Universidad Ramon Llull

DOCTORAL THESIS

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To my parents, my sister and my brother;

and to Joan Manuel

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“Because I knew you, I have been changed for good”

(*For Good*; *Wicked* musical; lyrics by Stephen Schwartz)

♬

ABSTRACT

The present thesis investigates the catalyzing role of behavioral emotional intelligence (EI) over the relationship between general intelligence, or g, and learning performance. It comprises three empirical articles embedded within an overarching introduction - including an overall theoretical framework - and a final chapter dedicated to the general discussion of findings, limitations, practical implications and avenues for future research. All studies are based on the population of management graduates at a leading European business school.

The first article verifies the validity and reliability of a multi-rater measure of behavioral EI, the Emotional and Social Competencies Inventory (ESCI), and inquires whether certain types of raters (e.g., in the personal and professional contexts), are relatively more apt than others, to assess specific competencies. While it confirms the hypothesis that there is a systematic order in ratings, whereby personal raters observe a higher degree of leniency bias than professional ones, it also shows how some competencies such as organizational awareness or emotional self control are best assessed by raters with a symmetric relationship with the person (e.g., friends, work peers). The second article shifts the focus onto the relationship between behavioral EI and a measure of general intelligence, the Graduate Management Admission Test (GMAT), to inquire whether these different but related constructs are divergent enough to assure the discriminant validity of behavioral EI.

The most important contribution of this thesis is presented in the third article. We develop and test a task-dependent interaction model to inspect the moderating role of EI over the relationship between general intelligence and learning performance when two distinct types of tasks, engaging two antagonistic cognitive domains – social and non-social (or material) tasks –, are undertaken. Based on a sample of 864 international MBA candidates, the results reveal that, aside a positive main effect of emotional and social competencies on the classroom performance of professional executives, these competencies moderate the relationship between g and learning performance. Whereas we find evidence that in non-social tasks,

behavioral EI has a stronger effect on learning performance among candidates characterized with a low g, our data shows little support to the principal hypothesis, whereby in social tasks EI catalyzes or improves the relationship between cognitive abilities and learning performance. To aid the discussion of these findings we conduct ex-post focus groups with 3 teams of MBA candidates, and uncover a deeper problem tied with the individualistic nature of the sophisticated work systems students implement to get through their team assignments. Indeed, in order to cope with multiple requests they strive to minimize the actual interaction and group discussion with their teams, bypassing the opportunity to engage in real teamwork – that is to collaborate and help one another in their shared learning purpose.

The concluding chapter stirs an overarching discussion on the results from the three empirical articles, acknowledging their limitations and offering insights of fruitful opportunities for future research. Specifically, we draw practical implications from our findings, and suggest specific research designs and context settings wherein the task-dependent interaction model we develop may gather further evidence and stimulate novel research.

Keywords: Emotional intelligence, emotional and social competencies, multi-rater assessment, competency development, general cognitive ability, learning performance, social and non-social cognitive domains

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Chapter 1 | Introduction

"That was a very beautiful day when I visited him [his old classmate Michele Besso] and began to talk with him as follows: 'I have recently had a question which was difficult for me to understand. So I came here today to bring with me a battle on the question'. Trying a lot of discussions with him, I could suddenly comprehend the matter."

Albert Einstein, Kyoto, 1922

1.1 General introduction

The conventional view of history is filled with lone geniuses: men and women who, through talent and perspiration, achieved feats no one else had before. To this day, there appears to be an underlying belief that having a strong cognitive intelligence is enough to achieve outstanding performance. Indeed, throughout the past century, general cognitive ability, also known as general intelligence, or simply *g*, has taken the leading role in explaining human performance, and its widespread use as the main selection criteria for acceptance in schools or job opportunities attests to that belief.

Yet, recent inquiry is exposing a different and intriguing fact: these lone geniuses were just the most well-known halves of collaborative duos. Pertinently, Joshua Wolf Shenk, in his book *Powers of Two: How Relationships Drive Creativity* (Shenk, 2014), refers to the myth of the lone genius that pervades our society. The author studies in depth a series of such collaborative pairs that have advanced arts and sciences by leaps and bounds: Lennon-McCartney, Picasso-Matisse, Newton-Halley, Einstein-Besso, Curie-Curie or more recently Jobs-Wozniak and Kahneman-Tversky. Notably, the Economics Nobel Prize winner, Daniel Kahneman, offers an illustration of his collaboration with Amos Tversky as follows:

"While writing the article that reported these findings, Amos and I discovered that we enjoyed working together. Amos was always very funny, and in his presence I became funny as well, so we spent hours of solid work in continuous amusement. The pleasure we found in working together made us exceptionally patient; it is much easier to strive for perfection when you are never bored. Perhaps most important, we checked our critical weapons at the door. Both Amos and I were critical and argumentative, he even more than I, but during the years of our collaboration neither of us ever rejected out of hand anything the other said. Indeed, one of the great joys in the collaboration was that Amos frequently saw the point of my vague ideas much more clearly than I did. (…) We developed a routine in which we spent much of our working days together, often on long walks. For the next fourteen years our collaboration was the focus of our lives, and the work we did together during those years was the best either of us ever did." (Kahneman, 2011, p. 5-6).

Even if these team collaborations speak volumes of the particular relationship qualities, which are idiosyncratic to the unique pairs of individuals that form them, recent research exposes how oftentimes it only takes one of the team members, usually the "tacit" team leader ((Druskat, Batista-Foguet & Wolff, 2011) to inspire the team with a certain level of empathy and emotional management to stimulate the team build up of behavioral norms and rituals that stimulate conversation and debate of ideas in the generation of novel insights, all the while avoiding stumbling over the claws of personal conflict (Druskat & Wolff, 2001). These outstanding collaborative duos thus entice us to quest: What are the individual behavioral abilities these collaborations involve, that bring about such summit performances, that make even the lone geniuses' achievements pale in comparison?

Our premise throughout this thesis is that in the quest for learning and generating novel insights or product innovations, collaboration among pairs trumps individual competition in all cases, but especially when contrasted with the competition among "lone geniuses". Regardless of the role that one's individual intelligence has on one's own performance, we believe that individual learning performance grows exponentially through outstanding collaborations with others. The fact that humanity has performed at its best through a conscious choice of working in small teams, communities and societies confers legitimacy to this belief.

Indeed, over the past few decades, research in the field of cognitive psychology has found that although individual cognitive ability strongly correlates between .30 and .50 with performance, it actually only explains about 25% of individual's variance in performance (Goldstein et al., 2002; Hunter & Hunter, 1984). This finding has propelled further investigations aimed at discovering which other factors or novel constructs could explain such large amount of variance (i.e., about 75%) in performance (e.g., Gardner, 1993). It was then, amid such lively inquiry, that Peter Salovey and John Mayer first conceived the original idea of Emotional Intelligence (EI; Salovey & Mayer, 1990; Mayer et al., 1990), lying at the intersection of emotion and cognition to form a new type of intelligence related to how individuals are able to gain awareness of their own and others' emotions and how that awareness foster their ability to manage emotions in the self and in other people.

Emotional intelligence was then defined as involving the "*ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions*" (Salovey & Mayer, 1990, p. 189).

Later popularized by Daniel Goleman in a top best-seller trade-book (Goleman, 1995), the case for emotional intelligence was built over claims that it could explain the variance in human performance that was not yet accounted for by cognitive intelligence (Mayer & Salovey, 1997; Goleman, 1998; Mayer, Salovey & Caruso, 2000). In result, this argument has led to an emphasis on the identification of the direct effect of emotional intelligence on performance and whether it is higher or lower than that of cognitive ability. Indeed, as of today, the majority of empirical research on EI is based on linear combination models that assume emotional and cognitive intelligences make independent contributions to human performance.

Yet, if even most of the work in organizations is carried out inside team units (Druskat & Wolff, 2001, 2008), these are replete with comments such as: "She may be a genius, but she isn't getting things done here because she can't work with people", or perhaps more frequently "He's great at getting along with people, but he rarely contributes an idea that helps solve our problems". These anecdotes suggest that both EI and cognitive ability are necessary and interdependent for being successful at work, especially if we do work in small teams, communities and organizations where interpersonal interactions abound.

As such, throughout this dissertation, we explore the relationship between EI and *g* and place a central hypothesis by which these two sets of abilities mutually reinforce their effects on learning performance whenever social tasks are at hand.

To be clear, our understanding of learning performance adopts LePine, LePine & Jackson's (2004) definition "*as the degree to which individuals acquire the knowledge, skills, attitudes, or behavior reflected in the objectives of a particular learning experience.*" (LePine et al., 2004, p. 883).

Underneath our central hypothesis, we contend that the assumption of independence that is taken for granted in a large portion of empirical studies undertaken on EI, is in contradiction with the very concept of emotional intelligence, which lies at the intersection of emotion and cognition and "combines the ideas that emotion makes thinking more intelligent and that one thinks intelligently about emotions" (Mayer & Salovey, 1997, p. 5). Notably, the core of the concept of EI is grounded on an important neuroscience discovery: the integration of emotion within cognitive processes across a variety of mental functions such as memory, attention, and decision-making (Damasio, 1994; Forgas & Moylan, 1987; Mayer & Bremer, 1985). Therefore, additive independent models may indeed be too simplistic and incomplete to represent the contribution of EI to performance (Côté & Miners, 2006).

Besides the dominance of additive linear models, two other issues may also be hindering previous findings on emotional intelligence research. First, prior studies often use a domain-general assessment of EI (e.g., Mayer et al., 2003), which may convey the idea that high EI individuals have all the right ingredients to succeed and in so doing "invite the attribution of a halo effect" (Boyatzis, 2008, p. 8). Instead, EI's contribution to performance may best be captured through specific abilities, whereby each may enhance problem-solving in some contexts (e.g., street sales) but not in others (e.g. formal presentations). This may explain why research based on unidimensional assessments of EI has shown mixed findings across different tasks (e.g., Austin, 2004; Day & Carroll, 2004; see Zeidner et al., 2004). Therefore, a general assessment of EI may feasibly address broad domains, but does poorly when studying performance in specific contexts (Bearden et al., 2001).

1.2 Main research questions

As we identify the aforementioned gaps in the EI literature, this dissertation formulates the following research questions:

1_A. Is the multi-rater assessment of behavioral EI valid and reliable?

1_B. Are there some raters who are more apt to assess specific EI behaviors than others?

These two interrelated questions address the quality of our operationalization of behavioral emotional intelligence through a multisource assessment of actions or activity indicators that capture specific EI abilities. Because these are behaviors that are intentionally manifested and embedded within situated contexts, they fall into the concept of competencies. Since our multisource assessment collects observations of a person's EI competencies from multiple sources across the personal and professional sphere, we are also interested in investigating whether some types of observers are more appropriate than others for assessing specific EI behaviors. Hence, our first article in this thesis (Chapter 2) focuses on answering this question.

2. What is the relationship between behavioral emotional intelligence and general cognitive ability?

A debate has emerged as to whether emotional intelligence and cognitive ability are the same, different or complimentary. For instance, the mainstream approach of ability EI is found to have a high correlation with cognitive intelligence, which has sparked considerable criticism on the lack of divergent construct validity (Landy, 2005). This has urged recent research calls – e.g. a special issue in *Frontiers in Psychology* has recently launched a call for papers to advance research on how emotional intelligence is related to cognitive abilities –, to examine the relationship between EI and cognitive ability. Our second article (Chapter 3) contributes to this call, by analyzing a Bayesian hierarchical model whereby general cognitive ability is in part explained by our behavioral measure of EI.

3. How does behavioral EI moderate g in enhancing learning performance in social versus non-social tasks?

Amid the swarmed discussion about emotional intelligence are claims that cognitive intelligence, or general cognitive ability, is a stronger predictor of life and work outcomes as well as counter claims that EI is their strongest predictor (Boyatzis et al., 2015). Instead, by asking this question, we take the stance that both EI and g are fundamental for performance, and focus on investigating how these two forms of intelligence interact together to enhance learning performance. Second, research on EI has devoted little attention to examine how EI may differently relate to performance in different *types* of tasks. Notably, EI may be especially relevant in tasks that require interpersonal interaction, an idea that finds supports in studies showing how EI behavior affects group processes (Jordan & Troth, 2004; Druskat & Wolff, 2001), particularly the leadership of self-managed teams (Wolff, Pescosolido & Druskat, 2002; Druskat & Wheeler, 2003), and the quality of social interactions (Lopes et al., 2004; Lopes et al., 2011). For this reason, in our third article (Chapter 4) we internalize task-dependence in the analysis, considering two types of tasks, social and non-social, within the same sample.

1.3 Overarching theoretical framework

1.3.1 Epistemological framework

How do we access knowledge about the world? Our epistemological position sides with the philosophers of science Karl Popper (1959) and Thomas Kuhn (1962) in the belief that science, and social sciences in particular, in all their rigorous and meticulous methods, cannot access any definitive proof of scientific knowledge in terms of what is true or what is false. Although, we may describe ourselves as *ontological realists* in that we believe there are some real entities that exist in the world which are not necessarily (socially) constructed, by siding with post-positivists such as Popper and Kuhn we acknowledge there is always room for measurement error (Crotty, 2015). And science has learned to cohabit comfortably with its presence. Moreover, error is a vital force for progress.

Concerning methodology, although some researchers may refer to experiments as the "golden standard" of all methods, we consider that the wide variety of methods and research designs from quantitative to qualitative face some degree of exposure to error. Shadish, Cook and Campbell (2002, p. 30) share their perspective on the matter as follows:

"We now understand better that the experiment is a profoundly human endeavor, affected by all the same human foibles as any other human endeavor, though with well-developed procedures for partial control of some of the limitations that have

been identified to date. Some of these limitations are common to all science, of course. For example, scientists tend to notice evidence that confirms their preferred hypotheses and to overlook contradictory evidence. They make routine cognitive errors of judgment and have limited capacity to process large amounts of information. They react to peer pressures to agree with accepted dogma and to social role pressures in their relationships to students, participants, and other scientists. They are partly motivated by sociological and economic rewards for their work (sadly, sometimes to the point of fraud), and they display all-too-human psychological needs and irrationalities about their work."

Furthermore, researchers may learn as much from those hypotheses that gather little support from the data collected in the field than from those that are supported. Indeed, there have been many calls for researchers, reviewers and journal editors to avoid overemphasizing statistical significance in their assessment of research quality (Cohen, 1994; Gigerenzer, 2004; Meehl, 1978; Nicherson, 2000; O'Boyle et al., 2014; Schmidt, 1992, 1996; Shmidt & Hunter, 2002; Wagenmakers, 2007). Nonetheless, most researchers still assume that statistically significant results in support of their hypotheses are more likely to be published than nonsignificant results or unsupported original hypotheses (Bakker et al., 2012), an assumption that is not unfounded, given that a significant majority of journals may tend to reject papers with unsupported hypotheses (Orlizky, 2012). Arguing this point, a recent meta-analysis tracking the differences between doctoral dissertations and their resulting journal publications, found that the ratio of supported to unsupported hypothesis more than doubled – from 0.82 in dissertations it went up to 1.94 in the resulting journal articles (O'Boyle et al., 2014). Exposing this form of outcome-reporting bias, the authors labeled this phenomenon the "Chrysalis Effect" to illustrate "the metamorphosis process whereby an ugly caterpillar (initial results) turns into a beautiful butterfly (journal article)" (O'Boyle et al, 2014, p. 2).

To be sure, the Chrysalis Effect is at the root of more than a 20% leap in statistical significant hypothesis, which positively biases the validity of management theories due to a ritual of dismissing the publication of those articles wherein theories and hypothesis are unsupported by statistical significant tests. Seen that science is a cumulative process, where past research and theories guide present theory development, a biased literature may hamper researchers' ability to produce and test novel theories or to offer incremental contributions to existing theory that, while lacking support in specific research design settings may perhaps be supported in other contexts or samples.

The third article (Chapter 4) in this doctoral thesis includes a central hypothesis that has found little support in the data collected. In light of the argument above, we have decided to perceive it not as a hindrance to the article's future publication, but rather as an opportunity to further explore and identify potential issues within the specific context of our sample, which may, in turn, illuminate future research towards improving the ability to collect evidence in support of said hypothesis.

1.3.2 Emotional intelligence: An integrated approach

Capturing the philosophical spirit of modern days' emotional intelligence, Aristotle first noted that "those who possess the rare skill to be angry with the right person, to the right degree, at the right time, for the right purpose, and the right way are at an advantage in any domain in life" (Langley, 2000, p. 177). Yet, the Stoics of Ancient Greece insisted that emotion and emotion-laden aspects of life were inferior to reason, a view that, to the exception of the European romanticists of the eighteen-century, prevailed throughout millennia (Mayer, Roberts & Barsade, 2008). Only recently, in the mid-twentieth century, the first mentions of "emotional intelligence" begin to appear; the first in Van Ghent's (1953) literary account of Jane Austen's *Pride and Prejudice*, referred to various characters displaying this quality. A few decades later, we witness the emergence of emotional intelligence as a new scientific concept in Salovey & Mayer's (1990) seminal article that launched EI into psychology research. Emotional intelligence is thus originally and scientifically defined as:

"the ability to monitor one's own and other's feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (Salovey & Mayer, 1990, p. 189).

Building the pillars of EI's emergence, during the previous decade of the 80s, groundbreaking research in two areas of psychology had been developing. First, a cognitive revolution was underway: narrow cognitive conceptions of analytical intelligence were expanding towards the idea of multiple intelligences, spanning across social, practical, and personal intelligences (Gardner, 1983; Sternberg, 1985). In parallel, research on emotion was showing unequivocal evidence of the integration of emotion within cognitive processes, facilitating such facets of mental functioning as memory, attention, and decision-making processes (Damasio, 1994; Forgas & Moylan, 1987; Mayer & Bremer, 1985). These discoveries, although countering millenary wisdom that emotion was an "acute disturbance of the individual as a whole" (Young, 1943, p. 263), were lighting up a lively inquiry among psychologists and neuroscientists alike, about the possibility of an overlap between emotion and intelligence. This way, an articulate conception of emotional intelligence came to form as a true intellectual ability, meeting Carroll (1993)'s dominant three-stratum theory of intelligence, in particular that EI, as any other intelligence, is developable with age and experience (Mayer, Caruso & Salovey, 1999).

Although Salovey, Mayer and colleagues (1990a, 1990b, 1997) initially stirred the scientific community with the idea of a new form of intelligence pertaining to emotions, Goleman's (1995, 1998) best sellers galvanized public interest with claims that EI was superior to traditional intelligence in predicting workplace performance. With the rise of EI's cachet came the widespread use of the concept by organizational consultants, coaches, educators and researchers alike. Soon, the diversity of people interested in the topic matched the variety of EI assessments available. To such an extent that, today, EI researchers embrace alternative approaches to its measurement, assessing EI through different facets other than formal and fluid intelligence.

Despite EI's field being deep in controversy with several definitions and assessments over its first 25 years of research, emotional intelligence, as a concept that comprises a set of inter-related abilities pertaining to the perception and regulation of emotions in the self and in others (Mayer & Salovey, 1990), provides a common content domain to existing EI measures (Joseph et al., 2014). What distinguishes existing EI models is the choice of measurement theory, a decision that is tied to the reflective facet of EI one wishes to observe. Notably, EI may be observed as a standard mental ability, a self-perceived quality within the personality realm, or ultimately, as it manifests into real life behavior. This way, three distinct but complementary EI approaches can be found in the literature (cf. Fernández-Berrocal & Extremera, 2006; Boyatzis et al., 2015):

1. **Ability EI**, following Salovey, Mayer and colleagues' work, assumes EI can be measured similarly to traditional forms of intelligence, with a maximum performance-based questionnaire – e.g., the Mayer, Salovey and Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey & Caruso, 2000) in which item responses are judged wrong or right by a panel of emotion research experts. Studies using MSCEIT have shown consistent prediction of g, even when controlling for personality (Webb et al., 2013). Regarding performance, although some studies show relationships with school (Brackett et al., 2004), and job outcomes (Mayer et al., 2008), three meta-analyses found that relative to other EI approaches, Ability EI is not as good predicting job performance (Van Rooy & Vaswervaran, 2004; O'Boyle et al, 2011; Joseph & Newman, 2010).

