>beta-lactamic</i>	5	1
Subaverage		3.75	2.25
CSIC			
Martha	<i>CSIC + Intsitute of Calaiysis and Petrochemistry (ICP)</i>	5	1
Anna	<i>Spanish National Research Council</i>	5	1
Maria	<i>The Spanish National Research Council</i>	3	4
Laura	<i>Spanish National Research Council</i>	5	1
Subaverage		4.5	1.75
ENANTIOMEROS			
Martha	<i>enantiomers from a drug</i>	3	3
Anna	<i>Enantiomer</i>	5	1
Maria	<i>Enantiomers</i>	3	5
Laura	<i>Enantiomers</i>	NOT RATED	NOT RATED
Subaverage		3.67	3
SOLKETAL			
Martha	<i>Solketal</i>	5	1
Anna	<i>Solketal</i>	5	1
Maria	<i>Solketal</i>	4	3
Laura	<i>Solketal</i>	4	2
Subaverage		4.5	1.75
CATALISIS Y PETROLEOQUIMICA			
Martha	<i>CSIC + Intsitute of Calaiysis and Petrochemistry (ICP)</i>	5	2
Maria	<i>institute of catalysis and petroleochemistry</i>	4	4
Subaverage		4.5	3
ALCOHOLES PRIMARIOS			
Maria	<i>primary alcohols</i>	3	5
Subaverage		3	5
MEZCLAS RACEMICAS			
Martha	<i>racemic mixtures</i>	3	2
Anna	<i>Racemic mixture</i>	5	1
Laura	<i>Racemic</i>	5	1
Subaverage		4.33	1.33
ENANTIOMERO "R"			
Maria	<i>enantiomorph "R"</i>	4	5
Laura	<i>R-enantiomer</i>	5	1
Subaverage		4.5	3
ENANTIOMERICAMENTE PUROS			
Anna	<i>enantiometrically pure</i>	5	1
Laura	<i>Enantiomerically</i>	5	1
Subaverage		5	1
LLEVAR A CABO			
Anna	<i>carry out</i>	5	1
Maria	<i>to carry out</i>	5	1
Subaverage		5	1
TRATAMIENTOS ANTI-SIDA			
Martha	<i>antiAIDS</i>	5	1
DE INTERES FARMACEUTICO			
Laura	<i>of pharmaceutical interest</i>	5	1
CSIC TRANSLATION			
Anna	<i>Spanish National Research Council</i>	5	1
AVERAGE		4.37	2.00

8. Discussion of Results from a Teaching and Research Perspective

In this small-scale study, I explored the Web search behaviors of six participants—four translation students in their first or second semester of study, and two translators with different levels of professional and teaching experience—with a view to drawing implications for the teaching of online information skills for translation purposes. To this end, I collected data in two different research settings. First, I conducted a pilot study that provided the setting for collecting data on the two translators referred to above—a PhD student of translation with three years of casual professional translation experience and a translation teacher with over 15 years of professional translation experience. Second, I carried out a multiple-case study within an introductory course on scientific and technical translation with English and Spanish. The course, which had four participants and lasted for a twelve-week period during one semester, provided the setting to collect data on the students' Web search behaviors embedded in four translation tasks, of which two (dealing with the translation of two popular-science texts from Spanish into English) have been analyzed here. In particular, I examined the participants' online search behaviors in relation to a number of task attributes (text type and translation brief) and user attributes (translation expertise, Web search expertise, and domain knowledge). While for the first task data was obtained from all six participants, the second task was only carried out by the four translation students.

In the following, I will outline the main findings of this study, first by discussing the type of interactions observed between the selected research attributes and the participants' online search behaviors, and second, by examining the relationship between these behaviors and translation performance. Furthermore, with regard to the latter, the discussion of the findings will be complemented by an assessment of the possible implications of my study for teaching. Finally, I will conclude with some methodological observations and proposals for possible avenues for future research.

Given that this study was not designed to control variables and that the findings obtained apply to a specific research and pedagogical context, any causal relationship to be discussed in the following should only be regarded as hypothetical, thus leading only to the most tentative of results and conclusions. Nevertheless, this call for caution does not undermine the value of the study. In line with the principles of grounded theory, I am presenting my findings within an open-ended framework that provides the ground

for the generation of hypotheses. These will hopefully encourage and enable further exploratory research as well as experimental studies aimed at testing some of these hypotheses.

8.1. Main Interactions between Research Attributes and Web Search Behaviors

Profiling the participants according to the user attributes selected for this study allowed me to assess their general levels of both translation and Web search expertise, as well as their overall level of domain knowledge for each translation task. This, in turn, allowed me to observe a number of interactions or relationships between the selected research attributes (including task-related attributes) and the participants' Web search behaviors.

With regard to translation expertise, the findings of this study show that, in contrast to other studies where translation experience was not found to necessarily correlate with translation performance (e.g. Gerloff 1988; Jääskeläinen 1996; Jensen and Jakobsen 2000), the participants' past experiences with translation as well as their declarative knowledge of translation generally correlated with their procedural behavior (or translation performance). Bob was found to be the most experienced and knowledgeable participant of all, followed by Daniel and the four translation students. Their approaches to translation and the quality of the translations they produced support this finding, showing considerable differences not only between Bob and Daniel but also among the translation students themselves.

Interactions between translation expertise and Web search behaviors were most notably felt in connection with the participants' choice of online information sources to address their various information needs. Overall, the translation students' choice of online information sources was (naturally) restricted by their lack of knowledge about and training in the use of translation resources, such as specialized dictionaries, glossaries, terminology databases, and parallel texts. The student participants also lacked experience in the analysis of translation-related information needs, which would help explain why they (including Daniel, i.e. the PhD translation student with three years of casual translation experience) frequently used the same information sources to address their search needs. In contrast, Bob, the participant with the highest level of translation expertise, used a wide variety of resources. The fact that some of the students did not always distinguish between various resources based on different types of information

needs and goals seemed to result, in turn, in a rather highly iterative/repetitive type of online search behavior that was characterized by frequent repeat visits to the same site (primarily reference sites) and, in the case of the two non-native speakers of English (Anna and Maria), to repeat searches as well.

Having said that, a closer look at task-related factors—in particular the degree of specialization—suggests that increased task complexity (along with increased translation experience) had a bearing on students' choice of information sources. While in Task 1, the students and Daniel frequently or entirely limited their online searches to either a regular bilingual dictionary or a Spanish monolingual dictionary, Bob only resorted to a monolingual dictionary once, favoring instead the use of frequency checks in Google, parallel texts, and encyclopedic information. That is, Bob's range of search behavior was wider than that of the students and Daniel. The only exception here was Anna, the student with the most recent translation training experience, who combined the use of a single dictionary with selected encyclopedic information and several parallel texts. In Task 2, however, the students' use of information sources increased, thus involving slightly more variation than in Task 1. That is, their range of search behavior was wider than in Task 1. In particular, there was a slight increase in the range of dictionaries and a shift towards encyclopedic information sources (namely Wikipedia) was observed. In addition, in the case of Laura, a move towards the use of parallel texts was observed as well. Most likely, it was the broader nature of Task 1 that led most participants to search primarily for linguistic information (which would explain the dominant use of dictionaries). The exceptions here are, again, Bob and Anna, who also searched for extra-linguistic information, i.e. thematic and cultural content. In contrast, the more specialized nature of Task 2 as well as a better understanding of the translation process seemed to lead most students to seek, to a lesser or greater extent, both linguistic and extra-linguistic information (as illustrated by the shift towards the use of Wikipedia and, in some cases, parallel texts).

Interactions between translation expertise and Web search behaviors were also observed regarding the participants' search styles, particularly in terms of their engagement with Web content. In Task 1, for example, Bob spent more time on average searching and reading the content retrieved for his thematic searches, while most students generally spent less time doing so, mainly as a result of their interest in retrieving equivalents as opposed to acquiring background knowledge as well. As already indicated above, the

only exception was Anna, who also searched for background information and read content to address some of her thematic needs. In terms of searching styles, this translated into Bob and Anna displaying a more interactionistic type of online search style—i.e. one characterized by their engagement with or consumption of selected Web content—than the other participants. These latter, in contrast, generally displayed a typically shallow online search style that was characterized by checking and comparing, and that mainly resulted from a desire for fast and easy access to information. In Task 2, where the average session lengths generally increased for most information needs (except for the least technical ones) and students, their searching styles continued to be primarily motivated by their desire for fast and easy access to information aimed at retrieving equivalents. Laura, however, like Anna, showed a different searching style, also interacting with the Web content she accessed in order to address some of her thematic needs. While Anna did so via browse searching (like in Task 1), Laura favored Google searches, for which she used source-text keywords as lexical filters to construct simple, yet rather long query statements. This helped her constrain the body of search results to documents dealing with these terms and, oftentimes, with the same topic as the source text. In my opinion, Laura's online search evolution can be attributed not so much to task-related factors but to a learning effect, i.e. to her better understanding of the translation process. Anna also showed considerable progress in her translation performance for Task 2. In the case of Martha and Maria, their translation learning curves were less steep than those of their fellow classmates and became more visible towards the end of the introductory course on scientific and technical translation.

Perhaps another sign of Laura's evolution can be found in her reaction to the translation assignment in Task 2. Here, she used the translation brief as a decision-making criterion for omitting a specific cultural element in her translation of the source-text title, so as to make it more meaningful for target readers. Similarly, Anna (in Task 1) also showed an awareness of the possible implications of the translation assignment by using the socio-cultural knowledge she acquired through her background research to translate the source-text title in a way that would be highly meaningful to target readers. In the case of Martha and Maria, no explicit translation instances could be found in either of the two tasks that would reflect the use of the brief as a decision-making criterion for translation.

Based on the above tentative results, one could argue that task-related factors appear to have had a bigger impact on the participants' range of search behaviors (which significantly increased in Task 2 for all four students) than on their depth of research (where only Laura's and Anna's research was notably deeper). The total number of pages accessed in each task supports the fact that the students' range of search behavior was wider in Task 2 than in Task 1. While they accessed relatively few pages in Task 1 (an average of 2.63 pages per search need), in Task 2 they accessed an average of 7.05 pages per information need. Subsequently, the average number of pages that each student accessed to address all of their search needs was considerably higher in Task 2 (33.5 pages per student participant) than in Task 1 (10.5 pages). This significant increase in numbers can be attributed, once again, to differences in topics and the degree of specialization. This is in line, for example, with Byström, who states that a common finding in information seeking studies "is that task complexity (considered on a job level) increases the use of information sources ... regardless of the type of source," which suggests that "there is more information processing involved in more complex work" (2002: 582).²¹⁵ Furthermore, in her study of information sources of varying task complexity, Byström found that "the acquisition of certain information types in connection to different levels of perceived task complexity reveals that the increase of task complexity leads to the need for more information types" (ibid: 589). She also observed that "the more complex the task and the more information types involved during task performance, the higher the number of information sources used" (ibid.). In addition to these aspects, a *higher awareness* on the part of the students of the complexity of translation could also help explain their broader and more intensive use of (different) sources of information in Task 2.

Task-related factors also seemed to have had an impact on the participants' choice of initial search actions. The findings of this study show that in Task 1 there was little or no variation in initial search actions across the six participants. Bob almost entirely used search engine queries to initiate all his searches, while the student participants and Daniel chose to initiate all or almost all of their searches using direct addresses,

²¹⁵ In this study, the increase in the overall completion time for each task is another indicator of the increased level of complexity and information processing required in Task 2. As shown in 6.3.1.2, the students' average completion time for the first task was 69 minutes and 16 seconds, while their average completion time for the second task was 95 minutes and 37 seconds. As text 2 was shorter than text 1, the increase in total time for each participant could in fact be taken as an indicator of increased task complexity.

regardless of the type of information needed. In other words, the participants with the least translation (and search) experience started their searches from ‘the known,’ while the most experienced translator (and searcher) preferred to initiate his searches with ‘the unknown.’ In Task 2, however, the students’ choice of initial search actions was wider than in Task 1, and involved a combination of direct address searches (to access reference sites) and search engine queries. This could be explained by the fact that the text for this task included more specialized terms and cultural elements than Task 1, for which some of the students seemed to consider research in regular dictionaries to be unsuitable. Consequently, they shifted some of their initial search actions from fact-based resources (i.e. reference works) to more open-ended searches in Google.

The fact that the student participants frequently initiated their searches by directly accessing known (reference) sites is somewhat consistent with the findings of previous Web search studies, which show that known sites are important for regular searchers. According to White and Iivonen, users have been found to “start their searches from known sites and visit known sites many times during their searches ... or over time” (2008: 723). This is also true for the student participants in this study, who resorted to known sites (mostly dictionary sites) not only at the beginning of their searches but also during their search processes in both tasks. Furthermore, as a general pattern (especially in Task 1), most of the student participants typically carried out search engine queries only when their dictionary searches failed to provide them with satisfactory answers. Similarly, albeit in an entirely different context, Byström and Järvelin found that the participants of their information-seeking study (a group of municipal workers in Finland) generally used more fact-based resources for lower complexity tasks, while they used more general sources for higher complexity tasks (1995: 208; cf. White, Matteson, and Abels 2008: 591). As White, Matteson, and Abels point out, “[d]ictionaries are factually based so translators’ use initially of dictionaries is comparable to the fact-based sources used by the municipal workers. When the dictionaries do not provide acceptable answers, the translators move beyond them to different types of resources” (ibid.). That both professional and student translators tend to rely on dictionaries (regardless of their format) as a primary source of consultation is perhaps not so surprising. As Palomares Perraut and Pinto Molina explain, “las fuentes

terminológicas y lexicográficas son las más necesitadas y utilizadas por los traductores” (2000: 111).²¹⁶

With regard to the participants’ overall level of Web search expertise, correlations could be established between Bob’s and Daniel’s Web search experience and their Web search knowledge. Yet only Bob’s experience with and declarative knowledge of online searching could be correlated with his procedural online search behavior (or Web search performance). In Daniel’s case, no such correlation could be established given the little research he conducted online, which was limited to the use of a single bilingual dictionary. The students’ past experiences with online searching neither correlated with their declarative knowledge of Web searching nor with their procedural behavior. That is, in this study, extensive use of the Web for information-seeking purposes does not necessarily correlate with sophisticated use.

Interactions between Web search expertise and Web search behaviors were most notably felt in connection with the participants’ query construction and modification abilities to locate relevant information on the Web. In particular, the findings of this study suggest that different levels of Web search expertise correlate with various conceptions of how search engines work as well as with the effectiveness with which query statements are expressed and refined. As indicated in previous chapters, users depend on their understanding of search engine features in order to transform questions into appropriate search query syntax. The student participants, who had little online search expertise, typically favored simple queries, sometimes using natural language in their queries, and frequently over- or under-specifying their search requests. When they did not find satisfactory results, they sometimes replaced, added, or subtracted terms, but rarely made use of search operators and/or query modifiers—except for some phrase searches—for query refinement. At other times, they tried new search paths or gave up their searches altogether. Furthermore, they generally used few query terms in their pursuit of relevant results—their searches averaged 2.44 terms per simple query in Task 1 and 2.38 terms in Task 2—and typically accessed one of the first three (in some cases,

²¹⁶ Similarly, in the joint project carried out by the National Research Council of Canada and the Université du Québec en Outaouais with regard to translators’ use of tools and resources, it was found that, although corpus-based tools (e.g. translation memories, bilingual Websites, etc.) “have made it into the mainstream ... **they have not misplaced Termino-lexicographic tools**” such as dictionaries, terminology databases, and lexicons (Dèsilets 2010: n.p., emphasis in the original).

five) results displayed on the search results page.²¹⁷ The students' rather simple query behavior appeared, in turn, to reflect their misconceptions about how search engines work, above all, by showing considerable trust in these tools (more specifically in Google).

The above results seem to be more or less in line with those obtained in other Web searching studies, which found that “users prefer rather simple search statements and do not plan their searches” (White and Iivonen 2008: 724). Web searchers have also been found to use relatively few query terms—generally two or three keywords per search (see, for example, KeywordDiscovery.com 2010; Battelle 2006; Jansen, Spink, and Saracevic 2000)—rarely construct complex/advanced queries (Jansen, Spink, and Saracevic 2000), and “easily modify their query statements, give up the old ones, and try new ones” (White and Iivonen 2008: 724). Jansen, Spink, and Saracevic (2000) also found that the average number of pages accessed by users is 2.35 and that most searchers do not access any results past the first results page (*ibid.*). Based on these findings, one could hypothesize that the typical profile of a regular searcher involves shallow searching, which, at first, may suggest “an unsuccessful, uninformed, or lazy form of behavior” (Nicholas et al. 2006: 210). Yet for the student participants in this study, this type of online search behavior was often successful for retrieving translation equivalents, mainly by using the Web as a type of metadictionary and, on occasions, as a parallel, aligned corpus. Shallow searching was not always successful, however, for retrieving relevant background information on the Web that could be efficiently used for translation purposes.