2. **Self-report EI** is based on self-perceptions of EI reflecting facets within the personality realm (Bar-On, 1997; 2000), attitudes and behavioral tendencies (Petrides & Furnham, 2000; 2001). This approach uses self-report questionnaires, which although show acceptable validity - e.g., Trait EI Questionnaire (TEIQue; Petrides & Furnham, 2001), oftentimes need correction for social-desirability bias (Paulhus & Reid, 1991). While self-report EI is neither strongly related to g nor to job outcomes, it does show a significant relationship to personality (Joseph & Newman, 2010; O'Boyle et al., 2013);

3. **Behavioral EI** assesses a person's emotional intelligence as it manifests through behavior in real-life situations. Its most representative model is probably emotional and social competencies (e.g., ESCI; Boyatzis, 2009; Boyatzis & Goleman, 2007). What is distinctive about this approach is that it does not rely on the self as a source of information. Instead, behavioral EI collects observations from others, the people who live or work with the person being assessed (also known as multi-source or 360º assessment), regarding what and how frequently they see the person behaving in ways that are emotionally or socially competent (Boyatzis, 2009; Boyatzis et al., 2015). Behavioral EI as measured by the Emotional and Social Competency Inventory (ESCI; Sala, 2002; Boyatzis & Sala, 2004; Montemayor, 2004; Boyatzis & Goleman, 2007; Byrne et al., 2007) is only mildly related to g, but shows evidence of a strong relationship to workplace performance (Boyatzis et al., 2012; Downey, Lee & Stough, 2011).

Other classifications of EI literature exist, but they are based on a field division that sets apart EI research on Salovey & Mayer's (1997) Ability EI – corresponding to streams 1 and 2 in Ashkanasy & Daus (2005) classification – from all other EI approaches, notably self-report and behavioral EI, which are clustered together and labeled as “mixed EI” (Mayer et al., 1999; Ashkanasy & Daus, 2005). Referring to the obscure nature of this label, Joseph et al. (2014, p. 2) likens it to a “black box” (Callon, 1986; Latour, 1999) and notices how prior theoretical work on mixed EI is scant. To be clear, not one theoretical article exists on mixed EI. This is due to the fact that “mixed EI” was not created as a construct by any of the research it is said to represent; rather it is an uninformative label originated in Mayer et al. (1999), to designate research on the field of EI offering original contributions that go beyond Mayer and Salovey’s approach of Ability EI (Mayer & Salovey, 1997).

Therefore, the classification we support is one that provides a balanced organization of EI research, based on the three existing measurement theory options (i.e., ability, self-report, or behavioral approaches) through which research on EI is flourishing. This way, we subscribe to Fernández-Berrocal & Extremera’s (2006) comprehensive view of the EI field, wherein all “these approaches try to discover the emotional components that underlie *emotionally intelligent people* and the mechanisms and processes that set off the use of these abilities in our everyday life” (Fernández-Berrocal & Extremera, 2006, p. 8; emphasis added).

1.3.3 Behavioral EI

In this thesis we choose to follow a behavioral approach to EI, as it allows capturing emotional intelligence at a facet that is closer to action and consequential to real-life and work performance, i.e., actual behavior in situated contexts. Considering the etymological roots of emotion come from the Latin word *emovere*, a combination of *ex* (out) + *movere* (to move) is a good reminder that emotion is strongly associated with external movement that provides signals to others. Darwin’s (1872) treatise on emotional expression performed a comparative study of humans and animals and gathered unequivocal evidence on the breadth of emotional communication that is captured through body movements and facial expressions. Similarly, emotional intelligence can be seized in both verbal and non-verbal behavior that is visible and consequential to others, offering a sound basis to establish a behavioral approach to EI.

Particularly, we use the Emotional and Social Competencies Inventory (ESCI; Boyatzis et al., 2015; Boyatzis & Goleman, 2007; Boyatzis, 2009), a behavioral EI measure that shows evidence of construct and discriminant validity (Byrne et al., 2007; Cherniss, 2010; Cherniss & Boyatzis, 2013). The ESCI model and each of the 14 emotional, social and cognitive competencies it comprises, are empirically supported by over 40 years of research on the individual characteristics and/or behaviors that distinguish outstanding from average and poor job performance (Boyatzis, 1982; McClelland, 1998; Spencer & Spencer, 1993). Competencies have been identified inductively from qualitative studies of leadership performance using behavioral event interviews with leaders and managers in many positions and across several countries (Boyatzis, 2009; McClelland, 1998; see Emmerling, Canboy, Serlavós & Batista-Foguet, 2015, for a comprehensive review). Because the identification of competencies and their refinement emerges from performance based criterion sampling, they are expected to be closely related to work and life outcomes (Boyatzis et al., 2015).

Originally job competencies were defined as "an underlying characteristic of a person which results in effective and/or superior performance in a job" (Klemp, 1980). Later, Daniel Goleman emphasized that competencies are learned capabilities rooted in behaviors that can be changed and improved (Goleman, 1998). Indeed, the development of emotional and social competencies is framed within the Intentional Change Theory (ICT; Boyatzis, 2001; Kolb & Boyatzis, 1970; cf. Boyatzis 2006a, 2006b), which supports the idea that while sustained and desired change may appear to an external observer as an emergent or even catastrophic change (Casti, 1994), it is actually experienced by the self as an epiphany or discovery (Boyatzis, 2008; cf. Boyatzis, 1982). This is because the most profound and effective changes in behavior are driven by our dreams or aspirations and brought to reality through the creation of a personal vision of an ideal self. (Boyatzis, 2008). It is then, by contrasting the ideal self with the real self – assessed by others' perceptions of one's competencies – that individuals can identify and focus on their strengths so as to create a learning and development plan that is rooted in self-directed learning and behavioral change towards reaching the ever growing ideal self (Boyatzis, 2001, Kolb & Boyatzis, 1970).

The figure 1.1 below offers a visual summary of the ICT in action as it is implemented in the Leadership Assessment and Development Programme (LEAD course), currently running at Case Western Reserve University and ESADE in both business and law programs.

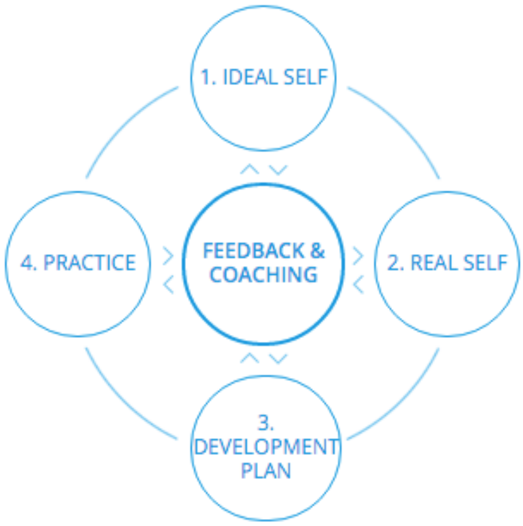

Figure 1.1 | Visual representation of Boyatzis' Intentional Change Theory. *Source*: ESADE/Endalia, adapted from Boyatzis (2006).

As of today, Richard Boyatzis integrates a compelling definition of competency as a set of interrelated behaviors, organized around an underlying or unconscious intent, which produces outstanding performance (Boyatzis, 2009).

As mentioned above, behavioral EI concerns the same content domain as other EI approaches, i.e., the concept of emotional intelligence as defined in Mayer & Salovey (1990). Specifically, the ESCI model parallels the definition of EI, in that it addresses: 1) the same core abilities of perception (or awareness) and regulation (or management) of emotion; 2) the same targets, that is, whether abilities are directed at self or others.

The distinction between approaches is in the facet of the construct they observe. In a critical review of the field, Zeidner et al. (2004) clarifies what differentiates the approach of ability EI from its behavioral counterpart is akin to the distinction between fluid and crystallized ability or intelligence. As the authors explain: "EI [i.e., the ability EI approach] (as a *fluid* ability) does not guarantee that individuals will actually manifest competent behaviors at the workplace. (…) Whereas EI may determine a person's potential for learning practical job-related emotional and social skills, the level of emotional *competencies* [i.e., the behavioral EI approach] (as a *crystallised* ability) manifested by that person shows how much of that potential she or he has actually realised" (Zeidner et al., p. 377; emphasis added). Indeed, some individuals may be good at mindfully thinking and coming up with solutions to hypothetical emotional-laden problems, but lack the training or experience for actually performing the behaviors they prescribe (Fiori, 2009).

Overall, the ESCI model comprises 12 EI competencies that are structured into four clusters, resulting from the Cartesian product of 2 EI abilities (awareness and management of emotion) by 2 targets (self and others): 1) *Emotional self-awareness* represents a single competency; 2) *Emotional self-management* includes the competencies of emotional self-control, adaptability, achievement orientation and positive outlook; 3) *Social awareness* involves empathy and organizational awareness competencies; and 4) *Relationship Management* includes the competencies of coach and mentor, inspirational leadership, influence, conflict management and teamwork. These 4 clusters can be further aggregated into EI competencies proper, including those clusters that regard the awareness and management of emotional in oneself (i.e. *Emotional self-awareness* and *Emotional self-management*), and Social Intelligence (SI) competencies that concern the awareness and management of others' emotions (i.e., the competencies within the 2 clusters of *Social awareness* and *Relationship management*). When the ESCI model is used with the purpose of development and/or outcome assessment, two cognitive competencies that have gained traction in predicting effective leadership, management and executive performance, are added (Boytzis, 1982; Spencer & Spencer, 1993). They are systems thinking and pattern recognition (Boyatzis, 2009).

In its most distinctive feature, the ESCI model measures behavioral EI as is seen and assessed by others. For this matter, it uses a 360º assessment instrument (Boyatzis & Goleman, 2007; Boyatzis & Sala, 2004; Sala, 2002), which enables multiple raters from different life spheres – notably, professional (i.e., bosses, peers and subordinates), personal (i.e., relatives, spouses and friends), and other raters – to provide behavioral observation scores to the person being assessed. The instrument assesses how frequently observers have seen 5 specific behavioral indicators for each competency, and uses an 11-point frequency scale from 0 (never) to 10 (always), a scale that has been shown to have superior reliability in frequency rating than other 5 or 7 point Likert scales (Batista-Foguet et al., 2009). This way, competencies as a behavioral approach to EI are observed and scored by others who live and work with the person (as opposed to self-assessment) shows a consisting prediction to job and life outcomes (Boyatzis, 1982, 2006; Boyatzis et al., 2012; McClelland, 1998; Dulewicz et al., 2003; Law et al., 2004; Sy et al., 2006; Ryan et al., 2009, 2012; Boyatzis et al., 2011, 2012; Emmerling & Boyatzis, 2012; Aliaga Araujo & Taylor, 2012; Gutierrez et al., 2012; Sharma, 2012; Spencer & Spencer, 1993; Amdurer et al., 2014; Victoroff & Boyatzis, 2013; Mahon et al., 2014).

1.3.4 EI, cognitive ability and learning performance

Throughout the past century, general cognitive ability, also known as general intelligence, general mental ability or simply *g*, has taken the leading role in enlightening our understanding of human performance. Intelligence however is notoriously hard to define, and even after 100 years of active research on the topic there appears to be no agreement on a single definition of what it means for an independent system (be it animal, human or artificial) to possess intelligence (Cherniss, 2010; Matthews et al., 2002; cf. Sternberg, 2000). Notably, back in the 80s when a group of twelve distinguished researchers on the concept of intelligence were asked to define the concept, they gave twelve different definitions (Cherniss, 2010).

Yet, throughout this thesis we take the perspective of Carroll's (1993) dominant three-stratum theory of intelligence, whereby intelligences are structured hierarchically. Carroll (1993) establishes three criteria for which certain abilities may be considered an intelligence: First, they must reflect an ability rather than a tendency to act in certain ways; second, the abilities must be correlated with one another and yet be different from other sets of abilities; and third, and most importantly, the abilities must meet a developmental criterion to be considered an intelligence. That is, intelligence is developable, and capable of improving over time and with learning experiences (Carroll, 1993). Furthermore, the three-stratum theory of intelligence considers that general intelligence or *g* is a global ability located at the apex of subsumed and specialized intelligences. Thus *g* concerns "the general efficacy of intellectual processes" (Ackerman et al., 2005, p. 32; see Carroll, 1993). This way, *g* is thought of as the underlying common factor to all types of cognitive processing (e.g., verbal, mathematical, spatial, logical, musical, emotional, etc.). As a latent construct, *g* is therefore not observed directly; it must be inferred from the positive correlations among different abilities (Spearman, 1904; Jensen, 1998). Based on the large body of evidence showing *g* has a strong relationship to school and workplace performance across tasks and settings (Gottfredson, 1997; Jensen, 1998; Ree & Carretta, 1998, 2002; Salgado et al., 2003; Schmidt & Hunter, 1998), researchers have referred to *g* as the best single predictor of performance (Gottfredson, 1986; Schulte et al., 2004).

Regarding human performance, we are especially interested in the learning performance of individuals. As aforementioned earlier, learning performance relates to one's ability to apprehend knowledge, skills, attitudes or behaviors that are required and/or reflected by the objectives of certain learning experiences, such as courses in a graduate program, or novel tasks associated to a job position in an organization.

Prior research on the effect of emotional intelligence on academic performance has produced mixed results (Brackett et al., 2011). For instance, a study with high school students in Spain found a positive relationship between MSCEIT ability EI scores with final grades, while controlling for personality and academic intelligence (Márquez, Martín & Brackett, 2006). However, though, while several studies initially report findings attesting to a positive association between EI and academic performance, the results often become non-significant as soon as they are controlled for extant variables, such as verbal intelligence scores (cf. Barchard, 2003; Brackett & Mayer, 2003) or even show no correlations at all (Bastian et al., 2005).

Yet, the predictive validity of EI on outcomes related to work or managerial performance is far more encouraging. Notably, earlier research, initially flourishing in the US – supports the relevance of EI competencies for success in work outcomes (e.g., Boyatzis, 1982; Goleman, 1998; Spencer & Spencer, 1993). Similarly, more recent studies conducted in Spain have shown emotional intelligence competencies are in a positive relationship with managerial performance (Guillén et al., 2009). Moreover, a recent meta-analysis reviewing 43 effect sizes has concluded that the three approaches to EI have positive correlations with job performance, varying between .24 and .30 (O'Boyle et al., 2011).

Furthermore, other empirical studies are showing positive correlations between EI and sales performance (Kidwell, Hardesty, Murtha & Sheng, 2011). Notably EI has also been positively linked to entrepreneurial performance in the UK, in a study involving 528 participants in the prediction of product innovation (Ahmetoglu, Leutner & Chamorro-Premuzic, 2011). Another study in Italy with 53 entrepreneurs bears further support to these results (Camuffo, Gerli & Gubitta, 2012).

In this thesis, since the population under study comprises managers and professional executives enrolled in an international MBA program, our learning performance measures are situated within the scholastic requirements of graduate educational programs. Accordingly, learning performance appears as the dependent variable of interest in the third article of this thesis (Chapter 4), and is framed within a task-dependent model of interaction between EI competencies and general cognitive ability in the fostering of learning performance in social and non-social cognitive domain tasks (cf. Jack et al., 2012). Although the present research is embedded within the context of a popular graduate program, the Master of Business and Administration (MBA), we consider that, since the participants enrolled in this program are either currently employed in directive or managerial positions (as is the case of executive and part-time MBA candidates) or have recently been employed as such (full-time MBAs), the MBA population may confer our results some degree of generalizability into the broader population of management leaders and executives.

1.4 Thesis overview and structure

The present doctoral thesis is partly funded by MICINN within the framework of a competitive research project awarded to the *Leadership Development Research Centre* (GLEAD) at ESADE. The project is entitled "Emotional and Social Competencies Development Program within the European Higher Education Area" (reference: EDU2010-15250).

This thesis follows the structure of a *monograph by articles*, which according to ESADE and Universitat Ramon Llull PhD regulations, requires the inclusion of 3 unpublished articles (central chapters), embedded within an overarching introduction and followed by a global discussion and conclusions chapter. At the moment, one of the articles in this thesis (chapter 3) has already been published in *Frontiers in Psychology* (cf. Boyatzis et al., 2015). Articles 1 and 3 (i.e., Chapter 2 and 4) are currently in preparation to be submitted to the *International Journal of Human Resource Management* and *Frontiers in Psychology* respectively. The articles use quantitative research designs and methodology, to the exception of the third article, which also uses qualitative methods, notably to better inform the discussion of results.

All articles are based on primary data on behavioral emotional intelligence collected at ESADE, within the framework of the Leadership Assessment and Development Programme (LEAD course). This course focuses on the development of emotional and social competencies that enable the building of resonant relationships, a robust pillar for outstanding leadership (Boyatzis & McKee, 2005). This course was adapted from its original version at the Weatherhead School of Management of Case Western Reserve University (in Cleveland, Ohio) through a fruitful collaboration between Professors Richard Boyatzis, Ricard Serlavós and Joan Manuel Batista-Foguet, who customized the course contents to the Catalan context and ESADE's community in particular. The course has been such a success it is nowadays transversal to 20+ graduate management programs at ESADE (including full-time, part-time and executive MBAs, as well as executive Masters).

Collectively, the three articles that integrate this thesis form a cumulative sequence of findings that expand our current knowledge on the "What?", "What for?" and "So what?" of behavioral emotional intelligence, particularly in what regards its role in enhancing learning performance alongside with cognitive intelligence. More specifically, they seek to respond to the three main research questions, mentioned earlier, namely: Is the multi-rater assessment of behavioral EI valid and reliable? What is the relationship between behavioral emotional intelligence and general cognitive ability? And how does behavioral EI moderate *g* in enhancing learning performance in social versus non-social tasks?

Thus, the first article (Chapter 2) focuses on our measure of behavioral emotional intelligence, the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis & Goleman, 2007) to verify that the operationalization of behavioral EI through emotional and social competencies is valid and reliable. Because the behavioral assessment of each EI competency is sourced from different types of observers (also termed as raters types) across an individual's professional and personal entourage, we also perform a comparative analysis on these raters' differing perspectives. Specifically, we quest whether there are specific competencies that can be more accurately assessed by particular raters, depending on the rapport each rater type has with the individual and the degree to which their relationship may or may not elicit certain relevant behaviors for each competency. That is, we inspect how the perception of particular competencies varies with the eyes of the beholder that observes them.

The second article (Chapter 3) shifts the focus towards the relationship between behavioral EI and general cognitive ability in reply to recent calls for improving our understanding of how emotional intelligence may depend on or be influenced by one's cognitive intelligence (e.g. a recent special issue in *Frontiers in Psychology* was entirely dedicated to the relationship between emotional intelligence and cognitive abilities). Our findings reveal that behavioral EI and *g* are only slightly related in men, and interestingly, negatively associated in women. Lastly, the third article (Chapter 4) delves into studying the central hypotheses in this dissertation in what regards the moderating role of behavioral EI as it interacts with cognitive ability to enhance the individual learning performance. Specifically, as we study the classroom success of 864 business professionals in a leading European MBA program, we develop and test a task-dependent interaction model that reconciles the divergent findings in previous interaction studies. Notably, we propose that in social tasks behavioral EI and cognitive abilities are mutually reinforcing in their effects on learning performance, such that the more cognitive resources an individual has developed the greater the effect that behavioral EI may have on his or her overall performance.