On the above basis, and considering translators' extensive use of the Web as an external resource for seeking both linguistic and extra-linguistic information, one could argue that (student) translators would ideally need to develop online information skills that go beyond a mere shallow searching and that are closer to an expert, interactionistic, and deep searching style. In this study, for example, Bob's online search expertise was highly visible in his query construction and modification patterns. He would always

²¹⁷ This suggests that “problem coverage,” defined by Désilets (2010: n.p.) as the “probability that at least one relevant solution is found in the top 10 results,” seemed more important to students than “precision,” or the “probability that a proposed solution is relevant.” This was also true for the professional translators in Désilets' study, who found aspects of “recall”—“i.e. the percentage of all relevant solutions proposed by the resource”—to be important too, albeit to a much lesser extent than problem coverage and precision (*ibid.*).

create advanced queries by combining one or more phrase searches with other query terms and/or the site modifier—i.e. he would plan and specify his searches according to his information needs, and goals—and follow result links and/or come back to the main SERPs to modify his advanced queries until he would find the desired information. His query statements thus seemed to reflect not only his Web search expertise but also his translation expertise, as he always used source-text keywords as lexical filters, sometimes combining them with keywords retrieved from online documents to acquire relevant thematic content (and not just linguistic information). As mentioned above, Laura developed a similar type of query behavior for Task 2, i.e. she used more precise search terms, most likely as a result of her translation learning progress.

In this context, Hsieh-Yee's (1993) study shows that users' levels of search experience and domain knowledge were found to affect their selection of search terms. Furthermore, Spink and Saracevic (1997) observed that, in addition to Web search experience and domain knowledge, the search terms from a user's domain knowledge along with those from the system's output were the terms that proved most successful for retrieving relevant content (cf. Spink and Jansen 2004: 56). In this study, source-text domain knowledge (i.e. the remaining user attribute) did not seem to have a particular bearing on the participants' selection of query terms as these were mostly determined by the source texts themselves. Nevertheless, both source-text domain knowledge and task-related factors appeared to have had a combined effect on the participants' amount and type of information needs. In general, it was possible to observe that the higher the level of *perceived* domain knowledge, the lower the number of information needs and the less specialized the nature of these needs. Daniel, for example, who in Task 1 declared his level of source-text domain knowledge to be 'high,' had the lowest number of information needs (five) of all six participants. These needs were all of a general lexical nature, i.e. they did not involve any specialized concepts or ideas mentioned in the text. Similarly, Martha, who had the second lowest number of information needs (seven) in Task 1, also declared her level of domain knowledge to be 'high.' Her information needs were also of a general lexical nature, with only two needs involving the search for background information. Laura, whose information needs were higher (eleven in total) than Martha's and Daniel's, declared her level of domain knowledge as sufficient to understand most of the subject-specific words, expressions, or ideas mentioned in the text. Her needs were also of a general lexical nature and did not involve any thematic

searches. Bob, who researched a similar number of information needs (ten) than Laura, declared his level of knowledge as low. His search needs were mostly of a thematic nature. Anna also declared her level of domain knowledge as low but had twice as many information needs (19) as Bob. Yet, similar to Bob, some of her information needs involved thematic searches. Maria, finally, also declared her level of domain knowledge as low. She had the highest number (29) of information needs, none of which involved thematic searches. Differences in linguistic ability and translation directionality, among others, would seem to explain the higher number of information needs experienced by Anna and Maria, i.e. the two non-native speakers of English among the students.

In Task 2, the number of information needs increased for Anna (21) and Laura (19), but decreased for Maria (23), while remaining the same for Martha (seven). Anna, Maria, and Laura all declared their source-text domain knowledge to be ‘very low’. Martha, however, indicated that her level of domain knowledge was sufficient to understand several specialized concepts and ideas mentioned in the text. Furthermore, while Anna’s and Laura’s search needs involved the search for both linguistic and extra-linguistic information, Martha’s and Maria’s searches primarily concerned the search for linguistic information. That is, the various types of information needs appeared to influence the types of research conducted online.

Finally, it should be pointed out that both the type of research and the amount of time spent online seemed to have had an impact on translation quality. Anna and Laura, who in Task 2 conducted both linguistic and extra-linguistic research, and experienced the highest increase in research time compared to Task 1 (13% and 20% respectively), produced better quality translations than Martha and Maria, who primarily conducted linguistic research and experienced the lowest increase in research time (3% and 8% respectively). These results seem to be somewhat in line with previous findings (e.g. Krings 1988; Gerloff 1988; Jääskeläinen 1990) that suggest that translation quality is related to the amount of time and effort invested in translation processing—of which documentary research is an essential part.

8.2. Web Searching and Translation – Implications for Teaching

Perhaps one of the most significant implications of the above tentative results from a didactic perspective refers to the importance of teaching translation students—early on

in the curriculum—(a) the diversity of (online) resources available for translation and (b) how to select adequate resources based on different types of problems, or information needs. As I have previously shown, the student participants typically used reference sites (mostly dictionaries) as their first port of call in searching for both linguistic and thematic (specialized) information, i.e. they did not always base their selection of specific information sources on specific types of information needs (or goals pursued). This is true particularly for Task 1. And while in Task 2 the range of information sources generally increased, with students showing a greater awareness of the appropriateness of specific resources for specific information needs, reference works continued to be the most dominant resource type. As briefly discussed in Chapter 7, Massey and Ehrensberger-Dow (forthcoming) obtained similar results in their pilot study of resource use by a group of translation students (at various levels of undergraduate study) and instructors. Among others, Massey and Ehrensberger-Dow found that online dictionaries ranked high on the students' list of resources used for solving "extra-linguistic problems requiring expert or specialized knowledge," while the use of search engines and parallel texts were "the top choices for the instructors" (these resources were also the top choices for the translator with the highest level of expertise in this study). In the case of linguistic research, however, "instructors showed a greater preference for monolingual print and CD/DVD dictionaries than the students" (*ibid.*). In contrast, the students favored the use of multilingual resources. According to Massey and Ehrensberger-Dow, the findings from their pilot study

on linguistic and extra-linguistic resources indicate potentially important discrepancies in resource use between instructors and students. While the instructors appear to prefer reviewed or authoritative resources such as published printed and electronic dictionaries or terminology databases for linguistic research, this seems to be less important as a criterion for students. Students show a greater inclination than instructors to use multilingual resources for both linguistic and extra-linguistic research, but use monolingual dictionaries and special search facilities rather less. On the basis of these findings, it could be said that the instructors possess a greater awareness of the appropriateness and reliability of resources for specific problem types, in these respects coming closer to accepted best practice in translation-specific information behavior than the students (*ibid.*).

Based on these findings, Massey and Ehrensberger-Dow conclude that "students' self-reported resource use partly confirms Varantola's observations that student 'translators try to find non-dictionary type information in dictionaries because it is not readily or systematically available in other sources' (1998: 189)" (*ibid.*). They nevertheless remark

that, “[o]ver a decade after publication of this article ... we would argue that such information is now readily available, and that students should be made sufficiently aware of where such resources are and how they can be best accessed and used” (ibid.). While this observation may indeed apply to both print and electronic dictionaries, one wonders whether the same can be said for free online dictionaries of a less authoritative nature. Overall, the students of this study tended to rely on online bilingual dictionaries as their initial source of consultation, thus typically carrying out search engine queries only when their dictionary searches failed to provide them with satisfactory answers. A look at how students used the bilingual dictionary WordReference.com—which was the dictionary most frequently used by three of the four students—shows the limits of this particular resource. While most of the students’ problems were solved successfully, an analysis of the unsuccessful solutions shows that uncritical reliance on solutions offered in online bilingual dictionaries led to poor translation solutions in some cases. This fact—most likely due to an over-supply of (perhaps poorly contextualized) possible translation solutions—continues to highlight the importance of training translation students in the use of dictionaries in different formats, i.e. in print, electronic, and online forms.

The fact that the students sometimes misused general online bilingual dictionaries by trying to find information on acronyms, allosemantic words, and collocations would thus seem to confirm Varantola’s hypothesis above. Furthermore, the analysis of unsuccessful solutions resulting from the consultation of online dictionaries suggests that polysemous words caused particular difficulty to the novice students of this study. As mentioned above, it is often the abundance of choice in dictionary entries that causes users to select inappropriate solutions. Here, translator training would benefit from emphasizing more strongly the need to cross-check dictionary search results, both within the dictionary accessed itself and within selected parallel texts. The same applies to issues of stylistic appropriateness of target language expressions, in particular, L2 expressions. Here, as Varantola points out, it is “obvious that for translators tackling even non-highly-specialised text more is needed in the way of reference sources than ... dictionaries: access to relevant parallel corpus material becomes essential” (1998: 189). Thus, “[i]n the hands of trained and lexicographically sophisticated users, this battery of reference sources would provide the most effective type of integrated environment for translators to work in” (ibid: 191-192). In this study, for example, background research

involving the use of several resources such as reference works and parallel texts in fact led to the most successful translation solutions among students,²¹⁸ in particular where interaction occurred between the students and the texts accessed, and where effort and time was invested in acquiring background knowledge.

Overall, the findings of this study seem to highlight the need for formal training in the use of appropriate resources—and the formulation of effective search statements—based on question analysis (i.e. information needs analysis), an aspect also supported by Massey and Ehrensberger-Dow’s (forthcoming) pilot study. Here, particular attention would ideally need to be paid to the more or less open (i.e. non-factual) vs. closed (i.e. factual) nature of information needs (or questions asked) as well as the predictability of sources of information for providing suitable answers. As White and Iivonen point out, these two question characteristics may have an impact on users’ choice about their initial “Web search strategy,” which, in turn, “has implications for the continuation of the search” (ibid: 722-723). The results of this study seem to support this claim. Comparing the initial search actions of Task 2 (for which some of the students searched both for linguistic and extra-linguistic information) with those of Task 1 (for which most students sought linguistic information only), a major shift away from direct address searches was identified. While in Task 1, almost three quarters (74.6%) of all initial search actions involved the use of direct addresses to visit known dictionary sites, this number fell to 50% for Task 2. Instead, for Task 2, all four students carried out 48.15% of their combined initial search actions in the form of search engine queries.

Nevertheless, as shown earlier, students’ abilities to transform questions into appropriate query statements were not always successful, mainly as a result of their lack of understanding of search engine features as well as the lack of planning searches according to specific information goals. Given that the keyword search approach to information seeking and retrieval is considered the most powerful method to finding information online, the sooner students are exposed to the features of various search

²¹⁸Nevertheless, one of the downsides of working in a multitasking environment is the fact that the users’ cognitive load might increase (see, for example, the findings of this study concerning students’ task progression profiles in 6.3.2). In Désilets, Barrière, and Quirion’s study, for instance, some professional translators explicitly “commented on the fact that they did not like having many resources opened at once, because they needed to constantly navigate between them” (2007: n.p.). Désilets, Barrière, and Quirion therefore argue that one of the possible advantages of a wiki translation resource—i.e. “a free, open, massively collaborative wiki based resource,” which translators could use for problem solving—“is that it might grow into a single resource with a broader coverage of all problem types and content domains” (ibid.).

engines (including metasearch engines) the better. The findings of this study point to two particular training needs in this area: (a) knowledge about search engine performance for data retrieval as opposed to information retrieval (cf. 6.1.5.1), and (b) the use of search engine features to efficiently construct advanced queries for finding relevant information on the Web. In this context, and as discussed at the beginning of this study, the importance of integrating online information skills in the translation curriculum has long been recognized by the teaching community. The importance that these skills are given within the curriculum can be observed, for example, in the results obtained by Pinto Molina and Sales Salvador in their survey of information literacy instruction in Spain. Here, the authors found that,

well ahead of the rest of the items, the translation and interpreter trainers see the first need of a specialized translator as being the skill of information search (68%). This is followed by subject knowledge (34%), which is, after all, the product of a sound global information competence that is continually being enriched and updated for whatever field of expertise (2008a: 61).

Yet, when teachers were asked which elements they thought needed to be added to the curriculum where they felt “students had not yet acquired the necessary [information] skills,” they suggested “reinforcing knowledge of *documentation techniques in general*” (ibid., emphasis in the original) and of information search in particular (ibid: 62). Concerning the latter, Pinto Molina and Sales Salvador state that “teachers are no doubt aware that their students tend to conduct their information searches in an intuitive fashion, low on structuring and only vaguely systematized, and suppose that a search engine like Google ‘knows everything’” (ibid.). In this study, a high degree of trust in this search engine was also observed.

When the teachers were asked whether they thought “that the core component Documentary Research Applied to Translation (4 credits, first cycle) [was] sufficient to equip students with documentation competence as part of a broader translation competence,” Pinto Molina and Sales Salvador found that 41 % of respondents did not think so compared to 34% of respondents who did. Moreover, upon adding “the ‘no’ and ‘qualified yes’ scores (the latter being 24%), [they found] that 65% of the trainers in [their] sample believe[d] that the core component under the existing curriculum does not fully meet the students’ needs” (ibid: 64). This concern is also voiced by Kelly, who, in her overview of the Spanish undergraduate degree in translation and interpreting studies,

remarks that courses tend to be disassociated from one another, as in the case of “Documentary Research,” for example, which

is separated from Terminology, despite the fact that much documentary research carried out by translators is essentially terminological in purpose. In most universities, there is no link established among these three areas [computing, documentary research, and terminology] or between them and practical translation activities (2005: 68).

It is not surprising, then, that in order to improve information literacy instruction, the teachers in Pinto Molina and Sales Salvador’s study emphasized, above all, the need for closer coordination between teachers of information literacy and those in charge of teaching specialized translation (and interpreting) courses in various areas of expertise (2008a: 64). They also remarked that the teaching of documentary research should be extended “with additional instruction in the second cycle and the addition of optional courses” (ibid.). Another suggestion made—one I am particularly keen on—relates to the need to “consolidate” and “extend” (online) information skills “within each specialized translation field, on the basis of closer links to professional practice and employing a more applied approach with the use of case studies” (ibid.). The findings of my study suggest that successful query construction depends not only on knowledge about search engine features but foremost on the selection of key source-text terms and the planning of search statements based on thorough question analysis (i.e. information needs analysis). This calls, in line with the proposals above, for a highly applied and contextualized approach to the teaching of (online) information skills within translation practice courses, thus enabling students to develop and/or enhance said skills through meaningful and experiential learning.

Such an applied approach to the teaching of (online) information skills would, in turn, facilitate a transversal approach to the teaching of specialized translation. As González Davies points out, “si se enseña la traducción especializada incluyendo una gran gama de tipologías textuales, temas y subtemas, y otorgando un papel relevante a las destrezas de documentación de manera que lo aprendido en una clase sea en gran medida aplicable en la otra, las distancias entre especialidades menguan” (2003: 15). Indeed, if we are to teach our students to deal with different areas of specialization, text types, and topics, our focus needs to shift from the acquisition of specialized knowledge in several domains to the generation of information skills that will enable (student) translators to deal with various fields of expertise. In addition, it would allow for existing models for

the development of information competence—such as the model INFOLITRANS (information literacy for translators) proposed by Pinto Molina and Sales Salvador (2008b, 2008c)—to be integrated into practical translation activities.

8.3. Methodological Observations and Possible Avenues for Future Research

As I mentioned at the beginning of this study, one of my secondary research goals was to assess the usefulness of the main data collection tools employed, both with regard to their value in teaching and in research. In the following, I will in particular assess the online search reports (OSRs) and the use of screen recording software, and will combine this assessment with a more general discussion of the research methods used in my study.

Overall, the OSRs were very positively received by the student participants of this study for their didactic merits. The individual elements of the OSRs encouraged students to reflect more thoroughly and more critically about the nature of the problems they faced, the decisions they needed to take, and the options they were presented with. As such, the OSRs became tools supporting the constant decision making processes involved in translation. Furthermore, the OSRs raised the participants' awareness of perceived problems in general and of the importance of problem detection and solving in particular. Finally, the students also praised the didactic usefulness of the OSRs for supporting their Web searching processes, especially when it came to evaluating the content found on the Web.

Nevertheless, despite the OSRs' apparent positive didactic value, it is the very nature of written reports that potentially reduces their value as a research tool. As indicated above, the presence of the OSR (or any type of problem report) heightens students' meta-cognitive levels of awareness, thus introducing an unnatural element into the translation process, which in turn threatens the reliability and validity of this tool. The use of OSRs in my study underlined other general problems associated with written protocols that have been reported in other studies (cf. Gile 2004; Hansen 2006; Pavlović 2007, 2009). This includes the fact that the online search reports not only represented an additional, time- and energy-consuming task for the students, but were also seen by some of them as causing interference with and disrupting the actual translation process. Hence, it would be advisable to instruct students to complete the reports after their translations. This could, however, lead to difficulties associated with the recall of information due to

limited short-term memory capabilities, a phenomenon that one of the students of this study commented upon. In this regard, Pavlović states that students are not likely to “recall all the problems they encountered, solutions they considered, resources they consulted, or the reasons for their final decisions” (2007: 182). Problems of information recall could partially explain another aspect of written reports that may negatively impact on their value as research tools, namely the question of the thoroughness and completeness of the reporting. In this context, a lack of detail is not necessarily the main concern (a lot of the OSR entries were indeed very detailed). The problem rather lies with the question of what gets reported in the first place and what not, i.e. of what is being considered a problem and what not. Here, I identified a pattern of students not reporting general lexical problems for which they were mainly looking for confirmation (or “reassurance”) of already existing tentative solutions.