1.4.1 Articles' interconnectedness

The three articles in this thesis are connected by at least three common threads:

a) They are all empirical studies, using quantitative research designs and methodology, although the third article (Chapter 4) also uses *ex-post* focus group discussions to help the discussion of results. All articles use primary data on behavioral emotional intelligence collected within the LEAD course. This course is transversal to 20+ graduate management programs at ESADE (Executive Masters, as well as full-time, part-time and Executive MBAs).

b) The main independent variable of interest is common to all articles, i.e., behavioral emotional intelligence. While the first article focuses on verifying the construct validity and reliability of our measure and studying the differences in ratings across the various types of raters, the other two articles study behavioral EI in relationship to cognitive ability (Chapter 3) and their interaction effect on learning performance (Chapter 4).

c) All studies report results contingent on which group of raters (i.e., bosses, peers, subordinates, friends, partners and relatives) is assessing the subject's EI competencies. But, while the first article studies all six groups of raters across the professional and personal contexts, and finds that observers within each context offer similar enough ratings to be aggregated, the second and third articles use this finding to report results by rater context only, i.e., professional and personal.

While all articles are relevant to the overall contributions offered in this thesis, the final article provides the broadest picture, featuring all variables of interest and exploring a novel path, one of interaction with cognitive intelligence, through which we may best capture how behavioral EI affects learning performance. Table 1.1 below presents a synopsis of the empirical articles contained in this thesis.

Table 1.1 | Synopsis of the three empirical articles

Articles / Chapters	**Article 1 / Chapter 2**	**Article 2 / Chapter 3**	**Article 3 / Chapter 4**
Topic	EI Competencies	EI Competencies ~ Intelligence	EI Competencies × Intelligence ➚Learning Performance
Title	The 360º Assessment of EI Competencies within the Professional and Personal Entourage: A validation study	EI Competencies as a Related but Different Characteristic than Intelligence	When EI Competencies Catalyze the Relationship between Intelligence and Learning Performance: A task-dependent interaction model
Research questions	Is the multi-rater assessment of behavioral EI valid and reliable?; Are there some raters who are more apt to assess specific EI behaviors than others?	What is the relationship between behavioral EI and general cognitive ability?	How does behavioral EI moderate general cognitive ability in enhancing learning performance in social versus non-social tasks?
Theoretical framework	Emotional Intelligence (Salovey & Mayer, 1990) Behavioral approach to EI (Sala, 2002; Boyatzis & Sala, 2004; Boyatzis, 2009; Byrne et al., 2007; Boyatzis et al., 2015) Intentional Change Theory (Boyatzis 2001, 2006a, 2006b; Kolb & Boyatzis, 1970) Theory of multiple selves (Ibarra, 1999)	Emotional Intelligence (Salovey & Mayer, 1990) Behavioral approach to EI (Sala, 2002; Boyatzis & Sala, 2004; Boyatzis, 2009; Byrne et al., 2007; Boyatzis et al., 2015) Intentional Change Theory (Boyatzis 2001, 2006a, 2006b; Kolb & Boyatzis, 1970) Three-stratum theory of intelligence (Carroll, 1993)	Emotional Intelligence (Salovey & Mayer, 1990) Behavioral approach to EI (Sala, 2002; Boyatzis & Sala, 2004; Boyatzis, 2009; Byrne et al., 2007; Boyatzis et al., 2015) Intentional Change Theory (Boyatzis 2001, 2006a, 2006b; Kolb & Boyatzis, 1970) Three-stratum theory of intelligence (Carroll, 1993)
Method	Quantitative: 360-degree assessment; Confirmatory Factor Analysis; Inter-rater agreement	Quantitative: Confirmatory Factor Analysis; Bayesian hierarchical model	Quantitative: Bayesian hierarchical model; Qualitative: *ex-post* focus group
Sample	555 full-time, part-time and executive MBA candidates in a leading European business school between 2006-14	641 full-time and part-time and executive MBA candidates in a leading European business school, between 2006-13	864 full-time, part-time and executive MBA candidates in a leading European business school, between 2006-13

Table 1.1 | (continued)

Articles / Chapters	Article 1 / Chapter 2	Article 2 / Chapter 3	Article 3 / Chapter 4
Topic	EI Competencies	EI Competencies ~ Intelligence	EI Competencies × Intelligence ➚Learning Performance
Expected findings	Validation of the ESCI-U as a behavioral EI measure; Identification of a systematic pattern in competency ratings by rater type	Behavior EI is slightly related to general cognitive ability; This relationship is moderated by rater type and gender	In non-social tasks, EI negatively moderates the relationship between *g* and performance
Unexpected findings	Supervisors are the raters that most rate women's EI competencies ahead of men's, particularly in the competencies of achievement orientation, adaptability, organizational awareness, conflict management, coach and mentor, influence, inspirational leadership and teamwork	No	We find little evidence in our sample that in social tasks, behavioral EI positively moderates the relationship between *g* and performance
Publication status	Loewe, N., Batista-Foguet, J. M., Canboy, B., Mosteo, L. & Truninger, M. (2013). Friends, relatives and couples' perspectives on multisource assessments of emotional and social competencies. *IV International Congress in Emotional Intelligence Proceedings*. New York, NY Truninger, M., Loewe, N., Batista-Foguet, J. M., & Serlavós, R. The 360º Assessment of EI Competencies within the Professional and Personal Entourage: A validation study. (Preparing submission to the *International Journal of Human Resource Management*)	Boyatzis R. E., Batista-Foguet, J.M., Fernández-i-Marín, X., & Truninger, M. (2015). EI competencies as a related but different characteristic than intelligence. Frontiers in Psychology, 6 (72): 1-14. doi: 10.3389/fpsyg.2015.00072	Truninger, M., Batista-Foguet, J. M., Serlavós, R. & Boyatzis, R. (2013). The emotionally competent highway from IQ to performance: Testing an interaction effect model. European Survey Research Association. Lljubljana, Slovenia. Truninger, M., Fernández-i-Marín, X., Batista-Foguet, J. M., Boyatzis, R. E., & Serlavós, R. When EI Competencies Catalyze the Relationship between Intelligence and Learning Performance: A task-dependent interaction model. (Preparing submission to *Frontiers in Psychology*)

1.5 Main contributions

From a theoretical perspective we contribute to establishing an alternative approach to the role of behavioral EI in learning performance (Côté & Miners, 2006; Verbeke et al., 2008; Kidwell et al., 2011). As we step aside from the swarmed discussion over which of EI or cognitive ability is the strongest predictor of life and work outcomes, we propose that both are fundamental to performance. Furthermore, we hypothesize that it is in the interaction and mutual reinforcement between behavioral EI and intelligence that lies the power of EI.

Specifically, the most valuable contribution we offer to future research rests on the theoretical framework we develop for studying the interaction of EI and *g* on performance: the task-dependent interaction model of EI. By internalizing distinct types of tasks within the same sample, we propose that in social tasks we may best observe the positive moderation of EI on the relationship between cognitive abilities and learning performance, whereas in non-social task this interaction may have the opposite sign, i.e., EI may be more helpful to those that face greater cognitive challenges in their tasks. This model provides a potential way to reconcile the divergent findings among previous interaction studies conducted in job roles that require interpersonal interaction, and those conducted in academic settings where such interaction is oftentimes absent. Therefore, we invite researchers to explore task-dependent models, such as the one found herein (see Chapter 4), for considering both multiplicative and additive effects of EI on learning performance.

Our construct validation study of the Emotional and Social Competencies Inventory (Boyatzis & Goleman, 2007), is also an important contribution as we help foster the establishment of behavioral EI as a valid and reliable approach with which to observe the EI abilities in action, embedded within real contexts, and not just on paper in a laboratory setting.

Furthermore, our results along with previous work (Boyatzis et al., 2015; Furnham et al., 2014) show the importance of considering 360º multi-source assessments of EI. Different people, at work and at home, have unique vantage points from which to observe distinct facets of behavior, particularly depending on the specific relationship and rapport they have established with others. Similarly to Boyatzis et al. (2015), our study shows that professional raters in general provide a more balanced assessment of EI competencies, with relatively smaller measurement error, as compared to self and personal raters, providing the smaller attenuation bias of our model estimates (i.e., had the higher coefficients). This suggests future research should benefit from introducing multi-source assessments in their EI measures. Specifically, it is interesting to dig deeper into the distinctive perspectives across the raters within each type (e.g., collaborators, bosses, peers; friends; relatives; spouse), and look into identifying which particular competencies each rater is best apt to observe and assess.

Finally, we join other researchers working on different EI approaches (Fernández-Berrocal et al., 2006; Boyatzis et al., 2015; Petrides & Furnham, 2000) in a shared call for research that promotes a comprehensive vision for EI, one that acknowledges the unassailable contribution each existing measure, be they ability, self-report or behavioral EI, makes to the advancement of our understanding of what an emotional intelligent person thinks like, feels like and acts like.

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Chapter 2 | The 360º Assessment of EI Competencies within the Professional and Personal Entourage: A validation study

ABSTRACT

Conventionally, 360-degree competency assessments only incorporate the focal manager self-evaluations and feedback from co-workers, omitting the perspective of those that observe a manager's personal-life. Personal sources, however, may provide feedback of particular interest when assessing behaviors that manifest across multiple life contexts, as is the case of competencies related to leadership effectiveness. In addition, communication technologies have changed working habits, places, and schedules, giving personal sources more opportunities to observe managers working. Accordingly, this article examines whether extending *sources* beyond the traditional organizational setting provides complementary feedback to the manager, which might be relevant for his or her leadership development at work. Using a repertoire of emotional, social, and cognitive competencies that have been related to leader effectiveness, we perform a comparative analysis across the ratings from self-assessments and six different external rating sources from both personal and professional life spheres: supervisors, peers, subordinates, friends, relatives, and couples. Despite the presence of leniency bias in personal ratings, we find evidence that personal sources provide higher levels of agreement in ratings of competencies such as organizational awareness, teamwork and inspirational leadership. Among personal raters, friends and partners provide the closest ratings to professional sources, particularly those from peers and subordinates, while offering a more knowledgeable perspective in the evaluation of certain leadership competencies.

Keywords: Multisource assessment; 360º assessment; Emotional intelligence competencies, rater types

2.1 Introduction

In organizations, multisource evaluation techniques such as 360º assessments are often used to provide comprehensive feedback to a manager – or target[1] - as multiple observers that live or work with the person are invited to participate in the assessment and anonymously disclose their views. Ideally, 360º assessments incorporate as many complementary perspectives as needed to draw a multilayered landscape of the person's behavior. This article focuses on the analysis of a repertoire of emotional, social, and cognitive competencies provided by various sources or rater types from the target's professional and personal life domains.

The purpose of this article is twofold: (1) It evaluates the quality of a behavioral instrument measuring Emotional Intelligence competencies, by verifying the constructs' validity and reliability and testing the overall model fit using Structural Equation Modeling (SEM) techniques and (2) it performs a comparative analysis of the different perspectives that various observers have when appraising the competencies. The main research question we address inspects whether there are some types of raters that may be more apt at assessing specific EI competencies than others. Specifically, how do self-evaluations compare with external raters judgment? Are all observers equally adequate to assess all competencies, or on the contrary, are there raters that being more exposed to specific behaviors can provide better judgments of certain competencies than others? What about gender differences? Are there competencies in which women are perceived as more apt than men, and vice-versa?

The central premise underlying multisource assessment is that the focal managers profit more when feedback is provided from multiple perspectives (London &

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[1] The terms "(focal) manager", "target" and "student" are used interchangeably throughout the article.

Smither, 1995). Managers behave differently around different types of raters, or rating sources. Different ratings sources have unique opportunities to observe manager's behavior and consequently provide different perspectives (Lawler, 1967). Even if the manager engages in relatively stable behavior across rating sources, raters from different groups may selectively attend to different aspects of an identical behavior and attach different levels of importance to the behavior (Borman, 1974; Tsui & Ohlott, 1988). Consequently, different rating sources often have varied, yet equally valid views of a manager's performance. Rather than creating a problem, rating discrepancies are seen as an opportunity under the multisource assessment approach to feedback. Managers and their coaches can take advantage of these different perspectives if they clarify the bases for feedback discrepancies and use them in creating managers' development plans. Therefore, according to the multisource assessment approach to feedback, 360-degree programs should ideally incorporate as many complementary perspectives as required to capture a comprehensive view of the focal manager's relevant behavior to leadership effectiveness at the workplace.

While there is no doubt on the value of co-workers' perspectives in appraising a manager's perceived strengths and weaknesses, sources from the manager's personal-life – such as manager's friends, relatives, and couple – are usually not considered for 360-degree programs assessing leadership at the workplace. However, most of the competencies related to leadership at work (Boyatzis & Goleman, 2007; Wolff, 2006) – like emotional self-awareness, optimism, and teamwork – manifest themselves across multiple life contexts, not only at the workplace. Also, communication technologies have blurred the traditional workplace boundaries, giving personal sources more opportunities to observe managers' behaviors while they work. Taking together, both factors may legitimate personal sources to provide relevant feedback on leadership-related behaviors at work. However, including extra sources in 360-degree programs is not without its costs. Although technology has greatly facilitated the task of gathering, analyzing, and reporting feedback, more raters may imply additional work. Therefore, the logic to justify the inclusion of sources from managers' personal-life sphere requires that these sources can provide substantially unique and relevant performance information about the managers.

This article empirically examines the assessment of emotional, social and cognitive competencies as observed by self, professional and personal sources in all-inclusive 360-degree assessment. Using repeated measures ANOVA we compare ratings provided by the managers themselves and their supervisors, peers, subordinates, friends, relatives, and partners. The data consists of managerial ratings from a sample of 555 MBA students assessed on a repertoire of emotional, social, and cognitive competencies shown to be crucial for effective leadership. Findings show evidence that personal sources complement professional raters in the assessment of leadership-related competencies.

2.2 Theoretical Framework

Most of the research on multisource assessment advocates for incorporating different rating sources in the design of 360-degree feedback programs. The rationale is that different rating sources provide substantially unique performance information about managers (Borman, 1997; Dalessio, 1998; Murphy & Cleveland, 1995), or what is often referred to as the "discrepancy hypothesis". There are three commonly accepted explanations for dissensus among rating sources: (1) differences in the performance information available to different sources (Lawler, 1967; Lance et al., 2008), (2) differences in criterion type and criterion weight used to evaluate performance (Borman, 1974; Tsui & Ohlott, 1988), and (3) sources' idiosyncratic rating tendencies leading to different measurement errors (Campbell et al. 1970; Saal et al., 1980). Evaluators rate managers based on perceived information, which may differ widely across individuals observing identical behavior (DeNisi et al., 1984; Landy & Farr, 1980). Also, managers behave differently in the presence of different groups of evaluators, therefore, different rating sources have unique opportunities to observe manager's behavior depending on the nature of the evaluator's relationship to the manager being rated (Lawler, 1967; Kavanagh et al. 1971; Thomson, 1970). Different evaluators might also attend to distinct aspects of the same observed behavior (Borman, 1974). Even if evaluators attend to the same aspects, they might still place different levels of importance, thus, arriving at different assessments of the same manager's performance. Further, different response bias – like halo, leniency, central tendency, and range restriction (e.g., Saal et al., 1980) - may affect sources differently reducing their rating accuracy. In any case, diverse rating sources often have distinct, yet equally valid views of a manager's performance, leading to rating discrepancies.

There are also situational factors that may influence dissensus among different groups of raters. Different rating sources are likely to observe managers in situations that are fairly different in nature. For example, while a manager's partner or spouse can observe how he or she fights back to recover from illness or is willing to offer selfless help to a stranger, a supervisor normally has more opportunities to observe the manager in formal situations that oftentimes follow a standard protocol of behavior. However, situations vary in terms of relevancy for a given competence, trait, or skill of interest (Haaland & Christiansen, 2002; Tett & Guterman, 2000). In other words, some situations have more potential than others to provide cues to trigger - or to activate - certain competency-relevant behavior (Murtha et al., 1996). Despite the multiple reasons for dissensus among different rating sources, some researchers have also found evidence that raters from the same organizational level disagree as much as raters from different levels (Viswesvaran, et al. 2002; Mount et. al, 1998; Lebreton et. al, 2003; Barr & Raju, 2003; Scullen et. al, 2000). Given the contradictory empirical findings of previous research on the level of discrepancy among professional sources, in this article we treat supervisors, peers, and subordinates separately.

Finally, the leadership competencies used in this study (Boyatzis, 2009; Boyatzis & Goleman, 2007) manifest themselves across multiple life contexts, not only at work. Also, communication technologies have blurred the traditional workplace boundaries, giving personal sources more opportunities to observe managers working. Still, it is reasonable to assume that professional sources have more opportunities to observe manager's leadership behaviors relevant to work. However, Landy and Farr (1980) found that the relevance of the interaction between rater and target to the dimensions being evaluated was more important than frequency of observation. Thus, competency-relevance differences among the situations in which personal sources and professional sources observe managers may compensate for differences in frequency of observation. In sum, there is no reason to expect personal sources to be less adequate than professional raters to assess the leadership-competencies used in this study. As Heger (2007) found a positive relationship between opportunity-to-observe and interrater agreement (between two raters) or consensus (among three or more raters), we expect that sources will attain more interrater agreement indices in those competencies for which the source is better suited and vice versa. On the basis of the above discussions, we formulated and tested the following four hypotheses:

Hypothesis 1: In the context of competency assessments designed for personal development purposes only, self-evaluations tend to consistently underestimate one's competencies as compared to others' ratings.

Hypothesis 2: Professional rater types have a higher level of interrater agreement in their ratings of emotional and social competencies than personal rater types.

Hypothesis 3: There are no significant rating differences within professional sources (i.e., between supervisors, peers and subordinates) and within personal sources (i.e., between friends, relatives and partners)

Hypothesis 4: There is a systematic rating pattern across self, professional and personal sources: self < supervisors < peers < subordinates < friends < relatives < partners.

2.3 Method

2.3.1 Participants

As part of a leadership development course (LEAD) at a Spanish Business School, students participate in a 360º competency assessment, whereby they complete a self-evaluation questionnaire on a repertoire of emotional, social and cognitive competencies and in parallel select multiple external observers within their professional and personal entourage, to assess the target student in the same questionnaire.

Our sample includes 555 MBA students who participated in the LEAD course between 2006 and 2014 and had at least one rater of each type. Students' age ranged from 22 to 55 (Mean = 31.2, SD = 6.2) and 33.2% were female. 84.3% of students were from Spain, while the remainder were from 32 different countries such as Germany (1.6%), USA (1.4%) or Mexico (1.3%). Participants' educational backgrounds according to the ISCED 2011 classification (UNESCO, 2012) were: Social sciences, business and law (43.1%), engineering, manufacturing and construction (36.2%), science (11.3%), health and welfare (5.5%), services (2%) and humanities and arts (1.8%). Students had on average 17 external raters (SD = 7.5; Range: 6 – 70). Among the total 8,309 observers who provided ratings, there were 6 rater types: supervisors (13.1%), peers (20.9%), and subordinates (20.5%)

within the professional sphere; friends (23.0%), relatives (15.6%), and partners or spouses (6.9%) within the personal context.

2.3.2 Measures

Individuals are assessed on the fourteen behavioral-based EI competencies included in the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis & Goleman, 2007): emotional self-awareness (ESA), achievement orientation (AO), emotional self-control (ESC), adaptability (A), positive outlook (PO), influence (I), empathy (E), organizational awareness (OA), inspirational leadership (IL), conflict management (CFM), coach and mentor (CM), and teamwork (T). Additionally, the ESCI-U includes two cognitive competencies: system thinking (ST) and pattern recognition (PR). A brief description of the 14 competencies from Boyatzis and Goleman (2007) is presented in the Appendix.