Furthermore, the interview data of this study shows that some of the participants—primarily the two non-native speakers of English among the students—omitted to report the information needs that they considered unproblematic. The more general nature of the unreported needs in fact seems to support the assumption that the participants tended not to report on searches that involved unproblematic processing and that primarily aimed at confirming preexisting solutions. Thus, taking only the reported search needs into account, it was possible to observe that all participants had a similar number of more or less problematic items (generally associated with technical terms) in both tasks. In contrast to my original position, in which I envisaged information seeking as motivated by the need to solve a (translation) problem (cf. 5.1.1), the results of this study appear to support Case’s statement that information seeking is sometimes motivated by “a desire to simply have more or less of some quality; more information; stimulation, or assurance; or less uncertainty, boredom overload, or anxiety” (2008: 88). That is, as the interview data of this study suggests, the notion of problem does not necessarily refer to something serious or difficult (cf. Jääskeläinen 1993; Séguinot 2000a; Sirén and Hakkarainen 2002).

The fact that the unreported searches were mostly carried out by the non-native speakers of English also appears to reinforce previous suggestions that (student) translators generally feel less confident in L2 translation than in other directions (Kiraly 2000b; Pavlović 2007). One would therefore concur with Pavlović that “[h]aving a wealth of external resources at their disposal and being able to use them well, is likely to help

students deal with [their] insecurity” in L2 translation (2007: 193).²¹⁹ Yet, this insecurity, or lack of confidence, does not necessarily have to be a bad thing. As Massey and Ehrensberger-Dow point out, “there is a risk of overconfidence and complacency when people translate into their L1” (2010a: 137). In contrast, when people translate into their L2 they may feel the need “to be more cautious and check resources for unfamiliar terms” (ibid.). A look at some of the translation solutions adopted by the native speakers of English in this study indicate that a more thorough browsing of English parallel texts would have contributed to a higher amount of successful translation solutions for these participants.

With regard to more general questions of research methodology, the fact that unproblematic needs did not show up in the OSRs and were only spotted through the screen recording (and confirmed in the interviews) stresses the need for methodological triangulation. Overall, OSRs have shown to be excellent didactic tools that raise students’ awareness of the translation and Web searching process, and encourages them to critically reflect on their decisions. I also think that they are useful research tools, but they need to be complemented by other tools so as to ensure a more complete picture. Furthermore, as suggested above, it would seem reasonable to employ written reports after the translation process has been completed so as to reduce their disruptive impact of said process. While leaving the completion of reports for the end would entail the risk of losing some of the information, these tools are still able to collect data in a highly systematic way (Gile 2004).

With regard to screen recording software, this has proved to be an excellent research instrument in this study. The software running in the background of the students’ computers was highly unobtrusive, with students seemingly unaware of its presence (one of the students was even checking her personal e-mail, while recording continued). The interview data confirms this claim, with the students stating that they forgot about being screen-recorded and that this tool did not “bother” them in any way. An aspect of screen recorders that in my opinion is worth studying in the future is their didactic potential. That potential has been indicated in a study carried out by Pym (2009), in which students’ first had their translation process recorded and then watched said

²¹⁹ In this study, the positive effects of having online resources available are most visible in the case of one of the two students who are non-native speakers of English.

process on screen, an exercise that, again, raised students' meta-cognitive levels of awareness, inviting and enabling them to critically reflect on their working styles.

On a more general level, and to conclude my reflections on methodology, the type of research that I carried out as part of this study (i.e. process-oriented research) left me with the general impression that one must cut down a whole forest to create a single toothpick. The amount of data generated even with a small cohort is rather overwhelming and suggests, at least to me, that such research is better carried out by a team of researchers as opposed to solo researchers. It is also important to state that studies like mine become much more useful when they can be and are transferred to other context-dependent research settings. Here, I find the approach taken by Susanne Göpferich and her colleagues in the TransComp project (see, for example, Göpferich 2009b, 2010) to pool research data in a dedicated database especially useful, as it would offer chances for cross-institutional research and allow for the comparison of several data sets. I consider my own study to be highly replicable and capable of producing similar results in similar settings. In this context, a number of data analysis and data collection tools that I developed for or adapted to my study are of particular value. First, I developed a comprehensive scheme for the coding of online search and translation-related actions. This scheme was based on an existing method for coding and classifying users' online information-seeking behavior, but which I considerably enhanced to account for translation-specific actions (cf. 5.8.3). Second, I adapted existing metrics (i.e. session length, query complexity, query length, and query type) from the Web searching literature to suit the needs of this study. Third, on the basis of previous existing written reports, I developed the OSRs, which, as I discussed above, have multiple advantages (as well as some disadvantages) and which can be easily adjusted to serve the needs of other studies.

Finally, as I mentioned above, I consider this study to be highly transferable, and I would be very interested in seeing similar studies that involve minority languages, or languages that are less widely used on the Internet. As Pavlović (2007) has shown with regard to Croatian, and as supported by Massey and Ehrensberger-Dow's (forthcoming) study, the use of the Internet by (and, I would add, its usefulness for) translators depends on the language pairs involved in the translation process. Despite this and other caveats, however, I am confident that the emerging research into the information behavior of translators is clearly moving into the right direction.

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APPENDICES

Appendix A

Please translate the following text, taking into account the translation brief below. In addition, please complete the accompanying Online Search Report, which can be accessed at:

http://www.surveymonkey.com/s.aspx?sm=OCbaFbxFwAJG2_2fr2QrGD9g_3d_3d:

Translation brief: *Greenpeace in New Zealand wishes to launch a new Consumer Network, which will focus public pressure to rid genetically-engineered foods from NZ shelves. As part of their food campaign objectives, they are gathering related leaflets, brochures and all types of advertising materials from other Greenpeace organizations around the world to put together an information package that will be distributed across the country with a view to mobilize thousands of people to voice their opposition to genetically-engineered foods. You have been asked to translate the section below from Spanish into English to be included in this information package for immediate publication purposes.*

Guía roja y verde de alimentos transgénicos

4ª edición – Actualización 10 de febrero de 2009

¿Por qué Greenpeace se opone a la liberación de transgénicos al medio ambiente?

El cultivo de transgénicos supone incremento del uso de tóxicos en la agricultura, contaminación genética, contaminación del suelo, pérdida de biodiversidad, desarrollo de resistencias en insectos y ‘malas hierbas’, riesgos sanitarios y efectos no deseados en otros organismos. Los efectos sobre el conjunto de los seres vivos son irreversibles e imprevisibles.

Los riesgos sanitarios a largo plazo de los OMG presentes en nuestra alimentación o en la de los animales cuyos productos consumimos no se están evaluando correctamente y su alcance sigue siendo desconocido. Nuevas alergias, aparición de nuevos tóxicos, pérdida de eficacia de ciertos medicamentos o efectos inesperados son algunos de los riesgos.

Los OMG refuerzan el control de la alimentación mundial por parte de unas pocas empresas multinacionales. Son una de las armas predilectas de estos dictadores de la alimentación, y lejos de constituir un medio para luchar contra el hambre, aumentan los problemas alimentarios. Los países que han adoptado masivamente el uso de cultivos transgénicos son claros ejemplos de una agricultura no sostenible.

La solución al hambre y la desnutrición pasa por el desarrollo de técnicas sostenibles y justas, el acceso de los pueblos a los alimentos que producen y el empleo de técnicas como la agricultura y la ganadería ecológicas.

Appendix B

Please translate the following text, taking into account the translation brief below. In addition, please complete the accompanying Online Search Report, which can be accessed at:

http://www.surveymonkey.com/s.aspx?sm=UTgDYD6YQhNC_2bsD4MKhqZQ_3d_3d

Translation Brief: *Reuters has asked you to translate the following press release into English for immediate publication in the Science & Health News section of Reuters.com.*

Un científico del CSIC descubre dos nuevas enzimas con posibles aplicaciones en el tratamiento del sida

La investigación, llevada a cabo por el investigador del Instituto de Catálisis y Petroleoquímica del CSIC Manuel Ferrer, sugiere que dos de estas nuevas enzimas, que presentan estructuras hasta la fecha desconocidas, pueden ser utilizadas para la síntesis de nuevos antibióticos beta-lactámicos de interés farmacéutico, así como para la separación de los enantiómeros de un fármaco aplicable a tratamientos anti-sida.

Según Ferrer, una de estas enzimas es capaz de separar eficazmente los enantiómeros de un fármaco pertenecientes al grupo de los alcoholes primarios, llamado solketal, y de los que sólo el enantiómero "R" posee eficacia en tratamientos anti-sida. Los enantiómeros empleados en la actualidad son mezclas racémicas en los que uno de los enantiómeros no tiene ningún efecto clínico, y su separación por métodos químicos convencionales es muy costosa e incluye laboriosas etapas de síntesis. Por ello esta nueva enzima supone una alternativa eficaz para la obtención de fármacos enantioméricamente puros a menor coste, aplicables en futuros tratamientos contra el sida.

1. BACKGROUND QUESTIONNAIRE

Please answer the following questions keeping to the order given here. As you will see, there are three different sections. In total, it will take you approximately 30 minutes to complete the form. The first section contains background questions. The second and third sections cover aspects of translation and online activities, respectively.

Please note that your answers will not be taken into account for the grades that you are given for this course. Quite on the contrary, the information gathered will help us better analyze your learning needs. Therefore, please do not use the Internet to answer the questions, and give honest and spontaneous answers instead.

If you have any doubts or need help with a particular question, please put your hand up so that we can provide you with any clarification you might need. You may also add whatever comments and/or explanations needed (to certain questions, for example) at the end of the questionnaire.

Many thanks for your collaboration.

2. BACKGROUND

1. First Name:

2. Last Name:

3. Age:

4. Gender:

Male

Female

5. Country of Origin:

6. Country of Residency:

7. E-mail Address:

8. Please rank the languages you speak according to your level of proficiency (A being the highest level and C the lowest one):

Language A

Language B

Language C

9. Please list your academic qualifications (including any degree you may be currently completing) by entering the highest qualification first and the lowest one last, if applicable. In addition, please specify in brackets where and when you completed each qualification.

1

2

3

4

5

3. TRANSLATION

1. Have you ever taken any translation practice courses?

No

Yes

If yes, please briefly describe such course(s) and specify when and where they took place:

2. Have you ever taken any translation theory courses?

No

Yes

If yes, please briefly describe such course(s) and specify when and where they took place:

3. Have you ever taken any translation technology courses (e.g. on electronic tools for translators, translation memory systems, localization tools, etc.)?

No

Yes

If yes, please briefly describe such course(s) and specify when and where they took place:

4. Have you ever attended any workshops and/or seminars related to translation?

No

Yes

If yes, please briefly describe such seminar(s)/ workshop(s), and specify when and where they took place:

5. Do you use any translation resources (e.g. offline and/or online dictionaries, terminology databases, encyclopedias, translation Websites, etc.)?

No

Yes

If yes, please list the name(s) of the translation resource(s) you use:

6. Have you ever done any translation work outside university courses? If so, please choose the appropriate option in each menu. Otherwise, please skip to the next question.

	What type of text?	In which direction?	For whom?	How?
Translation Job 1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Translation Job 2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Translation Job 3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Translation Job 4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Translation Job 5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

7. If you have done any translation work over the past year, please select the number of hours you have worked (on average) per month. Otherwise, please skip to the next question.

	0-10	11-20	21-30	31-40	41-50	Over 50
Hours worked per month:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

8. What is translation for you? Please list three or four words, expressions or ideas that you think best describe what translation is.

9. In your opinion, what should a good translator know? Please list three or four things that you consider most important.

10. Which instruments do you think can help a translator translate?

11. What different kinds of translations do you think a professional translator may be asked to do?

12. If you find a Spanish expression that you do not understand in a text, what do you do first? Please order the following options, putting a 1 by the one you would choose first and a 3 by the one you would choose last

Consult a bilingual dictionary

Try to understand the meaning of the word from the context

Consult a monolingual Spanish dictionary

Other (please specify):

13. If you find a Spanish expression that you understand, but for which you think your translation does not express the meaning clearly enough, what do you do first to find a good equivalent? Please order the following options, putting a 1 by the one you would choose first and a 3 by the one you would choose last.

Consult a bilingual dictionary

Try to express the same idea in as many ways as possible in English

Consult a monolingual English dictionary

Other (please specify):

14. When you are translating, what do you think is the basic unit you are translating?

The word

The sentence

Other

Other (please specify):

15. Please tick the elements you think intervene in a translation.

Client

Original authors

Socio-cultural environment of the translated text

Date of the original text

Deadline of the translation

Final reader

Function of the original text

Original reader

Other

Function of the translation

Socio-cultural environment of the original text

Other (please specify):

16. Please specify whether you think the following statements are true or false.

	True	False
The main problems encountered when translating non-specialized texts are vocabulary problems	<input type="radio"/>	<input type="radio"/>
Your translation of a sales contract for the Spanish company, "ABC, S.L.," will be different if you are translating it for a lawyer who wants to use it as proof in a trial, or for a British subsidiary company, attached to "ABC, S.L." that needs the translation to sign contracts with other British companies	<input type="radio"/>	<input type="radio"/>
All translators should be able to translate as efficiently into the foreign language as into their mother tongue	<input type="radio"/>	<input type="radio"/>
A good translator should be able to translate all types of texts with the same degree of efficiency	<input type="radio"/>	<input type="radio"/>
When a translator reads a text before translating it, the process is the same as for any other reader of the text	<input type="radio"/>	<input type="radio"/>
A bilingual dictionary is the main instrument used to find an adequate equivalent in the target language	<input type="radio"/>	<input type="radio"/>

4. ONLINE ACTIVITIES

1. How often do you use the Internet?

Never

Occasionally

Frequently

Daily

2. Do you have regular access to the Internet?

No

Yes

Please specify where you usually go online (e.g. at home, at university, etc.):

3. How many hours per week do you spend online?

Less than 5

5-10

10-20

More than 20

4. Which of the following activities do you do online, and how often? Please tick as many options as appropriate.

	Never	Rarely	Sometimes	Often	Very often
Academic research (e.g. assignments, essays, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Translation-related research (e.g. definitions, equivalents, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Learning (e.g. history, maths, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social networking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
News	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Entertainment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify):

5. Have you ever taken any course on online searching and/or Web-related courses (e.g. courses run by the University of Auckland Library such as the ones on Google or the Voyager catalogue, or courses run by your department)?

No

Yes

If yes, please specify the course name(s) and provide a short description of the course(s):

6. Have you ever learned how to perform Web searches and/or use certain Web resources by yourself?

No

Yes

If yes, please briefly explain what you have done to learn about Web searches and/or resources:

7. If you know any keyword search operators (e.g. the operator "OR", which is used in most search engines to find one or more keywords on the Web), please list a maximum of 5 and describe their function, i.e. what they are used for.

Search operator 1	<input type="text"/>
Search operator 2	<input type="text"/>
Search operator 3	<input type="text"/>
Search operator 4	<input type="text"/>
Search operator 5	<input type="text"/>

8. If you know any search engines (e.g. Google), please list a maximum of 5 and order them according to your frequency of usage (1 the most frequently used and 5 the least frequently used).

Search engine 1	<input type="text"/>
Search engine 2	<input type="text"/>
Search engine 3	<input type="text"/>
Search engine 4	<input type="text"/>
Search engine 5	<input type="text"/>

9. If you know any online databases (e.g. the University of Auckland's Voyager catalogue), please list a maximum of 5 and order them according to your frequency of usage (1 the most frequently used and 5 the least frequently used).

Online database 1	<input type="text"/>
Online database 2	<input type="text"/>
Online database 3	<input type="text"/>
Online database 4	<input type="text"/>
Online database 5	<input type="text"/>

10. If you had to search for pages that contain information on the migration of gray whales in the Pacific Ocean, how would you express this search in Google's search box?

Please type in your search query here:

Please add any comments you may have on your search query here:

11. If you had to search for pages that contain information on the migration of gray whales in the Pacific Ocean, how would you express this search in Google's Advanced Search?

All these words:

This exact wording or phrase:

One or more of these words:

Any of these unwanted words:

Results per page:

Language:

File type:

Search within a site or domain:

12. If you had to search for pages about maternity care in New Zealand, how would you express this search in Google's search box?

Please type in your search query here:

Please add any comments you may have on your search query here:

13. If you had to search for pages about maternity care in New Zealand, how would you express this search in Google's Advanced Search?

All these words:

This exact wording or phrase:

One or more of these words:

Any of these unwanted words:

Results per page:

Language:

File type:

Search within a site or domain:

14. When you perform a search to look for information on the Web, do you usually save the Websites or resources that contain the information you were looking for?

No

Yes

If yes, what do you usually do to save such information?:

15. Please specify whether you think the following statements are true or false.

	True	False
A search engine always finds results from one single Website	<input type="radio"/>	<input type="radio"/>
When a search engine finds multiple results, the most relevant result according to the search engine is listed first	<input type="radio"/>	<input type="radio"/>
If a search engine yields more results (hits) for the term "localization" than for the term "localisation", this means that the first term is the correct one	<input type="radio"/>	<input type="radio"/>
The URL "http://www.un.org/~slavic/actfl.htm" contains an html document from an educational site	<input type="radio"/>	<input type="radio"/>
The URL "http://www.my-adventures.co.nz" will direct you to a non-commercial site in New Zealand	<input type="radio"/>	<input type="radio"/>
The number and type of keywords typed in a search engine will affect the number and type of hits retrieved by the search engine	<input type="radio"/>	<input type="radio"/>

16. Please tick the criteria you think should be considered to evaluate resources on the Internet.

- | | | |
|--|---|--|
| <input type="checkbox"/> The author of the site | <input type="checkbox"/> The number of hits with links to the site | <input type="checkbox"/> The amount of site links to related sites |
| <input type="checkbox"/> The accuracy of the information | <input type="checkbox"/> The intended users | <input type="checkbox"/> Other |
| <input type="checkbox"/> The host of the site | <input type="checkbox"/> The number of graphs and multimedia elements in the site | |
| <input type="checkbox"/> The design of the site | <input type="checkbox"/> The currentness of the content | |

Other (please specify):

17. Do you agree for the answers to this questionnaire to be used anonymously for teaching and/or research purposes?

- No
- Yes

18. Please add any explanations and/or comments you may have:

Thank you very much for your time!