The ESCI-U questionnaire consists of 70 items – 5 per competency – that measure the frequency of observed behaviors associated to the fourteen competencies. A typical item includes a question "How often do you/does the target…?" followed by a behavioral indicator such as "See possibilities rather than problems." The questionnaire uses an 11-point Likert type scale to assess the frequency with which the individual demonstrates each behavior (from 0 = "never" to 10 = "always"). To accommodate for the possibility of external raters' uncertainty regarding a few aspects of the target's behavior, the response scale also includes the option "I do not know" (Batista-Foguet & Saris, 1997). Notwithstanding, for each questionnaire to be considered valid this option cannot be checked more than eight times by external raters, and five times in the case of self-evaluations. Although this scoring procedure often results in item level missing values, the data is complete at the competency level, such that we do not need to replace missing values.

The survey is administered through an online platform, where students self-select multiple external raters within 6 categories: supervisors (SV), peers (PE) and subordinates (SB) from their professional entourage, as well as friends (FR), relatives (RE) and partners (PT) within their personal spheres. Each selected rater receives an automatic email from our institution, with an invitation to participate in the 360º assessment of the target individual wherein they are informed about the strictly developmental purpose of the questionnaire and guaranteed the confidentiality and anonymity of their data, as students only receive feedback reports based on aggregated data.

2.4 Results

To evaluate the quality of the ESCI 360º assessment instrument, we began by examining construct validity[2]. Professional and personal raters have different vantage points from which to observe the target individual's behavior. These differences in perspective reflect the distinction between work and home contexts, as well as the specific nature of each rater's rapport with the target, as each relationship may elicit certain competencies to manifest more than others. This way, because we suspect that the ESCI factorial structure may differ across rater types we have modeled the data separately. After a first exploratory factor analysis (EFA) showing that the two cognitive competencies, systems thinking and pattern recognition, loaded highly on the same factor and had correlations above 0.89 on all rater types, the subsequent confirmatory factor analysis (CFA) failed to reject the unidimensionality of the 5+5 indicators corresponding to the two competencies. We thus modified the original 14-competency model to hypothesize a 13-factor model with one single cognitive competency.

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[2] Construct validity has been defined as "the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests" (American Educational Research Association et al., 1999, p.9).

To test the measurement model of the 13 competency scales we used Lisrel 9.2. In the presence of missing values, we performed a Full Information Maximum Likelihood (FIML) estimation for each rater type, while using the same model specification. Table 2.1 shows that the global fit indexes of the measurement model were acceptably close to the recommended thresholds. Although the FIML chi-squares are considerably high, these were due to a few irrelevant misspecifications, further magnified by the high power in our analysis (i.e., large sample size and high reliabilities). The factor loadings of each item on its respective competency were all above 0.7.

Table 2.1 | Global fit indexes of the ESCI measurement model for each rater type (*n*= 555)

Rater type		Full Information ML χ^2 (df)	90% CI RMSEA	P-value for test of close fit (RMSEA < 0.05)
Self		5790 (2267)	(0.0512; 0.0546)	1.000
Professional	**Supervisors**	6766 (2267)	(0.0582; 0.0614)	1.000
	Peers	7536 (2267)	(0.0631; 0.0663)	1.000
	Subordinates	7323 (2267)	(0.0618; 0.0650)	1.000
Personal	**Friends**	7739 (2267)	(0.0643; 0.0676)	1.000
	Relatives	6499 (2267)	(0.0563; 0.0596)	1.000
	Partners	5862 (2267)	(0.0518; 0.0551)	1.000

In addition, we checked that: 1) all the model estimates were reasonable and had the expected sign; 2) the correlation residuals suggested no further addition of parameters; and 3) the modification indexes led to sensible estimates. Throughout this process we paid more attention to the detection of misspecification errors rather than the global fit per se (Saris et al., 2009), as we must consider the high power of the test and its effect on significance levels. We detected no significant misspecifications in our CFA model as tested with each rater type. Next, we assessed discriminant validity by comparing the square root of the average variance extracted (AVE) of each reflective construct with their correlations. Despite the relatively high correlations between some constructs, all models specifying the correlation coefficient between pairs of competencies as constrained to 1 have been rejected. Therefore, these results indicate that the 13 competencies in the ESCI model are adequately discriminated.

Once established the validity of our scales, we addressed reliability. In Table 2.2 we used Cronbach's α to assess the internal consistency of each set of five reflective indicators per competency. Nonetheless, because Cronbach's α may either underestimate or overestimate reliabilities whenever the assumption of tau-equivalence is not observed (Raykov, 2001), in such cases we used Heise and Bohrnstedt's (1970) Omega (Ω), which only requires the measures to be congeneric (i.e., the items in a scale should be unidimensional). As shown in Table 2.2 all competency reliabilities for every rater type were well above 0.7, except for the self-evaluation of conflict management. In fact, it is worth noting that self-assessments obtain relatively lower reliabilities in all competencies as compared to any of the external rater types.

Table 2.2 | Cronbach's α and Omega reliabilities of EI competencies per rater type (*n* = 555)

	Cronbach's α							Ω						
Competencies	**Self**	**Professional**			**Personal**			**Self**	**Professional**			**Personal**		
		SV	**PE**	**SB**	**FR**	**RE**	**PT**		**SV**	**PE**	**SB**	**FR**	**RE**	**PT**
Emotional self-Awareness	0.797	0.843	0.864	0.843	0.820	0.861	0.834	0.824	0.859	0.884	0.867	0.848	0.868	0.846
Achievement orientation	0.753	0.861	0.859	0.894	0.804	0.821	0.761							
Adaptability	0.731	0.857	0.860	0.871	0.808	0.851	0.767							
Emotional self-control	0.861	0.919	0.929	0.926	0.895	0.901	0.891							
Positive outlook	0.839	0.865	0.880	0.892	0.849	0.876	0.863	0.844	0.870	0.882	0.907	0.850	0.876	0.870
Empathy	0.787	0.906	0.910	0.918	0.903	0.901	0.875							
Organizational awareness	0.798	0.868	0.875	0.875	0.823	0.813	0.778							
Conflict management	0.684	0.847	0.867	0.880	0.806	0.835	0.782							
Coach and mentor	0.840	0.908	0.913	0.920	0.892	0.891	0.847							
Influence	0.748	0.865	0.872	0.873	0.826	0.788	0.798	0.752	0.870	0.875	0.876	0.833	0.800	0.803
Inspirational leadership	0.837	0.926	0.925	0.936	0.899	0.899	0.883							
Teamwork	0.875	0.946	0.951	0.949	0.920	0.941	0.900							
Cognitive	0.858	0.916	0.918	0.926	0.894	0.911	0.892	0.861	0.931	0.923	0.927	0.905	0.918	0.896

After establishing the construct validity and reliability of the measurement instrument regarding each of the 13 competencies in the ESCI model, we computed each competency' summated rating scale, per individual rater. Note that before aggregating the ratings of multiple raters within the same type (i.e., supervisors, peers, etc), in order to obtain their mean rating for each target and competency, we needed to ascertain the similarity of ratings within each group or type of raters. As such, we computed two different estimates of rating similarity: The intraclass correlations (ICC; Shrout & Fleiss, 1979) and the interrater agreement index, r_{WG} (James, Demaree, & Wolf, 1984, 1993). While ICC provides information about rating consensus (interchangeability) and consistency among raters (same rank order), r_{WG} assesses the extent of agreement (LeBreton et al., 2003; McGraw & Wong, 1996). When each target participant is rated by a different set of K judges on an interval response scale, one-way random effects ICC (1, K) provides an estimate of stability (i.e., reliability) of the mean rating among judges (LeBreton & Senter, 2007). Based on sub-samples of students with at least three raters of the same type, we estimated ICC (1, 3) across the thirteen competencies and the six rating sources. The resulting intraclass correlations – presented in Table 2.3 – ranged from 0.261 to 0.666 (Mean=0.527). Previous studies have reported just slightly higher ICCs for sources of the professional domain (Brutus et al., 1999; Johnson & Ferstl, 1999; Ostroff et al. 2004). Although others have argued that values below 0.7 do not justify within-source ratings aggregation if used for psychological measures in the early stages of development (Nunnaly, 1978), this is not our case since the ESCI instrument has been developed over the past two decades.

Regarding the interrater agreement index, we computed $r_{WG(J)}$, the multi-item extension of James, Demaree and Wolf's (1984), by using the five item scores per competency and taking into account all the raters per each target student. r_{WG} measures how the observed variance in ratings compares to the variance of a theoretical distribution representing no agreement (i.e., the null distribution). When factors such as social desirability or leniency affect the ratings (James et al., 1984; LeBreton & Senter, 2007; Smith-Crowe et al., 2014), they can lead to a restricted range of responses (Klein et al., 2001). In these circumstances, Smith-Crowe et al. (2014) recommends researchers to provide an assessment of interrater agreement relative to null distributions with moderate to high skews. Although our questionnaire instructions clearly stated the pure developmental purpose of the multisource assessment, we expected a certain persistence of leniency bias. Therefore, we computed agreement indices using moderate and heavily negative skewed null distributions (σ = 6.32 and 4.02 respectively for a 11-point Likert scale, according to LeBreton & Senter, 2007). Next, following James et al. (1984)

recommendation, out-of-range values were reset to zero. Finally, we averaged individual target's $r_{WG(5)}$ indices into a within-source mean interrater agreement index for each competency.

Table 2.3 presents the mean $r_{WG(5)}$ computed for each rater type and two levels of skewness: moderate (MS), and heavy skew (HS). For the moderate case – which is usually considered the most likely in performance assessments - we report the percentage of targets whose interrater agreement index is over 0.7. Taken together the low ICCs and high $r_{WG(5)}$ values, these results suggest that ratings variance might be substantially restricted. LeBreton et al. (2003) showed that when between-target ratings variance becomes substantially restricted, ICCs grossly underestimate the level of rating similarity. In such cases, the low ICCs may be due to an artifact of the statistical tool rather than a lack of rating similarity. Fortunately, restricted variance in ratings does not affect $r_{WG(J)}$, seen that this statistic is not based on correlations.

Table 2.3 | Competency interrater agreement and intra-class correlations for each rater type: (a) Professional raters; (b) Personal raters

(a)	Supervisors (*n* = 312)				Peers (*n* = 457)				Subordinates (*n* = 391)			
Competencies	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) *n* = 138**	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) *n* = 324**	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) *n* = 259**
Emotional self-awareness	77%	0.761	0.596	0.307	78%	0.752	0.585	0.656	70%	0.689	0.488	0.487
Achievement orientation	91%	0.877	0.750	0.317	95%	0.915	0.804	0.625	89%	0.861	0.727	0.475
Adaptability	91%	0.870	0.713	0.404	91%	0.887	0.751	0.572	90%	0.863	0.715	0.525
Emotional self-control	80%	0.787	0.626	0.412	85%	0.818	0.665	0.597	79%	0.789	0.608	0.627
Positive outlook	87%	0.835	0.704	0.391	92%	0.879	0.727	0.601	89%	0.867	0.729	0.550
Empathy	82%	0.796	0.666	0.347	83%	0.806	0.650	0.628	84%	0.807	0.645	0.632
Organizational awareness	85%	0.815	0.663	0.409	85%	0.839	0.695	0.666	83%	0.825	0.658	0.562
Conflict management	83%	0.807	0.642	0.261	80%	0.787	0.595	0.623	76%	0.748	0.548	0.588
Coach and mentor	79%	0.781	0.606	0.426	79%	0.771	0.617	0.646	72%	0.730	0.553	0.617
Influence	86%	0.838	0.643	0.469	84%	0.804	0.621	0.569	76%	0.753	0.551	0.531
Inspirational leadership	73%	0.774	0.594	0.439	79%	0.773	0.599	0.599	76%	0.738	0.567	0.638
Teamwork	86%	0.829	0.707	0.553	83%	0.814	0.683	0.653	81%	0.799	0.677	0.646
Cognitive	84%	0.827	0.663	0.300	86%	0.826	0.681	0.555	87%	0.815	0.656	0.402
Max.	91%	0.877	0.750	0.553	95%	0.915	0.804	0.666	90%	0.867	0.729	0.646
Min.	73%	0.761	0.594	0.261	78%	0.752	0.585	0.555	70%	0.689	0.488	0.402
Mean	83%	0.815	0.659	0.387	85%	0.821	0.667	0.615	81%	0.791	0.625	0.560

(b)	Friends (n = 471)				Relatives (n = 400)				Partners (n = 22)		
Competencies	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) n = 347**	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) n = 214**	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**
Emotional self-awareness	77%	0.756	0.546	0.578	78%	0.774	0.587	0.567	58%	0.601	0.448
Achievement orientation	95%	0.915	0.821	0.386	96%	0.923	0.862	0.644	95%	0.938	0.807
Adaptability	94%	0.892	0.761	0.437	95%	0.907	0.793	0.659	95%	0.930	0.807
Emotional self-control	85%	0.818	0.666	0.499	86%	0.839	0.702	0.558	87%	0.795	0.672
Positive outlook	92%	0.879	0.758	0.448	93%	0.891	0.812	0.583	95%	0.923	0.848
Empathy	85%	0.828	0.669	0.612	85%	0.842	0.693	0.615	87%	0.843	0.774
Organizational awareness	90%	0.889	0.752	0.499	93%	0.895	0.792	0.534	100%	0.983	0.954
Conflict management	84%	0.800	0.619	0.479	82%	0.815	0.665	0.563	66%	0.696	0.523
Coach and mentor	84%	0.801	0.656	0.533	89%	0.858	0.730	0.563	87%	0.883	0.797
Influence	82%	0.800	0.623	0.486	83%	0.820	0.668	0.577	87%	0.847	0.767
Inspirational leadership	81%	0.792	0.646	0.453	87%	0.853	0.729	0.641	95%	0.889	0.824
Teamwork	89%	0.866	0.744	0.525	94%	0.908	0.824	0.602	87%	0.880	0.793
Cognitive	86%	0.848	0.693	0.325	91%	0.883	0.769	0.601	95%	0.888	0.828
Max.	95%	0.915	0.821	0.612	96%	0.923	0.862	0.659	100%	0.983	0.954
Min.	77%	0.756	0.546	0.325	78%	0.774	0.587	0.534	58%	0.601	0.448
Mean	86%	0.837	0.689	0.482	89%	0.862	0.741	0.593	87%	0.854	0.757

In contrast to what we expected in hypothesis 2, we may observe from the mean $r_{WG(5)}$ in the case of moderate skew, that all personal raters have higher levels of interrater agreement across all competencies than professional sources - i.e. the means of $r_{WG(5)}$ (MS) within friends (0.837), relatives (0.862) and partners (0.854) are higher than within supervisors (0.815), peers (0.821) and subordinates (0.791). The higher level of consensus in ratings indicates that observers within the personal entourage are exposed to a relatively more stable and consistent display of the person's behavior than are the raters from the workplace.

Table 2.4 (a) ranks for each rater type, the competencies in which they have the highest level of agreement down to the lowest, according to $r_{WG(5)}$ (MS). Notably, achievement orientation and adaptability are among the top competencies across all raters, as they elicit the highest levels of agreement within each source. This indicates that all sources across personal and professional contexts have been similarly exposed to opportunities to observe these two competencies in action. Conversely, emotional self-awareness is the least agreed upon competency, ranking at the bottom lowest level of agreement for all rater types. According to Wholers and London (1989), self-awareness is among the most difficult competencies for others to rate, oftentimes even for oneself, since people tend to abstain from disclosing the emotions that lay behind their thoughts and actions.

The competencies that obtain a larger consensus within the personal as compared to the professional context these are organizational awareness, inspirational leadership and coach and mentor. Curiously, the raters that are most exposed to a person's organizational awareness are partners and friends. This may be due to organizational awareness involving sensible and possibly classified information that may only be revealed within close and trustworthy relationships. As to the competencies that are best observed within professional surroundings as compared to personal ones, these include influence, positive outlook, conflict management and emotional self-control. Particularly, supervisors have the biggest exposure to influence related behavior, whereas peers have the largest consensus in observing emotional self-control, and subordinates agree the most when assessing positive outlook.

Table 2.4 | (a) Competency levels of interrater agreement within each rater type; (b) Spearman's correlation matrix of levels of agreement between rater types

(a)

Agreement	SV	PE	SB	FR	RE	PT
Highest	AO	AO	PO	AO	AO	OA
	A	A	A	A	T	AO
	I	PO	AO	OA	A	A
	PO	OA	OA	PO	OA	PO
	T	C	C	T	PO	IL
	C	ESC	E	C	C	C
	OA	T	T	E	CM	CM
	CFM	E	ESC	ESC	IL	T
	E	I	I	CM	E	I
	ESC	CFM	CFM	I	ESC	E
	CM	IL	IL	CFM	I	ESC
	IL	CM	CM	IL	CFM	CFM
Lowest	ESA	ESA	ESA	ESA	ESA	ESA

Key:

ESA	Emotional self-awareness
AO	Achievement orientation
A	Adaptability
ESC	Emotional self-control
PO	Positive outlook
E	Empathy
OA	Organizational awareness
CFM	Conflict management
CM	Coach and mentor
I	Influence
IL	Inspirational leadership
T	Teamwork
C	Cognitive

(b)

	SV	PE	SB	FR	RE	PT
SV	1	0.80	0.77	0.76	0.64	0.54
PE		1	0.96	0.93	0.75	0.70
SB			1	0.91	0.72	0.69
FR				1	0.88	0.76
RE					1	0.83
PT						1

SV	Supervisors
PE	Peers
SB	Subordinates
FR	Friends
RE	Relatives
PT	Partners

In panel (b) of Table 2.4 we quantified the degree of similarity with respect to the levels of agreement between rater types, using Spearman's correlations. The resulting correlation matrix shows that among all sources, peers, subordinates and friends are the raters that most coincide in their levels of agreement, with all three inter-correlations above 0.90. Also, among the personal sources, the relatives and couples have the least agreement with supervisors ($r_{SV\text{-}FR}$=0.76; $r_{SV\text{-}RE}$=0.64; $r_{SV\text{-}PT}$ =0.54).

Next, Figure 2.1 shows the competencies rating means by rater type. First, a grand mean of 7.81 across competencies and external raters suggests a certain degree of leniency in ratings. Second, means ranged from 6.92 to 8.72, implying a moderate to heavy restriction of variance in the ratings, a situation that is amply described in LeBreton et al. (2003). Taken together, these two data characteristics make rating mean differences between sources to be fairly small (e.g., the maximum difference on average are the 1.05 points relatives score above self-evaluations in the competency of inspirational leadership).

Most interesting, Figure 2.1 shows a systematic order in the ratings across all competencies: raters within the personal sphere – friends, relatives, and partners – offer higher ratings on average than any of the three co-workers in all of the competencies, except in emotional self-control and positive outlook, which were rated higher by subordinates than partners. Moreover, within each context, personal and professional, there is a systematic pattern in ratings, as follows: relatives give the highest ratings, followed by partners and then friends, which rate the closest to subordinates and peers; supervisors in turn rate all competencies the lowest (only above self-evaluations), followed by peers and subordinates. In sum, the systematic pattern in source ratings from lowest to highest evaluations in all competencies on average partially confirms hypothesis 4 and is as follows:

Self < Supervisors < Peers < Subordinates < Friends < Partners < Relatives

Notably, self-evaluations are the lowest among all raters and in all competencies, confirming hypothesis 1 that within the context of competency assessments that serve purely developmental purposes, one's self-evaluation is an underestimate of the true score in any competency, as compared to any of the external ratings.

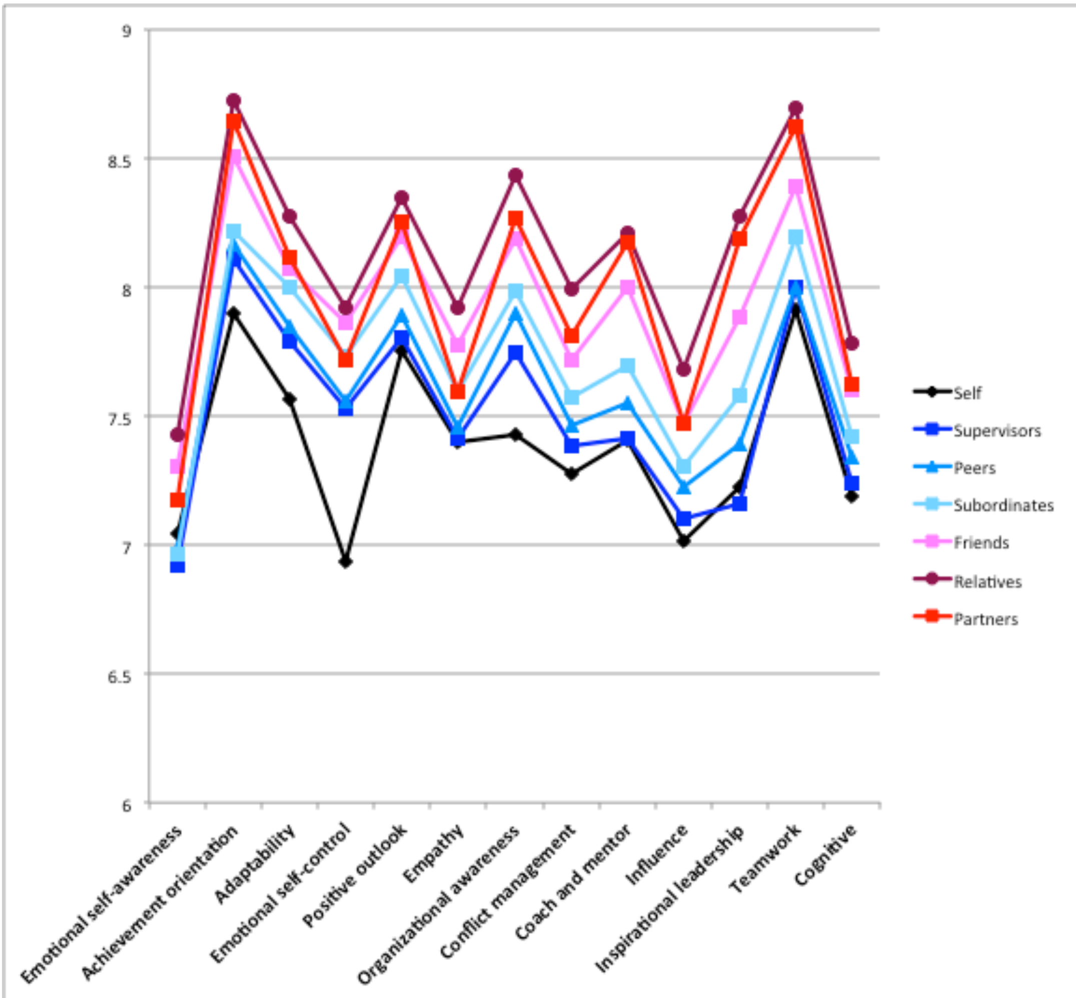

Figure 2.1 | EI competencies rating means by rater type

To investigate whether the mean differences between the seven rating sources are statistically significant, we conducted an analysis of variance (ANOVA). Although previous research has found correlations between the ratings from co-worker groups to be fairly low (e.g., Conway & Huffcutt's, 1997; Landy & Farr, 1980), as we are introducing new types of rating sources, we perform repeated measures ANOVA, which does not assume independent samples. Using Huynh-Feldt corrected values, F-tests are significant at $p<0.05$ for all the competencies. Therefore, we conclude that the scores of the seven rating sources differ significantly. However, in order to figure out which sources are most responsible for these differences, we need to conduct a post hoc test. Table 2.5 shows the results of the post hoc test (multiple paired t-tests) where the p-values are corrected according to Bonferroni criterion.

Table 2.5 | Mean Differences. Post Hoc Test (Multiple Tests of Significance)[3]

Emotional self-awareness

	SE	SV	PE	SB	FR	RE	PT
SE	0	0.121 (1.000)	0.055 (1.000)	0.080 (1.000)	-0.264 (0.013)	-0.385 (0.000)	-0.133 (1.000)
SV		0	-0.066 (1.000)	-0.041 (1.000)	-0.385 (0.000)	-0.506 (0.000)	-0.254 (0.020)
PE			0	0.025 (1.000)	-0.319 (0.001)	-0.440 (0.000)	-0.188 (0.305)
SB				0	-0.344 (0.000)	-0.464 (0.000)	-0.213 (0.119)
FR					0	-0.121 (1.000)	0.131 (1.000)
RE						0	0.251 (0.023)
PT							0

Achievement orientation

	SE	SV	PE	SB	FR	RE	PT
SE	0	-0.207 (0.005)	-0.267 (0.000)	-0.319 (0.000)	-0.606 (0.000)	-0.822 (0.000)	-0.745 (0.000)
SV		0	-0.060 (1.000)	-0.112 (1.000)	-0.399 (0.000)	-0.615 (0.000)	-0.538 (0.000)
PE			0	-0.052 (1.000)	-0.339 (0.000)	-0.555 (0.000)	-0.478 (0.000)
SB				0	-0.287 (0.000)	-0.503 (0.000)	-0.426 (0.000)
FR					0	-0.216 (0.003)	-0.139 (0.292)
RE						0	0.077 (1.000)
PT							0

Adaptability

	SE	SV	PE	SB	FR	RE	PT
SE	0	-0.225 (0.002)	-0.285 (0.000)	-0.434 (0.000)	-0.513 (0.000)	-0.712 (0.000)	-0.554 (0.000)
SV		0	-0.060 (1.000)	-0.208 (0.006)	-0.288 (0.000)	-0.487 (0.000)	-0.329 (0.000)
PE			0	-0.148 (0.203)	-0.228 (0.002)	-0.427 (0.000)	-0.269 (0.000)
SB				0	-0.079 (1.000)	-0.279 (0.000)	-0.121 (0.736)
FR					0	-0.199 (0.011)	-0.041 (1.000)
RE						0	0.158 (0.125)
PT							0

Emotional self-control

	SE	SV	PE	SB	FR	RE	PT
SE	0	-0.597 (0.000)	-0.624 (0.000)	-0.794 (0.000)	-0.929 (0.000)	-0.985 (0.000)	-0.780 (0.000)
SV		0	-0.028 (1.000)	-0.198 (0.281)	-0.333 (0.001)	-0.389 (0.000)	-0.184 (0.451)
PE			0	-0.170 (0.698)	-0.305 (0.003)	-0.361 (0.000)	-0.156 (1.000)
SB				0	-0.135 (1.000)	-0.191 (0.351)	0.014 (1.000)
FR					0	-0.056 (1.000)	0.149 (1.000)
RE						0	0.205 (0.216)
PT							0

Positive Outlook

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.050 (1.000)	-0.139 (0.721)	-0.292 (0.000)	-0.441 (0.000)	-0.597 (0.000)	-0.501 (0.000)
SV		0	-0.089 (1.000)	-0.242 (0.005)	-0.390 (0.000)	-0.547 (0.000)	-0.450 (0.000)
PE			0	-0.153 (0.422)	-0.302 (0.000)	-0.458 (0.000)	-0.362 (0.000)
SB				0	-0.149 (0.490)	-0.306 (0.000)	-0.209 (0.031)
FR					0	-0.157 (0.358)	-0.060 (1.000)
RE						0	0.097 (1.000)
PT							0

Empathy

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.013 (1.000)	-0.057 (1.000)	-0.191 (0.164)	-0.374 (0.000)	-0.521 (0.000)	-0.194 (0.143)
SV		0	-0.044 (1.000)	-0.178 (0.280)	-0.361 (0.000)	-0.508 (0.000)	-0.181 (0.247)
PE			0	-0.134 (1.000)	-0.317 (0.000)	-0.464 (0.000)	-0.137 (1.000)
SB				0	-0.183 (0.232)	-0.330 (0.000)	-0.003 (1.000)
FR					0	-0.147 (0.849)	0.179 (0.264)
RE						0	0.327 (0.000)
PT							0

Organizational awareness

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.314 (0.000)	-0.470 (0.000)	-0.557 (0.000)	-0.760 (0.000)	-1.005 (0.000)	-0.836 (0.000)
SV		0	-0.157 (0.254)	-0.244 (0.002)	-0.446 (0.000)	-0.691 (0.000)	-0.522 (0.000)
PE			0	-0.087 (1.000)	-0.289 (0.000)	-0.535 (0.000)	-0.365 (0.000)
SB				0	-0.203 (0.025)	-0.448 (0.000)	-0.279 (0.000)
FR					0	-0.245 (0.002)	-0.076 (1.000)
RE						0	0.169 (0.144)
PT							0

Conflict management

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.114 (1.000)	-0.193 (0.106)	-0.300 (0.000)	-0.448 (0.000)	-0.724 (0.000)	-0.537 (0.000)
SV		0	-0.078 (1.000)	-0.186 (0.144)	-0.334 (0.000)	-0.610 (0.000)	-0.422 (0.000)
PE			0	-0.107 (1.000)	-0.256 (0.004)	-0.531 (0.000)	-0.344 (0.000)
SB				0	-0.148 (0.649)	-0.424 (0.000)	-0.237 (0.012)
FR					0	-0.276 (0.001)	-0.088 (1.000)
RE						0	0.187 (0.136)
PT							0

Coach and mentor

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.005 (1.000)	-0.138 (1.000)	-0.283 (0.004)	-0.590 (0.000)	-0.801 (0.000)	-0.762 (0.000)
SV		0	-0.133 (1.000)	-0.278 (0.005)	-0.584 (0.000)	-0.796 (0.000)	-0.756 (0.000)
PE			0	-0.145 (1.000)	-0.452 (0.000)	-0.663 (0.000)	-0.624 (0.000)
SB				0	-0.306 (0.001)	-0.518 (0.000)	-0.478 (0.000)
FR					0	-0.212 (0.104)	-0.172 (0.468)
RE						0	0.040 (1.000)
PT							0

Influence

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.092 (1.000)	-0.215 (0.038)	-0.291 (0.001)	-0.457 (0.000)	-0.668 (0.000)	-0.458 (0.000)
SV		0	-0.123 (1.000)	-0.199 (0.082)	-0.365 (0.000)	-0.575 (0.000)	-0.366 (0.000)
PE			0	-0.076 (1.000)	-0.242 (0.010)	-0.452 (0.000)	-0.243 (0.009)
SB				0	-0.166 (0.340)	-0.376 (0.000)	-0.167 (0.326)
FR					0	-0.210 (0.048)	-0.001 (1.000)
RE						0	0.209 (0.051)
PT							0

Inspirational leadership

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	0.068 (1.000)	-0.169 (0.539)	-0.353 (0.000)	-0.658 (0.000)	-1.049 (0.000)	-0.967 (0.000)
SV		0	-0.236 (0.038)	-0.420 (0.000)	-0.725 (0.000)	-1.116 (0.000)	-1.034 (0.000)
PE			0	-0.184 (0.322)	-0.489 (0.000)	-0.880 (0.000)	-0.798 (0.000)
SB				0	-0.305 (0.001)	-0.696 (0.000)	-0.614 (0.000)
FR					0	-0.391 (0.000)	-0.309 (0.001)
RE						0	0.082 (1.000)
PT							0

Teamwork

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.086 (1.000)	-0.092 (1.000)	-0.283 (0.001)	-0.483 (0.000)	-0.786 (0.000)	-0.715 (0.000)
SV		0	-0.006 (1.000)	-0.197 (0.112)	-0.397 (0.000)	-0.700 (0.000)	-0.629 (0.000)
PE			0	-0.191 (0.145)	-0.391 (0.000)	-0.694 (0.000)	-0.623 (0.000)
SB				0	-0.201 (0.094)	-0.503 (0.000)	-0.433 (0.000)
FR					0	-0.302 (0.000)	-0.232 (0.021)
RE						0	0.070 (1.000)
PT							0

Cognitive

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.054 (1.000)	-0.157 (0.264)	-0.233 (0.004)	-0.413 (0.000)	-0.598 (0.000)	-0.433 (0.000)
SV		0	-0.102 (1.000)	-0.179 (0.091)	-0.359 (0.000)	-0.544 (0.000)	-0.379 (0.000)
PE			0	-0.077 (1.000)	-0.257 (0.001)	-0.441 (0.000)	-0.277 (0.000)
SB				0	-0.180 (0.087)	-0.365 (0.000)	-0.200 (0.030)
FR					0	-0.185 (0.068)	-0.020 (1.000)
RE						0	0.165 (0.184)
PT							0

SE	Self
SV	Supervisors
PE	Peers
SB	Subordinates
FR	Friends
RE	Relative
PT	Partner

[3] Values represent the mean difference in ratings between each pair of sources ($\Delta\mu_{i,j} = \mu_i - \mu_j$, where i stands for the raters in rows and j for those in columns). Values in brackets are the p-value

These results show personal ratings have a greater leniency bias than professional ratings, i.e., their assessment of the targets' competencies is generally higher than professional sources. In particular, relatives provide higher mean scores than any other source. In fact, they provide statistically different ratings from co-workers in all competencies except for emotional self-control, in which relatives' ratings did not significantly differ from subordinates'. Among the external raters, the largest differences occur between relatives and supervisors. The second largest difference is found between relatives and work-peers and third largest between relatives and subordinates. Regarding partners, this personal source differed from all co-worker groups in 9 competencies (inspirational leadership, achievement orientation, organizational awareness, teamwork, positive outlook, influence and cognitive). Partners' ratings differ from supervisors' and work-peers', but not from subordinates', in adaptability and conflict management. Partners' ratings only differ from co-worker ratings in emotional self-awareness, empathy, and emotional self-control. As in the case of relatives, the largest differences occur with supervisors followed by work-peers. Finally, friends are the personal source that offers the most similar ratings to co-workers. Friends only differ with the three groups of co-workers in four competencies: emotional self-awareness, achievement orientation, organizational awareness, and change management.

When we examine the mean differences within the sources of the same context - personal or workplace – we observe that they tend not to significantly differ in their ratings. Therefore, hypotheses 2 was not supported. Friends, relatives, and couples provide similar ratings in emotional self-awareness, emotional self-control, and pattern recognition. Whereas friends-partners and partners-relatives pairs tend to

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associated to each mean difference. The mean difference is significant at the 0.05 confidence level. Adjustment for multiple comparisons is according to Bonferroni criterion.

agree in their ratings, friends-relatives differ significantly. Co-workers also tend to provide similar ratings in most of the competencies. Mean differences among supervisors-peers, supervisors-subordinates, and peers-subordinates did not significantly differ in 10 out 13 competencies (emotional self-awareness, empathy, achievement orientation, teamwork, conflict management, coach and mentor, positive outlook, influence and cognitive). In the case of inspirational leadership and organizational awareness supervisors rate targets significantly lower than work-peers and subordinates, whose ratings did not differ among each other. Similar patterns occurred with adaptability and emotional self-control, in which cases supervisors-peers and peers-subordinates strongly coincide in their ratings, but the mean difference between supervisors and subordinates is not significant.

Lastly, to inspect whether the competencies assessment by either self or the external raters are susceptible to variation by target's gender, we compute the differences in mean ratings (female-male) for each competency and rater type. Figure 2.2 shows the competency rating mean differences between females and males by rater type.

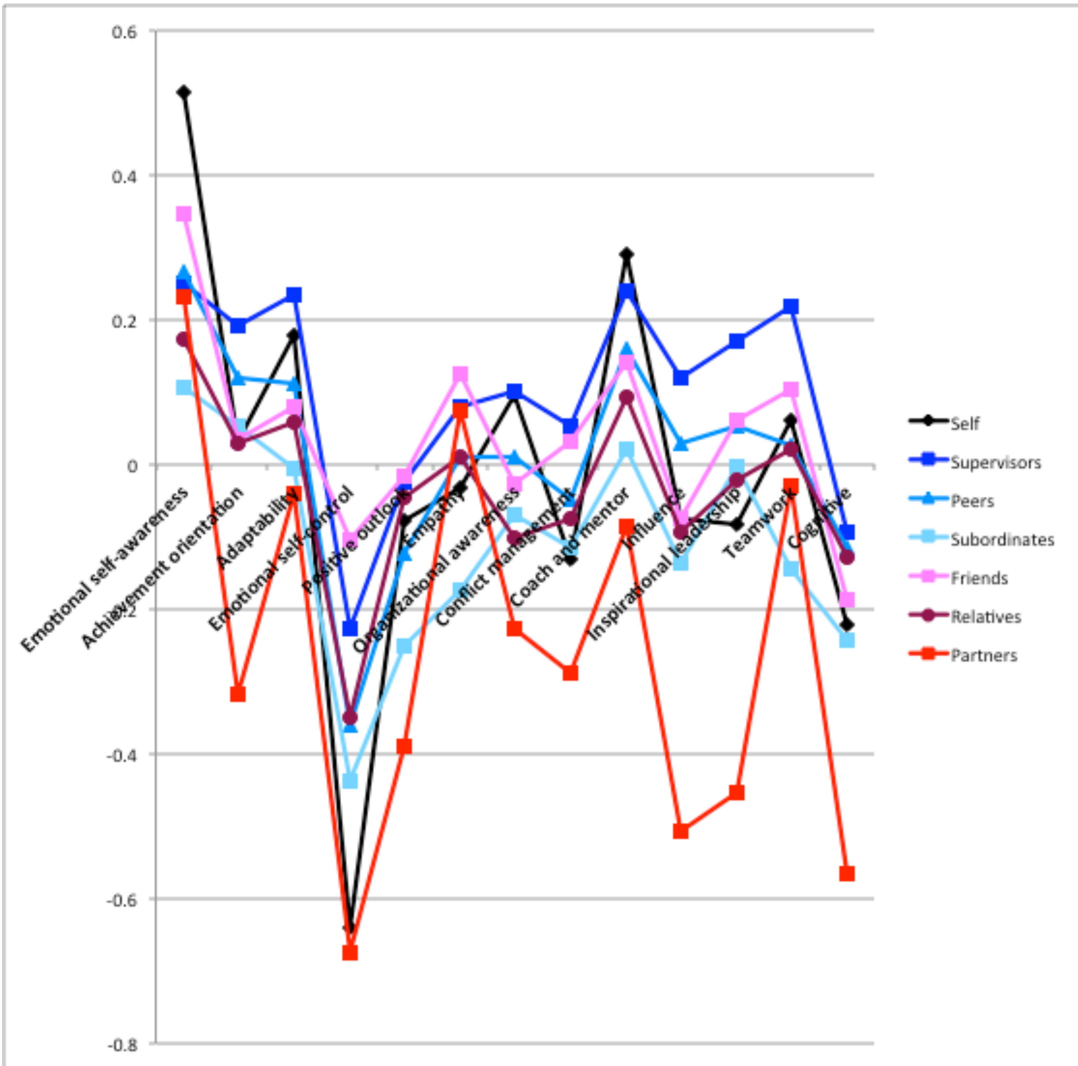

Figure 2.2 | Gender mean differences (female-male) in competency ratings by rater type

Emotional self-awareness stands out as the single competency in which all raters without exception, score women higher than men, on average. Other competencies in which women are perceived as ahead of men, notably by all raters but, to our surprise, their own partner(s), are achievement orientation, adaptability and coach and mentor.

Indeed, the most remarkable and yet disturbing result is the gender discrimination by none less than the target's partner(s). Across all competencies, partners report, on average, the lowest ratings of women's competencies as compared to men's. Overall, four competencies in which partners rate women considerably lower than men, especially when compared to other raters, are achievement orientation, conflict management, inspirational leadership and, perhaps the most shattering, cognitive competencies. In fact, all rater types without exception score cognitive competencies lower in women than in men, although the greatest discrimination is provided by the person's partner(s) no less.