1. TRANSLATION AND ONLINE SEARCH REPORT

Please complete the following report on the translation assignment you have just completed as well as on the different online search tasks you have carried out as part of your translation-related research.

2. DOMAIN KNOWLEDGE

1. First Name:

2. Last Name:

3. Have you ever taken any courses related to the subject field dealt with in the text?

No

Yes

If yes, please provide the course name(s) as well as a short description of such course(s):

4. Have you ever attended any workshops and/or seminars related to the subject field dealt with in the text?

No

Yes

If yes, please provide the name(s) and a short description of the workshop(s) and/or seminar(s):

5. Have you ever learned about the text's subject field by yourself?

No

Yes

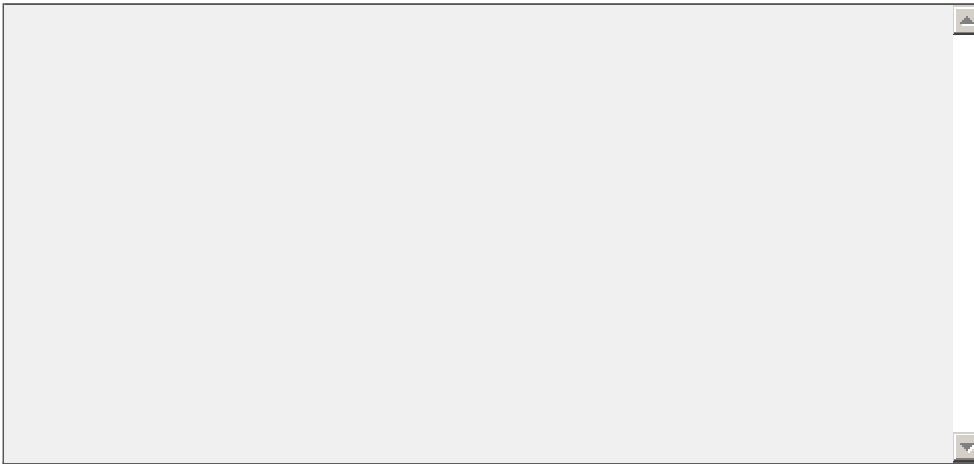
If yes, please briefly explain how and/or why you have learned about it:

6. Are there any subject-specific words, expressions or ideas mentioned in the text you were already familiar with before doing the translation?

No

Yes

If yes, please list the items you already knew or were familiar with before translating the text:



7. How much do you think you knew about the text's subject before doing the translation? Please choose the most appropriate option.

I did not know anything at all, so I did not understand any of the specialized concepts mentioned in the text

I had some basic knowledge and this helped me understand a few specialized concepts mentioned in the text

I had enough knowledge to understand most of the specialized concepts mentioned in the text

I had a high level of knowledge and this helped me understand all the specialized concepts mentioned in the text

In the following, please list all the text words, expressions or ideas for which you had to perform an online search, and answer the accompanying questions about their associated search tasks.

3. SEARCH TASK 1

1. Please specify:

The text item that prompted the search:

The reason why the text item prompted the search:

The type of information you were looking for:

The search result you selected:

The reason why you selected this result:

The source and context of your selected search result:

2. Did you find the type of information you were looking for?

Yes, I found the type of information I was looking for

Not quite, I have only found part of the information I was looking for

No, I have not found the type of information I was looking for

Please explain why you think your online search was successful, partially successful or simply unsuccessful:

3. How satisfied are you with your final search result?

Very dissatisfied

Very satisfied

Please tick the appropriate option

4. How difficult did you find this search task?

Very difficult

Very easy

Please choose the appropriate option

5. Please add any comments you may have about this search task:

Appendix E

ONLINE SEARCH PATHS – TASK 2						
ANTIBIÓTICOS BETA-LACTÁMICOS						
Martha	Type query: antibióticos beta-lactámicos	Click link (1st): Antibiótico betalactámico - Wikipedia	Modify query: antibióticos beta-lactámicos en ingles	Click link (1st): International Microbiology - Complejos génicos ("clusters") de ...		Modify query: b-lactam antibiotics
Anna	Type query: beta-lactámicos		Click link (1st): Antibiótico betalactámico - Wikipedia		Click site link: English	
María	Type site query: beta-lactámicos	Type query: beta-lactámicos english	Modify query: english beta-lactámicos	Click link (2nd): ERC: Guía Internacional de Indicadores de Precios de Me		Modify query: antibiotics beta-lactámicos
	Modify query: antibiotics beta-lactámicos beta-lactem	Click link (3rd): Antibióticos betalactámicos = Beta-lactam Antibiotics		Type query: beta-lactem antibiotics [sic]	Click link (1st): Beta-lactam antibiotic - Wikipedia	
Laura	Type query: beta-lactamic		Click link (1st): immobilization of some new beta-lactamic antibiotics derived from ...			
INSTITUTO DE CATÁLISIS Y PETROLEOQUÍMICA						
Martha	Type query: CSIC + Catálisis y Petroleoquímica		Click link (1st): institute of catalysis and petroleum chemistry - spanish national ...	Click site link: Biocatalysis		Click site link: Library
Anna	Type site query [WR]: catalisis	Type site query: catalisis	Click site link: catalisis		Type site query: petroleoquimica	
	Click site link: petroleoquímico		Type site query [WR]: petroleoquimica		Click site link [WR]: petroquímica	
María	Type site query [WR]: Instituto de Catálisis y Petroleoquímica	Type query: Instituto de Catálisis y Petroleoquímica	Click link: instituto de catálisis y petroleoquímica-consejo superior de ...	Click site link: English		Click site link: News
Laura	Type query: Petroleochemic	Modify query: Petroleoquímica		Type site query [MW, 2nd session]: catalisis		Click site link: catalysis
CSIC						
Martha						
Anna	Type query: CSIC	Click link (1st): CSIC	Type query: BBC news	Click link (1st): BBC NEWS News Front Page	Click site link: Health	Click site link: Steaming hot tea linked to cancer
	Click site link [CSIC, 2nd session]: Institutional documents	Click site link: Presentation	Type site query [BBC]: CSIC	Click site link: News - Sci/Tech - Giant crystal cave discovered	Type site (repeat) query [BBC, 3rd session]: CSCI	Modify site query: Spanish national research council
	Modify site query: "Spanish national research council"	Type query [4th session]: "Spanish National Research Council"		Click link (1st): CSIC	Click site link: Publications	Click site link: Press releases
	Click site link: Latest news	Click site link: INICIO	Click site link: Centres	Click site link: Alphabetical list of the CSIC's Institutes/Centre		Click site link: [See website]
	Click site link: English	Click site link: News	Click site link: Picture link (Home)		Click site link [CSIC, 5th session]: Media archive	
María	Type query: scic [sic]	Click link (2nd): SCIC - What does SCIC stand for? Acronyms and abbreviations by the ...	Click link (3rd): Singapore Chemical Industry Council	Click link (9th): SCIC		Type query: Consejo Superior de Investigaciones Scientificos english

Laura	Modify query: english Consejo Superior de Investigaciones Cientificos Type query: CSIC	Click link (1st): departamento de postgrado y especialización - consejo superior de ...	Click site link: ENGLISH	Click site link (CSIC.es): Información general	Click site link: Presentación	
ENANTIÓMEROS						
Martha	Type query: enantiómeros de un fármaco en ingles	Click link (4th): Industria farmacéutica - Wikipedia, la enciclopedia libre	Click site link: Search for English results only	Modify query: enantiómeros de un fármaco	Click option button: Pages from New Zealand	Modify query: enantiómeros
Anna	Click results link (1st): Enantiómero - Wikipedia Type site query [FD]: enantiómeros	Click link (2nd): Diferenciação Experimental entre Enantiómeros Type site query (WR): enantiómeros	Type query: enantiómeros	Click link (3rd): Enantiómeros Modify query: "enantiómeros "	Modify query: enantiomers Click link (1st): Enantiómero - Wikipedia	Click link (1st): Enantiomer - Wikipedia Click site link: English
Maria	Type site query [WR]: enantiómeros	Type query: enantiómeros english		Click link (2nd): resolved enantiomers > enantiómeros resueltos		
Laura	Type site query [WR]: enantiomero	Type query: enantiomero	Click link (1st): Enantiómero - Wikipedia		Click site link: English	
SOLKETAL						
Martha	Type query: solketal		Click link (1st): Solketal - Wikipedia		-	
Anna	Type query: solketal		Click link (1st): Solketal - Wikipedia		-	
Maria	Type site query [WK]: solketal					
Laura	Type query: enantiomers primary alcohol soketal [sic] Select option: Medical	Type query: solketal	Click link (1st): Solketal - Wikipedia	Modify query [2nd session]: solketal enantiomers primary alcohols Modify query: solketal primary alcohols	Modify query: solketal primary alcohols Type site query [MW]: solketal alcohols	
ALCOHOLES PRIMARIOS						
Anna	Type site query [WK]: alcoholes primarios			Click site link: alcoholes primary		
Maria	Type site query [WR]: alcoholes primario	Modify site query: alcohol primario	Type query: alcohol primario english	Type query: science spanish english dictionary	Click results link (1st): science - English-Spanish Dictionary - WordReference.com	Type site query [WR]: alcoholes primarios
Laura	Click link (6th): Spanish science, biology, chemistry translation dictionaries ... Type query: enantiomers primary alcohol		Modify query: alcoholes primarios	Click link (1st): Alcohol - Wikipedia	Click site link [WK]: English	
Laura	Type query: enantiomers primary alcohol		Click search link (2nd): Prediction of the Absolute Configurations of the Enantiomers of...			
ENZIMA						
Anna	Type site query [WR]: enzima					
Maria	Type site query [WR]: enzima	Click site link [WR]: enzyme	Click site link [WR]: enzima	Type site query [WR]: enzyme	Select drop-down menu: English Definition	Type query: new enzymes for cancer csic
	Click link (1st): (icp)-articulos-	Type query [2nd session]: enzymes		Click link (1st): Skin Cancer Treatment and Prevention Based on	Click link (2nd): Food Enzymes	

	post-print-digital-csic	for cancer treatment		Pancreatin Enzymes		and Cancer
	Click link (4th): Enzymes & Cancer	Click site link: Enzyme Therapy in Oncology	Click link (6th): Enzyme Therapy and Cancer		Click search link (10th): Enzymes - Natural Cancer Supplement	
Laura	Type query: aids enzymes		Click link (1st): Anti-AIDS Enzymes for Everyone Bodyhack			
POSEE EFICACIA						
Anna	Type site query [WR]: eficacia					
Maria	Type site query [WR]: eficacia					
Laura	Type query: posee eficacia		Modify query: enantiomers has potency		Type site query [WR]: eficacia	
MEZCLAS RACÉMICAS						
Martha	Type query: racémicas	Click link (2nd): racémicas - definicion de racémicas por el diccionario En Linea		Click site link: English Dictionary	Click site link [FD]: racemico	Click site link: English Dictionary
	Modify query: racémico in ingles	Click link (3rd): acido racemico - traducir "acido racemico" a inglés - traducción y ...		Modify query: racemic	Click site link: Racemic mixture - Wikipedia	Click site link [WP, 2nd session]: racemat
Anna	Type site query [WR]: racémicas	Type site query [FD]: racémicas	Click site link [FD]: racémica	Type site query [WK]: racémica	Click site link [WK]: racemic	Click site link: Español
Laura	Type query: racemic mixtures enantiomers					
FÁRMACOS ENANTIOMÉRICAMENTE PUROS						
Anna	Type query: enantiomeric	Click link (1st): enantiomerically - definition of enantiomerically by the Free ...	Modify query: "enantiomerically y pure medication"	Click link (6th): Racemic mixture - Wikipedia	Click site link: Español	Click site link: English
	Type query: Spanish-English chemistry dictionary	Click link (2nd): Wiley:Wiley's English-Spanish Spanish-English Chemistry Dictionary	Click link (9th): chemistry - English-Spanish Dictionary - WordReference.com	Type query [2nd session]: 'pure enantiomerically medication'	Click link (1st): Methods and compositions for treating urinary incontinence using ...	Modify query: "fármacos enantioméricamente puros"
	Modify query: "fármacos enantioméricamente puros" English	Click link (1st): ALIBRI Libreria	Modify query: [sic] "enantiometrically y pure"	Click link (1st): enantiomerically pure: Definition from Answers.com		Modify query: "enantiomerically y pure", medication
Maria	Type site query [WR]: enantioméricamente			Type site query [WP]: enantioméricamente		
Laura	Type query: enantiomerically pure	Modify query: enantiomerically pure medicines	Modify query [2nd session]: "enantiomerically y pure medicines"	Click site link: repeat the search with the omitted results included.	Modify query: "enantiomerically y pure drugs"	Type site query [WP]: entantiomers [sic]
TRATAMIENTOS ANTI-SIDA						
Martha	Type query: antiAIDS\	Click link (1st): Anti-AIDS - Latest news	Click link (3rd): Elena Franchuk ANTIAIDS Foundation	Modify query: antiAIDS	Click link (8th): At last, generic anti-AIDS medicine for sub-Saharan Africa - Le ...	
Anna	Type site query [BBC]: CSIC, AIDS		Modify site query: AIDS treatment		Type query [2nd session]: "anti-AIDS treatment"	
Laura	Type query: effective in anti-aids treatments			Type site query [WR]: tratamiento		
APLICABLE A						
Anna	Type site query [WR]: aplicable	Type query: "medication applicable to AIDS"		Click site link: Results for medication applicable to AIDS (without quotes):		Type site (repeat) query [WR, 2nd session]: aplicable

Laura	Type site query [WR]: aplicable					-
ENANTIÓMERO "R"						
Maria	Type site query [WK]: enantiómero "R"	Click IE button: Back x4	Click link (1st): Alcohol - Wikipedia	Type site (repeat) query [WK]: enantiómero "R"	Click site link: todas las página que empiezan por enantiómero "R"	"
	Click IE button: Back x2	Click site link: enantiómero "R"	Type query: enantiómero "R"	Modify query: enantiómero english	Click link (1st): enantiomorfo - translate "enantiomorfo" to English - translation and ...	
Laura	Type query: "R" enantiomer		Type query [2nd session]: r-enantiomer aids drug		Click search results link (2nd): Pharmacology and Drug Interactions	
FÁRMACO						
Maria	Type site query [WR]: farmaco	Type (repeat) site query [WR, 2nd session]: farmaco	Type (repeat) site query [WR, 3rd session]: farmaco	Click site link: fármaco antiangiogénico	Type query: [sic] entantiomerically pure medications	Modify query: enantiomerically pure drugs
Laura	Type site query [WR]: farmaco		Type site query [MW, 2nd session]: drugs		Type site query [MW]: medication	
INVESTIGADOR						
Maria	Type site query [WR]: investigador					-
Laura	Type site query [WR]: investigador					-
LLEVAR A CABO						
Anna	Type site query [WR]: a cabo por	Type query: "a cabo por"	Modify query: "llevar a cabo por"		Click link (2nd): definicion de llevar a cabo por el Diccionario En ...	
Maria	Type site query [WR]: llevar a cabo		Click site link: Look up "llevar a cabo" at dictionary.com		Click site link: llevar a cabo - WordReference Forums	
SEPARACIÓN DE LOS ENANTIÓMEROS						
Maria	Type site query [WR]: separacion		Type query: separacion chemistry english		Modify query: separate the enantiomers	
Laura	Type query: seperating [sic] enantiomer medicine	Click link (6th): Dr. Neil Kao's Allergy and Asthma Website: What are enantiomers?	Type query [2nd session]: separating method enantiomers	Click link (1st): Stereochemistry tutorial: Separation of Enantiomers	Type query [3rd session]: separating enantiomer aids drug	
	Click results link (1st): Journal of Chromatography A : Separation of enantiomers: needs...		Click results link (2nd): Organic Chemistry for Dummies - Google Books Result		Click link (4th): Asymmetry Can Cause Trouble : Thalidomide and Its Enantiomers	
SÍNTESIS*						
Maria	Type query: sintesis [sic] of new anibiotics		Click link (1st): Killing resistant germs: Total synthesis of new antibiotic successful		Modify query: synthesis of new antibiotics cancer	
Laura	Type site query [WR]: sintesis	Type query: etapas de sintesis	Modify query: stages of development	Modify query: [sic]entiomers stages of development	Modify query: separating [sic] entiomers stages	
	Click link (4th): Electrodialysis System for Large-Scale Enantiomer Separation		Modify query: synthesize	Click link (1st): synthesize - Definition from the Merriam-Webster Online Dictionary	Click site link: synthesis	
DE INTERÉS FARMACÉUTICO						
Anna	Type site query [WR]: interes	Click site link: more...	Click site link: de interés	Type query: "de interes farmaceutico"	Click site link: Advanced Search	
	Click drop-down menu: English		Click option button: Advanced Search		Click link (1st): The Pharmaceutical Search Engine	
Laura	Type query: of pharmaceutical interest		Click results link (1st): Journal of Chromatography A : Enantiomeric separation of			