Perhaps, the most reliable findings in Figure 2.2 can be read from supervisors', whom, as noticed before, are the most conservative rater type among all the external observers. Supervisors are the rater source that most distinctively perceives women ahead of men, notably in such competencies as achievement orientation, adaptability, organizational awareness, conflict management, coach and mentor, influence, inspirational leadership and teamwork. Among these, women stand out the most in adaptability, coach and mentor and teamwork (all rated above 0.2 points over men, on average). In contrast, the one competency in which women are rated significantly below men by all raters, self included, is emotional self-control.

2.5 Discussion

Our results show evidence in support of three out of the four hypotheses developed in this study. First, our data shows self-assessments were the lowest in all competencies as compared to any of the external raters, in support of Hypothesis 1. Indeed, when competency assessments have no administrative or promotional purpose, individuals tend to let their guards down, and rather than respond socially desirable answers by self-inflating their competency ratings, they tend serve their best interest to truly pursue a personal development agenda. In so doing, they are more honest in their self-evaluations. When this happens, a well-know truth about human nature is revealed: we tend to be our own worst critic, and have a tendency to underestimate our capabilities, as compared to others assessments. Hypothesis 2 however does not gather much support in our data, on the contrary, our data shows that personal rater types have higher interrater agreement in their assessment of most competencies than professional sources. Regarding the third hypothesis, sources from the same domain – personal or professional – do not significantly differ in their evaluations of targets. This may suggest that individuals tend to be more authentic around their personal connections, whereas they may display multiple or possible selves (Ibarra, 1999, Markus and Nurius, 1986; Roberts and Donahue, 1994), thus adding varying shades to their way of being when surrounded by different co-workers. This finding also indicates that it is reasonable to further aggregate the raters into personal and professional sources, as it is done in previous work (Boyatzis et al., 2015; Chapter 3 in this thesis). Yet, personal sources almost always provide higher ratings than professional sources confirming the presence of leniency bias. Finally, we also find enough evidence to support Hypothesis 4, whereby rating sources follow a systematic pattern from lowest to highest ratings as follows: self < supervisors < peers < subordinates < friends < partners < relatives.

Regarding the second hypothesis, results showed that personal rater types had higher interrater agreement than professional raters. While it is reasonable that all sources have enough opportunities to observe targets in situations that elicit competency-relevant behavior for achievement orientation, positive outlook and adaptability, it is revealing that personal sources, particularly partners, were well prepared to assess organizational awareness with the highest level of agreement. As for emotional self-awareness, it appears to be the least obvious competency to assess, perhaps because it does not manifest as visibly in behavior with others, than other competencies. According to Wohlers and London's (1989), self-awareness is among the most difficult competencies for others to rate. Even individuals often have difficulty assessing their own emotional self-awareness.

As to the third hypothesis, our results are consistent with earlier research, which finds evidence that rating source differences within the same context (i.e., home or workplace) are more significant than individual rater differences (Viswesvaran et al., 2002; Lebreton et al., 2003; Mount et al., 1998). However, our findings contrast with prior studies that finds low correlations between the ratings of supervisors, work-peers, and subordinates (e.g., Conway and Huffcutt, 1997 meta-analysis). LeBreton et al. (2003) call into question the extent and magnitude of discrepancies between different co-worker sources reported in previous research. These authors sustain that the low correlations between rating sources usually reported by previous research are due to the attenuation caused by restriction of variance in ratings. In our data, scores were restricted approximately to two points of the 11-points Likert scales, likely masking some rating underlying differences between sources within the same domain.

Hypothesis 4 was supported. Personal sources evaluated targets significantly higher than professional sources on almost all the competencies. Regardless of the results of the multiple significant tests, we found a systematic order in the ratings from different sources on half of the evaluated competencies, and slight variations of the same order in the other half. Taken together, these results indicate that personal sources might tend to provide more inflated scores than professional sources. . In other words, leniency bias (Saal, Downey, & Lahey, 1980) might affect personal sources more than professional sources. Previous research has found several contextual factors that usually influence rating leniency. Jawahar and Williams (1997) found that when raters are informed of the developmental purpose of evaluations - as opposed to administrative purpose – raters provide less lenient ratings. Also, raters accountable for their ratings tend to provide more accurate ratings (Mero & Motowidlo, 1995). Yet, in this study we treated all rating sources equally, providing them with the same instructions and guarantying them total confidentiality, therefore, other factors may explain rating leniency differences.

Interpersonal affect accounts for significant variance in performance appraisal ratings (Conway, 1998). Raters' positive affect toward a target is positively related to performance ratings leniency (Tsui & Barry, 1986). Given that couple and friends are usually chosen relationships, we can assume that raters from these sources are more likely than co-workers to maintain a positive affective relationship with the target. Also, rater's motivation influences rating accuracy (Harris, 1994; Salvemini et al., 1993) because the process of assessing target' performance requires raters to invest some effort. In some instances, raters even take risks because unfavorable ratings might damage interpersonal relationships or lead to resentment (Tziner et al. 2005). We argue that co-workers might be more motivated to help targets improve their leadership competencies at the workplace, as co-workers may also benefit more than personal sources from improvements. Consequently, it is not surprising that in our study personal sources were more affected by leniency bias, arriving to higher ratings than co-worker groups.

Furthermore, the inclusion of personal sources has the potential for increasing managers' acceptance of feedback. As Kaplan (1993, p. 21) claims: "the principal value of data on personal life…is to counter denial. It is much harder to question the validity of a characteristic reported by co-workers if the same characteristic is quite independently reported by members of one's family". Also, as feedback from co-workers is partially a reflection of the particular target, but also it is a function of the rater's perception of the professional role (Biddle, 1979), incorporating the opinion of personal sources may help to distinguish the two effects.

2.6 Conclusions

The central premise underlying multisource assessment – or 360-degree feedback - is that focal individuals profit more when feedback is provided from multiple perspectives. In the context of leadership assessment, 360-degree feedback programs have traditionally incorporated just the perspective of sources from the managers' professional domain – usually supervisors, work- We have to think a bit of which is the contribution of peers, and subordinates –omitting the perspective of manager's personal life sources. Different rating sources often provide different, yet equally valid perspectives of a manager's performance because of differences in: performance information available to raters, criteria used to assess performance, and source-specific rating bias. Although personal sources have fewer opportunities than co-workers to observe managers' behaviors at work, differences in situation's competence-relevance may compensate for lower frequency of observation. Consequently, personal sources may have enough legitimacy to evaluate manager's leadership-related competencies (Boyatzis, 2009).

In this study, we investigated the worthiness of including personal sources on 360-degree leadership assessments. By performing a comparative analysis between seven rating sources – self, supervisors, peers, subordinates, friends, relatives, and partners – we find that personal sources are adequately suited to evaluate leadership-related competencies, especially those competencies that are not as easy to observe in a formal professional environment as compared to a personal one, such as organizational awareness, inspirational leadership and teamwork. In contrast to what we expected, we did not find statistically significant differences among the ratings provided by supervisors, work-peers, and subordinates. However, personal sources and professional sources significantly differ in their ratings. Personal sources provided higher ratings than professional sources in almost all competencies. We attributed these differences to the fact that positive affect between rater and target makes personal sources more vulnerable to leniency bias. Finally, we conclude our discussion claiming that the inclusion of personal sources may have other benefits beyond the level of true discrepancy, such as increasing managers' acceptance of co-workers' feedback or helping to distinguish how much of co-workers feedback is the reflection of the particular target and how much it is a function of the professional role.

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Appendix of Chapter 2

Table 2.6 | Average variance extracted (AVE; i.e., average communality) per competency (*n*=555)

Constructs	AVE						
	Self	Professional			Personal		
		SV	PE	SB	FR	RE	PT
[ESA] Emotional self-awareness	0.457	0.530	0.569	0.526	0.494	0.562	0.518
[AO] Achievement orientation	0.390	0.564	0.558	0.634	0.472	0.488	0.405
[A] Adaptability	0.357	0.552	0.559	0.585	0.466	0.542	0.412
[ESC] Emotional self-control	0.560	0.702	0.728	0.718	0.641	0.653	0.627
[PO] Positive outlook	0.528	0.567	0.608	0.630	0.540	0.593	0.575
[E] Empathy	0.433	0.662	0.676	0.698	0.658	0.654	0.590
[OA] Organizational awareness	0.458	0.582	0.595	0.594	0.515	0.486	0.441
[CFM] Conflict management	0.321	0.533	0.574	0.605	0.467	0.520	0.439
[CM] Coach and mentor	0.518	0.666	0.681	0.701	0.626	0.625	0.532
[I] Influence	0.379	0.576	0.590	0.585	0.496	0.445	0.458
[IL] Inspirational leadership	0.515	0.718	0.716	0.752	0.644	0.644	0.606
[T] Teamwork	0.585	0.781	0.798	0.792	0.703	0.762	0.645
[C] Cognitive	0.420	0.561	0.567	0.599	0.501	0.533	0.481

Table 2.7 | Correlation matrix of competencies as scored by self-evaluations (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.326											
[A] Adaptability	.397	.508										
[ESC] Emotional self-control	.150	.257	.374									
[PO] Positive outlook	.297	.451	.391	.359								
[E] Empathy	.423	.283	.482	.426	.368							
[OA] Organizational awareness	.412	.373	.507	.362	.326	.479						
[CFM] Conflict management	.377	.402	.485	.410	.419	.566	.457					
[CM] Coach and mentor	.488	.404	.462	.232	.313	.512	.503	.520				
[I] Influence	.401	.431	.514	.271	.340	.431	.648	.569	.502			
[IL] Inspirational leadership	.409	.531	.510	.379	.513	.391	.549	.532	.583	.601		
[T] Teamwork	.300	.352	.498	.349	.346	.562	.484	.534	.589	.456	.517	
[C] Cognitive	.357	.500	.502	.285	.300	.320	.457	.411	.396	.494	.462	.267

Table 2.8 | Correlation matrix of competencies as scored by supervisors (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.486											
[A] Adaptability	.542	.773										
[ESC] Emotional self-control	.414	.478	.588									
[PO] Positive outlook	.501	.611	.624	.600								
[E] Empathy	.624	.539	.672	.687	.607							
[OA] Organizational awareness	.574	.624	.741	.574	.587	.767						
[CFM] Conflict management	.637	.642	.707	.665	.644	.789	.751					
[CM] Coach and mentor	.649	.613	.613	.509	.567	.719	.718	.747				
[I] Influence	.658	.662	.738	.493	.586	.672	.740	.783	.735			
[IL] Inspirational leadership	.606	.703	.715	.522	.642	.645	.708	.754	.824	.830		
[T] Teamwork	.568	.590	.666	.619	.617	.796	.750	.782	.812	.706	.752	
[C] Cognitive	.564	.679	.724	.496	.511	.529	.639	.598	.553	.679	.670	.508

Table 2.9 | Correlation matrix of competencies as scored by peers (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.492											
[A] Adaptability	.562	.749										
[ESC] Emotional self-control	.392	.438	.634									
[PO] Positive outlook	.469	.629	.681	.561								
[E] Empathy	.708	.566	.751	.720	.614							
[OA] Organizational awareness	.583	.632	.767	.597	.566	.735						
[CFM] Conflict management	.647	.609	.759	.647	.617	.811	.711					
[CM] Coach and mentor	.713	.633	.699	.571	.554	.830	.718	.782				
[I] Influence	.641	.587	.725	.553	.558	.723	.718	.759	.710			
[IL] Inspirational leadership	.631	.707	.755	.577	.659	.735	.747	.785	.809	.794		
[T] Teamwork	.619	.610	.744	.658	.621	.841	.748	.814	.865	.669	.810	
[C] Cognitive	.562	.668	.720	.517	.526	.616	.672	.615	.636	.704	.678	.578

Table 2.10 | Correlation matrix of competencies as scored by subordinates (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.505											
[A] Adaptability	.616	.809										
[ESC] Emotional self-control	.432	.463	.593									
[PO] Positive outlook	.570	.640	.689	.603								
[E] Empathy	.685	.628	.751	.706	.659							
[OA] Organizational awareness	.623	.686	.819	.588	.639	.754						
[CFM] Conflict management	.694	.742	.784	.606	.666	.806	.741					
[CM] Coach and mentor	.727	.736	.747	.541	.645	.816	.700	.820				
[I] Influence	.668	.680	.734	.427	.580	.671	.711	.778	.760			
[IL] Inspirational leadership	.653	.790	.787	.534	.681	.740	.739	.828	.841	.810		
[T] Teamwork	.604	.742	.782	.636	.647	.824	.736	.805	.843	.707	.815	
[C] Cognitive	.651	.728	.787	.496	.651	.660	.727	.722	.714	.771	.747	.667

Table 2.11 | Correlation matrix of competencies as scored by friends (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.470											
[A] Adaptability	.539	.722										
[ESC] Emotional self-control	.360	.500	.554									
[PO] Positive outlook	.496	.547	.599	.448								
[E] Empathy	.612	.526	.713	.585	.522							
[OA] Organizational awareness	.477	.594	.753	.476	.500	.674						
[CFM] Conflict management	.672	.610	.698	.609	.579	.741	.607					
[CM] Coach and mentor	.630	.610	.675	.514	.593	.779	.595	.757				
[I] Influence	.472	.508	.578	.351	.482	.464	.509	.577	.563			
[IL] Inspirational leadership	.576	.626	.674	.527	.608	.593	.553	.733	.726	.682		
[T] Teamwork	.554	.598	.701	.570	.555	.764	.663	.752	.794	.518	.703	
[C] Cognitive	.515	.584	.639	.479	.402	.519	.606	.574	.523	.593	.599	.512

Table 2.12 | Correlation matrix of competencies as scored by relatives (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.482											
[A] Adaptability	.610	.704										
[ESC] Emotional self-control	.482	.537	.637									
[PO] Positive outlook	.526	.574	.660	.558								
[E] Empathy	.706	.548	.705	.689	.521							
[OA] Organizational awareness	.543	.622	.719	.550	.545	.631						
[CFM] Conflict management	.670	.592	.722	.693	.571	.797	.604					
[CM] Coach and mentor	.667	.619	.668	.570	.512	.775	.578	.760				
[I] Influence	.505	.489	.600	.446	.528	.488	.578	.585	.503			
[IL] Inspirational leadership	.621	.664	.742	.598	.657	.662	.670	.726	.741	.680		
[T] Teamwork	.615	.610	.704	.598	.506	.774	.622	.749	.791	.492	.751	
[C] Cognitive	.572	.606	.719	.580	.532	.615	.669	.671	.616	.633	.697	.504

Table 2.13 | Correlation matrix of competencies as scored by partners (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.364											
[A] Adaptability	.502	.585										
[ESC] Emotional self-control	.306	.459	.503									
[PO] Positive outlook	.354	.465	.528	.467								
[E] Empathy	.610	.444	.617	.534	.461							
[OA] Organizational awareness	.450	.455	.634	.377	.391	.580						
[CFM] Conflict management	.541	.570	.666	.536	.528	.669	.567					
[CM] Coach and mentor	.530	.452	.557	.442	.499	.708	.549	.657				
[I] Influence	.401	.387	.469	.312	.362	.421	.532	.515	.473			
[IL] Inspirational leadership	.382	.563	.617	.462	.534	.512	.579	.632	.622	.627		
[T] Teamwork	.450	.527	.607	.453	.501	.637	.620	.662	.700	.439	.662	
[C] Cognitive	.473	.529	.600	.430	.409	.506	.586	.632	.502	.585	.550	.455

Chapter 3 | EI Competencies as a related but different characteristic than intelligence

ABSTRACT

Amid the swarm of debate about emotional intelligence (EI) among academics are claims that cognitive intelligence, or general mental ability (*g*), is a stronger predictor of life and work outcomes as well as the counter claims that EI is their strongest predictor. Nested within the tempest in a teapot are scientific questions as to what the relationship is between *g* and EI. Using a behavioral approach to EI, we examined the relationship of a parametric measure of *g* as the person's GMAT scores and collected observations from others who live and work with the person as to the frequency of his or her EI behavior, as well as the person's self-assessment. The results show that EI, as seen by others, is slightly related to *g*, especially for males with assessment from professional relations. Further, we found that cognitive competencies are more strongly related to GMAT than EI competencies. For observations from personal relationships or self-assessment, there is no relationship between EI and GMAT. Observations from professional relations reveal a positive relationship between cognitive competencies and GMAT and EI and GMAT for males, but a negative relationship between EI and GMAT for females.

Keywords:

Emotional intelligence, competency, cognitive competency, cognitive ability, emotional intelligence competency, social intelligence

3.1 Introduction

General cognitive ability (*g*) has been consistently shown to predict job performance in many studies and meta-analyses over the decades (Nisbett et al., 2012). But in the last 10–15 years, emotional intelligence (EI) has also been shown to predict job performance in an increasing number of studies (Fernández-Berrocal and Extremera, 2006; Joseph and Newman, 2010; O'Boyle et al., 2011; Joseph et al., 2014). A debate has emerged as to whether these two individual characteristics are the same, different, or complimentary. A meta-analysis of published papers as of 2009 claimed that *g* showed more predictive ability of job performance than EI (Joseph and Newman, 2010), although both were significant. In some recent studies EI has been shown to have greater predictive ability than *g* (Côté and Miners, 2006; Boyatzis et al., 2012). This study is an attempt to examine the relationship between a behavioral approach to EI and *g* and help create a more comprehensive perspective on these characteristics and the implications for future research.

A major criticism of the EI concept was found in Matthews et al. (2002), but they confused theoretical distinctions and measurement issues. More recently, Webb et al. (2013) said, "Although there is general agreement that the ultimate relevance of EI lies in its ability to predict important life outcomes (e.g., quality of interpersonal relationships, academic or occupational success), debate persists in how best to operationalize…and measure EI…" (p. 154). The debate is confusing at times because EI itself has been conceptualized and measured in various ways.

In some approaches, EI is viewed as the ability to be aware of and manage one's emotions and those of others which have been called stream 1 and stream 2 measures (Ashkanasy and Daus, 2005; O'Boyle et al., 2011). For example, Mayer et al. (1999) see their concept of ability EI as a formal type of intelligence specialized in the field of emotions and thus related to *g*. Initially, while they had no intention to relate EI to job and life outcomes, later studies have shown ability EI to associate with performance but not as strongly as other approaches (O'Boyle et al., 2011; Miao et al., unpublished). Another perspective sees EI as a set of self-perceptions, which are different from but related to personality traits (Bar-On, 1997) more than *g*. Although this approach along with some measures known as Trait EI (Petrides and Furnham, 2001) have been shown to predict job performance (O'Boyle et al., 2011), they also show a consistently strong relationship to personality traits (Webb et al., 2013). Regardless, it has been filed under the uninformative label of "mixed models" (Mayer et al., 1999).

Another way to understand EI involves observing behavioral manifestations of EI, in terms of how a person acts, as seen by others (Boyatzis, 2009; Cherniss, 2010; Cherniss and Boyatzis, 2013). Known as behavioral EI, it offers a closer link to job and life outcomes. Notably, it has been shown to predict job performance above and beyond *g* and personality (Boyatzis and Goleman, 2007). Nonetheless, this approach has been clustered incorrectly with self-perception approaches and filed under the same label of mixed models (Mayer et al., 1999), also called stream 3 (Ashkanasy and Daus, 2005; O'Boyle et al., 2011).

Although many issues emerging from these varied studies and meta-analyses call for further research, in this paper, we focus on examining the relationship between behavioral EI and *g*, and assessing the potential moderator effects of gender and type of observer or rater.

3.2 Behavioral EI

Because all of the papers in this special issue of Frontiers in Psychology are devoted to EI and *g*, we will forego an in-depth review of the literature on EI, and instead focus directly on behavioral EI. As mentioned above, EI competencies can be viewed as the behavioral level of EI (Boyatzis, 2009; Cherniss, 2010; Cherniss and Boyatzis, 2013). Competencies have been derived inductively from studies of human performance in many occupations and in many countries (Boyatzis, 2009). Because the identification of a competency and its refinement emerges from performance based criterion sampling, they are expected to be closely related to job and life outcomes. As a result, the EI competencies were discovered and measured as behaviors which were later clustered around intent and became each competency (Boyatzis, 2009).

In Boyatzis and Goleman (2007), EI includes two factors, EI and social intelligence (SI) competencies. EI includes competencies called emotional self-awareness, emotional self control, adaptability, achievement orientation, and positive outlook. In their model, SI includes: empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. For this paper, we are treating EI and SI competencies as a single construct of EI. When universities wish to use this EI model for student development and/or outcome assessment, two cognitive competencies which have a history of predicting effective leadership, management and professional performance are added. They are: systems thinking and pattern recognition (Boyatzis, 2009).

Behavioral EI as seen and measured through others' assessment (as compared to self-assessment) shows a consistent prediction or relationship to job and life outcomes (Boyatzis, 1982, 2006; McClelland, 1998; Nel, 2001; Cavallo and Brienza, 2002; Dulewicz et al., 2003; Law et al., 2004; Sy et al., 2006; Dreyfus, 2008; Hopkins and Bilimoria, 2008; Koman and Wolff, 2008; Williams, 2008; Boyatzis and Ratti, 2009; Ramo et al., 2009; Ryan et al., 2009, 2012; Young and Dulewicz, 2009; Boyatzis et al., 2011, 2012; Aliaga Araujo and Taylor, 2012; Gutierrez et al., 2012; Sharma, 2012; Amdurer et al., 2013; Victoroff and Boyatzis, 2013; Mahon et al., 2014; Badri, unpublished). Boyatzis et al. (2012) showed behavioral EI predicted job performance with significant unique variance, controlling for *g* and personality.

According to the dominant classification in Ashkanasy and Daus (2005), there are three different streams of EI research. Salovey and Mayer's Ability EI as measured by the MSCEIT is stream 1. Although it has shown relationships with school (Brackett et al., 2004), job and life outcomes (Mayer et al., 2008), these were not of primary consideration in its development (Mayer et al., 1999). Whereas ability EI shows no relationship to personality measures, it has shown consistent prediction of *g*, even when controlling for personality (Webb et al., 2013).

Self-perceptions and peer-report measures based on the Ability EI model are clustered within stream 2 (Ashkanasy and Daus, 2005). These measures such as the Trait EI Questionnaire (TEIQue; Petrides and Furnham, 2000, 2001), show similar validity patterns to the MSCEIT but are not as strongly related to *g*, nor job and life outcomes, yet they do show a significant relationship to personality (Webb et al., 2013).

Meanwhile, stream 3 (Ashkanasy and Daus, 2005) clusters both those EI measures based on self-perception and others' behavioral assessments (i.e., 360°, coded behavior from audiotape or videotape work samples or simulations). Consequently, there is a partition in results within this stream: some measures such as the ESCI (Boyatzis and Goleman, 2007) show a strong relationship and unique variance to life and job outcomes beyond *g* and personality (Byrne et al., 2007; Downey et al., 2011), while others such as the EQ-i (Bar-On, 1997) show a consistent relationship in predicting personality (Joseph and Newman, 2010; O'Boyle et al., 2011). We therefore, claim that clustering self-perception and coded or other perception measures confuses these relationships.

Instead, we support Fernández-Berrocal and Extremera's (2006, p. 8) comprehensive view of the EI field by which all "approaches try to discover the emotional components that underlie *emotionally intelligent* people and the mechanisms and processes that set off the use of these abilities in our everyday life" (emphasis added). In the authors' review of the first 15 years of EI research, behavioral EI as seen by others in 360° assessments is considered separately from self-perception approaches focused on moods and internal states, as well as personality traits such as Bar-On's (1997, 2007; Fernández-Berrocal and Extremera, 2006). Therefore, Boyatzis (2009) extends the work of Fernández-Berrocal and Extremera (2006) to propose an organization of the literature that is framed by the three existing methodological themes: EI ability methods; EI self-perception methods; and EI behavior methods.

In sum, the relationships of EI assessed at any level or with any method are still debated with comparative arguments about its link to *g* and personality. In this paper, we will focus on the relationship between behavioral EI and a measure of *g*.

3.3 General cognitive ability (*g*) and intelligence

According to Carroll's (1993) model of intelligence, the various mental abilities are structured hierarchically. General cognitive ability, located at its apex, is "the general efficacy of intellectual processes" (Ackerman et al., 2005, p. 32). Also known as general mental ability, general intelligence, or simply *g*, it is a well-researched construct with a large body of evidence supporting its predictive validity for such important outcomes as job performance and career success (e.g., O'Reilly III and Chatman, 1994; Schmidt and Hunter, 1998; Ferris et al., 2001). As a global ability, *g* can be thought of as the underlying common factor to all types of cognitive processing (i.e., verbal, mathematical, spatial, logical, musical, and emotional). From this perspective, *g* cannot be observed nor measured directly, it must be inferred from the positive correlations among distinct ability measures (Spearman, 1904; Jensen, 1998). As such, *g* subsumes different sets of abilities, each corresponding to a specialization of general intelligence.

General cognitive ability can be assessed through a variety of measures, such as IQ tests (Jensen, 1992; i.e., Ravens Progressive Matrices, Wechsler, Stanford Binet; Nisbett et al., 2012). Similarly, standardized admissions tests have been shown to “fit the general requisites of a measure of general cognitive ability” (O’Reilly III and Chatman, 1994). They also measure verbal and mathematical or quantitative reasoning skills separately. These tests such as the SAT, GRE, GMAT, MCAT, LSAT, and DAT are usually found to have strong correlations with the more direct measures of *g*, (Detterman and Daniel, 1989).

The GMAT is a standardized test that assesses a person’s analytical, writing, quantitative, verbal and reading skills for admission into graduate management programs worldwide. Although the GMAT is not formally validated as a measure of general cognitive ability, it is strongly correlated with the Scholastic Aptitude Test (SAT; e.g., Gottesman and Morey, 2006), which is shown to be a valid measure of *g* (Frey and Detterman, 2004). Considering the structural similarity of these tests (both consist of multiple choice questions that measure verbal and quantitative skills) and the general consensus that the *g*-factor can be measured by obtaining factorial scores across tests of different specific aptitudes, usually verbal and quantitative (O’Reilly III and Chatman, 1994), Hedlund et al. (2006, p. 102) concluded that “like the SAT, the GMAT can be characterized as a traditional measure of intelligence, or a test of general cognitive ability (*g*).” Indeed numerous studies have already used the GMAT as a measure of *g* (e.g., O’Reilly III and Chatman, 1994; Kumari and Corr, 1996; Mueller and Curhan, 2006), the latest of which is a study published in *Intelligence* (Piffer et al., 2014).

We suggest that the EI competencies may show a small, if any relationship to *g*. In fact, correlations between behavioral EI competencies coded from audiotapes of critical incident interviews about work samples and GMAT were not significant ($r = -0.015$, $n = 200$, p = ns; Boyatzis et al., 2002). In assessing predictors of sales leadership effectiveness in the financial services industry, Boyatzis et al. (2012) reported that EI as assessed by others showed a non-significant correlation with Ravens Progressive Matrices ($r = 0.04$, $n = 60$, p = ns).

In the inductive competency studies, two cognitive competencies repeatedly appeared to differentiate effective performance of managers, executives and professionals (Boyatzis, 1982, 2009; Spencer and Spencer, 1993). They were systems thinking and pattern recognition. The former is defined as seeing phenomenon as a series of causal relationships affecting each other. The latter is defined as perceiving themes or patterns in seemingly random information. As competencies, they are assessed both with a self-assessment and with observations of others as to how often a person demonstrates these behaviors. They are not defined or assessed as an intelligence measure but an indication of how often a person appears to be using these thought processes. As such, we expect them to be related to *g* more than EI competencies even though they are not a measure of *g*.

This leads us to the first two hypotheses for this study:

Hypothesis 1: EI competencies will have a slight relationship to g. Hypothesis 2: Cognitive competencies will be more related to g than EI competencies.

3.4 Self and multi-rater assessments

Differences in raters or sources of assessment are likely to play an important role in the findings. Self-perception and multi-rater assessment are different approaches to perceiving and collecting observations of a person's behavior (Luthans et al., 1988; Church, 1997; Furnham and Stringfield, 1998; Antonioni and Park, 2001; Taylor and Hood, 2010).

Self-assessment measures generally address how individuals respond to questions pertaining to their own emotions, perceptions or thoughts. These measures are easier and faster to administer than others, allowing for low costs of administration (Saris and Gallhofer, 2007). Social desirability is often an issue in self-reported measures (Paulhus and Reid, 1991). That is, respondents may base their answers on a desired state that often leads to inflated views of themselves. The validity of these measures can be improved by including questions that help control for social desirability (e.g., Paulhus and Reid, 1991; Steenkamp et al., 2010).

Used as a stand-alone measure, self-assessment of personality traits, attitudes or behavioral tendencies show acceptable validity (e.g., Furnham et al., 1999; Petrides and Furnham, 2000; Furnham, 2001; Petrides et al., 2006; Bar-On, 2007). Similarly, self-assessed measures of EI show acceptable validity (Bar-On, 1997; Petrides and Furnham, 2000, 2001). However, with regard to EI, self-assessments are also used in combination with others' ratings. Notably, the difference between self and others' perceptions is known as the self-other agreement. This difference is a highly reliable measure of self-awareness (Yammarino and Atwater, 1997).

Multi-rater or multi-source assessments involve different raters from work such as a person's peers, collaborators, subordinates or bosses, and possibly raters from one's personal environment. Raters provide observations of a person's behavior (i.e., what they have *seen* the person do). Research on social cognition reveals that people give more weight to their own thoughts and feelings than to their behavior when forming self-perceptions, but this effect is reversed when forming perceptions of others (Vazire, 2010). Different types of raters may offer unique information about the person being assessed (Borman, 1997). People may behave differently depending on the situation (e.g., at home vs. work; Lawler, 1967).

Other behavioral assessments such as coding from audio or videotapes of critical incidents or simulations may be considered "pure" behavioral measures, but even these measures require people to code them. In the coding, observers are engaged in subjective perceptions and labeling. In such qualitative research, the scholars increase confidence in the data reported by assessing inter-rater reliability. In 360° assessments, greater confidence in the data is developed from a consensual perception of multiple raters. In EI studies, both types of measures attempt to assess how a person has been acting as seen by others (i.e., a behavioral approach to measurement of EI).

A number of studies show that there are differences among bosses', peers' and subordinates' views, and sometimes even others like consultants, customers or clients. Atkins and Wood (2002) claimed specific types of raters were best positioned to observe and evaluate certain types of competencies depending on the personal and working relationships they had with the person being evaluated. For example, subordinates were found to be the best evaluators of competencies such as coaching and developing people, when compared to bosses or peers (Luthans et al., 1988). Similarly Gralewski and Karwowski (2013) showed how, even though teachers are often accurate at assessing the intelligence and academic achievement of their students (Südkamp et al., 2012), they lack the ability to assess less conventional skill areas, such as students' creativity. Different sources of raters might interpret the same observed behavior in different ways (Tsui and Ohlott, 1988). At the same time each rater source may have idiosyncratic tendencies leading to different observations and measurement error, like errors of leniency, central tendency, and range restriction (Saal et al., 1980). These are likely to be moderated by cultural assumptions (Ng et al., 2012). The research in assessing performance as well as skills and behavior with 360° assessments is summarized in Bracken et al. (2001). Social identity theory would contend that people find more legitimacy in assessing themselves with regard to those of higher status rather than merely more power (Taylor and Hood, 2010), suggesting that raters from work will be more potent than those from home.

Outside of family business, consulting or family therapy, the sources or raters that have been studied do not include family or friends (Bracken et al., 2001), with the exception of Rivera-Cruz (2004). She reported that female managers showed more EI competencies (as seen by others) at home versus work. In a desire to be comprehensive in assessments, data was collected in this study from a wide range of a person's relations – those from work and from their personal life (Boyatzis, 2009).

With regard to intelligence, it is expected that professional sources (i.e., sources from work) will have more of an opportunity to see and label behavior related to cognitive ability rather than those at home or in one's personal life.

This leads us to the third hypothesis for this study:

Hypothesis 3: Among personal, professional and self-assessment of a person's competencies, professional sources will show the strongest relationship of EI and cognitive competencies to g.

3.5 Gender differences

In self-assessment, an extensive body of literature validated by a recent meta-analysis showed strong evidence of male hubris and female humility: the tendency of males to have inflated views of their abilities, opposite to females' propensity to underestimate their worth (Furnham, 2001; Szymanowicz and Furnham, 2011). At the same time, there may be a gender bias in the type of *g* measures themselves as Furnham (2001) proposes that results may be based on the fact that most of these measures are "male normative". That is, they include specific tasks, such as spatial processing or mathematical reasoning at which males have been shown to do better than females.

As to others' ratings of EI competencies, stereotyping will likely affect peers perceptions of males versus females, even in the same setting (Taylor and Hood, 2010). Social identity theory, along with social comparison theory and self-categorization theory are expected to result in attributions made to females differently than those made to males even if their behavior was the same (Sturm et al., 2014). For example, Taylor and Hood (2010) reports that even though female MBAs appear to be more assertive and self-confident than other female samples, sexist bias in perception results in males being seen as more assertive and confident than females. However they did find that predicted ratings of others showed a gender difference: “women leaders believed that others would rate them lower than the actual ratings they received” (p. 542).

In light of these findings, we propose females may be subject to sexist discrimination in their multi-source assessments, particularly those from raters at work. This suggests there may be an interaction of both gender and rater in the relationship between EI and *g*.

This leads us to the fourth hypothesis for this study:

Hypothesis 4: Gender moderates the relationship of EI and cognitive competencies to g.

3.6 Materials and methods

Data were collected on 641 part-time and full-time MBA students from 23 countries, in a leading European business school, between 2006 and 2013. 30% were females, with an average age of 33 years for females and 34 years for males. As part of the MBA, the students took a required course called Leadership Assessment and Development which is based on the Intentional Change Theory (Boyatzis, 2008). In the course, students were asked to complete a self and multi-rater assessment of EI competencies. All data were collected under the informed consent an ethical guidelines of ESADE Business School.

3.6.1 Measures

3.6.1.1 Emotional Intelligence Competencies

We used the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis and Goleman, 2007), a 70-item survey instrument which measures 14 competencies of two types: cognitive and emotional. The first type is composed of two cognitive competencies: systems thinking and pattern recognition. The other, includes 12 EI competencies: emotional self-awareness, emotional self control, adaptability, achievement orientation, positive outlook, empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. Because the behavioral manifestations of these competencies are frequently observed in a variety of different situations they have been operationalized with as many as five indicators per competency. Psychometric properties of the test based on samples of 62,000 completions of the ESCI and 21,000 of the ESCI-U both reveals each scale shows model fit and satisfies criteria for discriminant and convergent validity (Boyatzis et al., 2014). A wide variety of validation studies on the test were reviewed earlier in this paper and in Wolff (2008).

Competencies can be considered to be the behavioral approach to emotional, social, and cognitive intelligence (Boyatzis, 2009). As such, the student is asked to solicit others from their work and life to complete the test about their behavior. The students had an average of 4.2 others complete the test for each of the 641 subjects in this analysis (standard deviation equals to 1.6). It is believed that multi-source assessment, such as 360°, provides protection against social desirability because of the distinct sources of responses.

Researchers have traditionally placed more emphasis on testing hypotheses on the relationships among constructs than on bridging the gap between abstract theoretical constructs and their measurements (i.e., epistemic relationships; Bagozzi, 1984). In our case, measurement error is particularly dangerous because it affects ESCI as a GMAT predictor leading to biased estimates of the structural effects (Frost and Thompson, 2000). Therefore, before estimating these effects, we examined the ESCI construct validity[4].

Since we suspected that the ESCI factorial structure provided by the personal and the professional raters could be different as a function of their different perspectives of the MBA students' behavior, we have modeled the data separately[5]. Two confirmatory factor analysis (CFA) models have shown that both sets of raters were consistent with the hypothesized 13-factor (i.e., the competencies) model[6].

For purposes of exploring our research question, we distinguished three types of sources, or assessments in this study. We used a classification provided by each respondent at the time of completing the test. The responses were grouped as either: self, personal, or professional. One is the assessment provided by the student about himself or herself. Another source was personal, such as a spouse/partner, friends, or family members. Professional sources were bosses, peers, subordinates or clients from work or classmates in the MBA program. There were a few cases in which personal or professional assessments were missing; these cases were dropped

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[4] We define validity as "the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests" (American Educational Research Association et al., 1999, p. 9).

[5] Since we didn't assume that Personal and Professional raters have the same perception and aggregate them under the usual "other" category of raters, we have tested their measurement or factorial equivalence (Meredith, 1993).

[6] Exploratory Factor Analysis (EFA, Promax rotation) has already shown that systems thinking and pattern recognition competencies correlate on both raters' perceptions above 0.94. The subsequent confirmatory factor analysis (CFA) did not reject the unidimensionality of the 5 + 5 items corresponding to the two competencies, that had ex-ante been assumed as distinct competencies. As a result, in this analysis, we used thirteen instead of the usual 14 factors underlying the ESCI model on this MBA population by having combined the two cognitive competencies into one scale.

resulting in a final sample of 624 individuals with personal and 611 with professional assessments available. All had self-assessment.

MBA participants and their raters were asked to indicate the frequency of the behavior on each item on an eleven point-scale ranging from (0) 'the behavior is never shown' to (10) 'the behavior is consistently shown.' This response set provides higher quality data on this predominantly European MBA population than the usual 5-point scale (Batista-Foguet et al., 2009). The final ESCI-U scores have been mean-centered to ease the interpretation of the parameters in the model. To compute the 360° assessments on the 70 items that constitute the ESCI-U survey, we first obtained for each item, its average score across all professional and personal raters separately, and then averaged across the five items per each competency. This way, our database consisted of 26,264 competency scores from 3 types of raters, on the 12 + 1 emotional, social, and cognitive competencies.

3.6.1.2 General cognitive ability (g)

We used the Graduate Management Admission Test (GMAT) as a measure of *g*. For this study we chose to collect our GMAT data from the GMAC, the entity that owns and administers the GMAT, and not through the Admissions Office at the University. We collected the students' GMAT scores from the first time they took the test. Using GMAT first time scores as compared to the scores with which students were admitted in the MBA program (usually obtained after repeatedly taking the test), enabled a wider range of variation in GMAT with higher dispersion and lower means. We, thus, attempted to minimize the issue of range restriction in GMAT (Oh et al., 2008) and the resulting attenuation bias in the model coefficients. In our sample, the GMAT mean is 602.4, which is a little higher than the overall GMAT for all test takers of 545. The sample's standard deviation of the GMAT is 79.3, almost two thirds of the reported GMAT deviation (at 121). Therefore, our sample contains individuals with slightly higher GMAT and less "heterogeneous" scores than the population of GMAT applicants.

The ESCI-U data are configured in two non-nested structures: (1) the rater groups, varying between self, personal or professional raters; and (2) the competencies category with 13 competencies divided into two types of competencies: cognitive and EI. The hierarchal structure of the data model is shown in Figure 3.1.

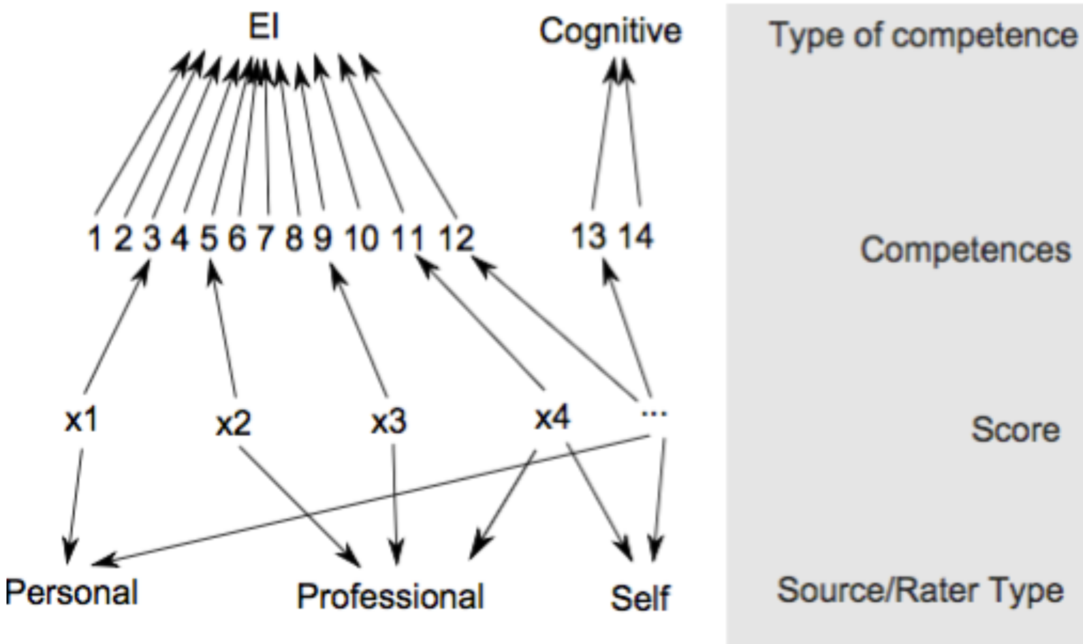

Figure 3.1 | Emotional and Social Competencies Inventory – University Edition (ESCI-U) data configuration. The ESCI-U data is framed within two non-nested structures: (1) the raters group, composed of self, personal and professional raters; and (2) the competencies category, withholding 14 competencies, which in turn are sub grouped into two types of competencies: Emotional and Cognitive.

The relationship between the ESCI-U and the GMAT scores might be affected by whether the ESCI-U scores on each competency are independent or not from the rater group. Therefore, treating each competency and group of raters as independent might mask important information. To adjust for this possibility, we allowed for a possible dependent relationship between the rater source and the competency category to be freely estimated in our model.

In order to be able to accommodate such a complex data structure and the relationships among the competencies (13 in two groups) and three types of raters, we need a specified model with sufficient flexibility to assign the proper systematic and stochastic variations. A multilevel/hierarchical model with non-nested structures in the first level (raters and competencies) and a nested structure in one of the components (competencies in two groups) is needed.

3.6.2 Bayesian model specification

We chose to analyze the data and test our hypotheses by specifying a Bayesian hierarchical model. The choice to work with a Bayesian model was due to two main factors: (1) the sample was an entire population in and by itself; and (2) it was not a random sample. These issues pose problems in many statistical analyses because traditional frequentist methods are based upon the assumption that the data are created by a repeatable stochastic mechanism. While mainstream statistics treat the observable data as random and the unknown parameters of the population are assumed fixed and unchanging, in the Bayesian view, it is the observed variables that are seen as fixed whereas the unknown parameters are assumed to vary randomly according to a probability distribution. Therefore, in Bayesian models, the parameters of the population are no longer treated as fixed and unchanging as a frequentist approach would assume[7].

In sum, the main advantages of the Bayesian approach are twofold: (1) it enables highly flexible model specifications (as the one needed to account for the hierarchical structure of our data); and (2) is more appropriate for settings where

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[7] Instead of a frequentist approach, in this approach a parameter is assigned a prior distribution (based on previous research in the field), which is then updated with the actual data by means of a specified likelihood function, so as to produce a posterior distribution of the parameter (Wagner and Gill, 2005). In fact, in our approach we are not entitled to use a *p*-value (as in frequentist statistics) as the probability of obtaining the observed sample results under the null hypothesis. As mentioned the data is not a sample of a larger population but it is a population.

the data is not a random sample, but the entire population. In addition, it offers a clear and intuitive way to present results. For example, it appears more intuitive by generating *probability* statements about the findings (for more readings on the advantages of Bayesian inference, check the introductory chapters of Gill, 2002; Gelman et al., 2003; Jackman, 2009).

To best accommodate the structure of our data, we used a multilevel or hierarchical model non–nested structure (by competency and rater group). Equation 1 below represents our model specification, which assumes a linear association between GMAT and ESCI-U scores.

$$
\begin{array}{rcl}
GMAT_{i,c,r} & \sim & N(\mu_i, \sigma) \\
\mu_i & = & \alpha_{c,r} + ESCI-U\theta_{c,r} + Female\beta_r + Female*ESCI-U\delta_{c,r} \\
\sigma & \sim & U(0,100) \\
\alpha_{c,r} & \sim & N(0,1000) \\
\theta_{c,r} & \sim & N(\Theta_{r,t}, \sigma_\theta) \\
\Theta_{r,t} & \sim & N(0,1000) \\
\sigma_\theta & \sim & U(0,10) \\
\beta_r & \sim & N(0, \sigma_\beta) \\
\sigma_\beta & \sim & U(0,100) \\
\delta_{c,r} & \sim & N(\Delta_{r,t}, \sigma_\delta) \\
\Delta_{r,t} & \sim & N(0,1000) \\
\sigma_\delta & \sim & U(0,10)
\end{array}
\tag{1}
$$

The *i* subscript refers to the individual, the *c* subscript refers to the competency and the *r* subscript refers to the rater group (self, personal or professional). The intercept, $\alpha_{c,r}$, varies by competency and rater group. The parameters that account for the ESCI-U effect, $\theta_{c,r}$, have a hyper-parameter, $\Delta_{r,t}$, that varies by rater group and by type of competency (i.e., cognitive or emotional)[8].

[8] Hyper-parameters provide a clear illustration of the Bayesian view on population parameters. That is, there are no static assumptions made about the mean of a parameter,

Additionally, the model includes gender as a source of variation, with coefficient β_r varying by group of raters. The moderator effect of gender on the association between ESCI-U and GMAT is also specified, an interaction that is parameterized as $\delta_{c,r}$ – varying by competency category and rater group, with hyper-prior specification that depends on the type of competency.

In total, there are six main parameters of interest to be estimated, which are compared regarding the type of competency (cognitive or emotional) and the rater group. Estimating a model like the one above is not possible using "canned" procedures from mainstream statistical packages. This confounds the other seemingly inappropriate assumptions from frequentist approaches based on maximum likelihood. One technical solution is to use Bayesian simulation techniques, which allow for highly flexible model specifications[9].

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rather the mean is allowed to fluctuate according to its own probability function. The subscript *r* on the hyper-parameter refers to the gender and the subscript *t* refers to the type of competency, Cognitive or Emotional.

[9] As mentioned earlier, Bayesian inference requires researchers to provide prior distributions for the parameters of the model. Given the lack of previous research on this topic, however, the current prior distributions were weakly informative. Consequently, our model has been estimated using Markov Chain Monte Carlo methods, more specifically, the Gibbs sampler. JAGS (Plummer, 2003) has been used for the estimation, while the chains have been analyzed under R with the coda and ggmcmc libraries (Plummer etal., 2006; Fernández-i-Marín, 2013; R Development Core Team, 2013). A total of 5,000 samples of two chains of simulated posteriors have been acquired under different initial values, with a burn-in period of 1,000 iterations. There is no evidence of non-convergence of the series according to the Geweke (1992) test.

3.7 Results

To test the structure of the 13 competency scales, we used LISREL 8.80 with the covariance matrix to estimate the factorial composition. The same CFA model was specified for professional and personal raters. The fit indexes of the measurement model were satisfactory, as shown in Table 3.1. Factor loadings of the items per competency were above 0.65. The usual global indexes shown in Table 3.1 are below or close the appropriate thresholds (Hu and Bentler, 1999). The relatively high values of chi-square were actually due to some irrelevant misspecifications, which were magnified due to the high power situation (large sample size and high reliability). We could have released a few constraints on uncorrelated uniqueness but their estimated values would be negligible.

Table 3.1 | Confirmatory factor analysis (CFA) model fit for different types of raters (n = 641)

Rater type	Satorra-Benter χ^2(df)	90% CI RMSEA	P-value for test of close fit (RMSEA < 0.05)	CFI	SRMR
Professional	4751 (2261)	(0.0404; 0.0437)	1.000	0.992	0.0525
Personal	5399 (2261)	(0.0456; 0.0488)	0.994	0.998	0.0579

In addition, it is well known that these global fit indexes may have limitations resulting in erroneous conclusions (Saris et al., 2009). Therefore, we checked whether: (1) all the estimated values were reasonable and of the expected sign; (2) the correlation residuals suggested the addition of parameters; and (3) the modification indexes and expected parameter changes led to plausible estimates. This process focuses more attention on the detection of misspecification errors rather than solely on the global fit (Saris et al., 2009). It considers the power of the test in addition to the significance levels. The results did not show any significant misspecifications in our CFA model for each set of raters.

Results from a discriminant validity analysis show that all the competencies are adequately discriminated[10]. Discriminant validity was assessed by comparing the square root of the AVE, as shown in Table 3.2, of each reflective construct with the correlations between the constructs, reported in Tables 3.3 and 3.4. Despite the relatively high magnitude of some correlations among competencies, the results suggested that the 13 competencies were adequately discriminated. To be sure, the two cognitive competencies were integrated into one scale for this analysis. Any model that specified a correlation between two competencies constrained to one has been rejected. Therefore, these results suggested the appropriateness of maintaining the 13 competencies rated by others as separate scales.

Table 3.2 | AVE, Cronbach's α and Omega reliabilities of EI competencies for (a) personal and (b) professional raters (*n* = 641).

Constructs	AVE		Cronbach's α		Ω	
	(a)	(b)	(a)	(b)	(a)	(b)
[AO] Achievement orientation	0.519	0.587	0.842	0.875	0.860	0.880
[A] Adaptability	0.558	0.591	0.856	0.875	0.890	0.910
[CFM] Conflict management	0.497	0.521	0.824	0.854		
[CM] Coach and mentor	0.610	0.617	0.882	0.888		
[ESA] Emotional self-awareness	0.589	0.591	0.874	0.847		
[ESC] Emotional self-control	0.676	0.731	0.905	0.920		
[E] Empathy	0.610	0.654	0.885	0.896		
[I] Influence	0.498	0.534	0.828	0.847	0.840	0.870
[IL] Inspirational leadership	0.693	0.702	0.913	0.920		
[OA] Organizational awareness	0.555	0.578	0.852	0.869		
[PO] Positive outlook	0.652	0.572	0.902	0.868		
[T] Teamwork	0.654	0.695	0.902	0.914		
[C] Cognitive	0.543	0.561	0.909	0.916	0.920	0.929

[10] In addition, as indexes of discriminant and convergent validity (Bagozzi and Yi, 1988), we first checked the average variance extracted (AVE; i.e., the average communalities per competency). As mentioned, the results showed that all items have loadings above 0.65, with competencies having always an AVE above or close to 0.5. In addition, cross-loadings from a previous EFA showed that all the items have much higher loadings with their respective construct (as suggested by Chin, 1998) than with any other competency.

Table 3.3 | Correlation matrix of EI competencies as scored by personal raters (*n* = 641)

	AO	A	CFM	CM	ESA	ESC	E	I	IL	OA	PO	T
[A] Adaptability	0.817											
[CFM] Conflict management	0.685	0.865										
[CM] Coach and mentor	0.626	0.705	0.853									
[ESA] Emotional self-awareness	0.560	0.597	0.726	0.749								
[ESC] Emotional self-control	0.566	0.720	0.809	0.534	0.460							
[E] Empathy	0.588	0.726	0.905	0.814	0.720	0.721						
[I] Influence	0.582	0.805	0.802	0.666	0.605	0.500	0.587					
[IL] Inspirational leadership	0.724	0.802	0.827	0.786	0.644	0.557	0.596	0.845				
[OA] Organizational awareness	0.651	0.870	0.841	0.693	0.568	0.646	0.746	0.783	0.764			
[PO] Positive outlook	0.619	0.696	0.670	0.575	0.534	0.553	0.517	0.552	0.734	0.566		
[T] Teamwork	0.640	0.780	0.890	0.824	0.594	0.675	0.787	0.653	0.786	0.811	0.674	
[C] Cognitive	0.781	0.900	0.793	0.641	0.629	0.632	0.646	0.797	0.769	0.806	0.601	0.646

Table 3.4 | Correlation matrix of EI competencies as scored by professional raters (*n* = 641)

	AO	A	CFM	CM	ESA	ESC	E	I	IL	OA	PO	T
[A] Adaptability	0.892											
[CFM] Conflict management	0.770	0.840										
[CM] Coach and mentor	0.740	0.743	0.875									
[ESA] Emotional self-awareness	0.674	0.730	0.799	0.777								
[ESC] Emotional self-control	0.509	0.627	0.799	0.593	0.527							
[E] Empathy	0.637	0.752	0.930	0.854	0.784	0.788						
[I] Influence	0.762	0.853	0.888	0.785	0.803	0.603	0.784					
[IL] Inspirational leadership	0.757	0.786	0.793	0.833	0.682	0.538	0.689	0.867				
[OA] Organizational awareness	0.686	0.854	0.829	0.738	0.729	0.680	0.825	0.858	0.722			
[PO] Positive outlook	0.734	0.742	0.759	0.662	0.603	0.600	0.683	0.705	0.781	0.669		
[T] Teamwork	0.683	0.753	0.877	0.903	0.683	0.698	0.887	0.757	0.741	0.830	0.692	
[C] Cognitive	0.848	0.908	0.832	0.743	0.776	0.589	0.720	0.869	0.769	0.797	0.652	0.696

With this evidence supporting validity of the scales, we addressed reliability. In Table 3.2 we used Cronbach's α for assessing the internal consistency of each set of five items within each competency. However, for those competencies in which tau- equivalence (Bollen, 1989) was not fulfilled, we used Heise and Bohrnstedt's (1970) W, which only requires fitting a unidimensional factor analysis model.

Although the two models shown in Table 3.2 fulfill the *configural invariance* (same CFA model for personal and professional raters), they showed support for rejecting the condition that the item loadings were the same in both groups of raters (i.e., they had measurement equivalence). Intraclass correlation indexes were not considered because we did not need to aggregate raters into one category of "others." As a result, the two raters' perspectives were considered under a hierarchical model specification.

The outcome of a Bayesian model is not a point estimate of the coefficient with an associated standard error, but a complete density distribution of the parameter, which can then be simply summarized by using its median and standard deviation to resemble the traditional frequentist approach of parameter estimates and standard errors. Moreover, percentiles of the parameter's distribution are used to summarize its credible interval (which is the Bayesian equivalent to a parameter's confidence interval in classical statistics). In addition, results and substantial interpretations of some of the parameters are presented using graphical figures, in accordance with statisticians' advice of "turning tables into graphs" (Gelman et al., 2002).

3.7.1 Cognitive vs. Emotional competencies

As mentioned earlier, the main parameters of interest, $\Theta_{r,t}$, are those that describe the association between GMAT and ESCI-U competencies depending on which type of competency, cognitive or EI, and which of the three groups of raters are considered. A caterpillar plot is shown in Figure 3.2 with the median of the posterior distribution of each parameter and the 90 and 95 percent credible intervals. The parameters can be interpreted as follows: (a) if the distribution crosses the zero point, there is no consistent relationship of significance; and (b) if the line is to the right or the left of the zero point, then it tells us about the relative impact. For example, in Figure 3.2, the cognitive competencies assessed by professional sources have a positive relationship to *g*. The distribution can be said to show that an increase of one unit in the cognitive competencies, as scored by professional raters, is expected to produce an on average increase of around 8.5 units in the GMAT scores. EI and cognitive competencies show no relationship to *g* with observations from personal sources. Observations from professional sources show a positive relationship between EI and *g*. Observations from self-assessment show a negative relationship between EI and *g*. In all three groups of raters the association between GMAT scores and the raters' evaluation of the cognitive competencies is considerably higher than with the raters' evaluation of EI competencies. This clearly indicates that GMAT scores are associated in a different way with the ESCI-U scores produced by the three groups of raters. Adding to the main effects mentioned, these results show that the rater group has a moderator effect on the association between ESCI-U and GMAT scores. Therefore we find support for hypothesis 1, strong support for hypothesis 2, and clarity as to the different sources for hypothesis 3.

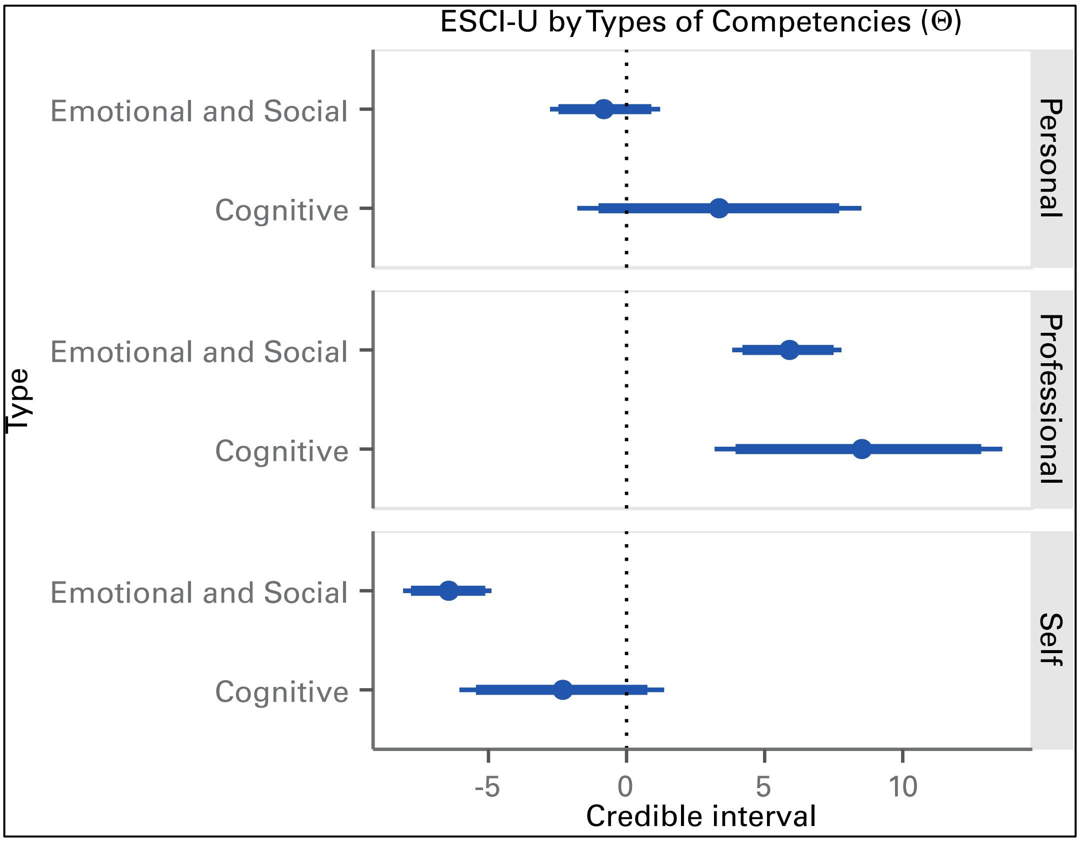

Figure 3.2 | Caterpillar plot of the posterior distribution of the effects of types of competencies on GMAT scores, by rater. Credible intervals (median, 90 - thick line - and 95% - thin line) of the distribution of the parameters that account for the association between the type of competency and the GMAT score. Hence, for the first element (Emotional-Personal), one unit increase in emotional competencies is expected to decrease the GMAT by around one point. However, since the credible interval overlaps zero, there may be weak evidence of an actual decrease.

Figure 3.2 also shows that others' ratings of behavior agree more with each other than they do with self-perceptions. This is a well-established result (Atwater and Yammarino, 1992; Carless et al., 1998) that brings further support to our claim that clustering self-report with others' ratings or 360° based approaches confuses the relationships of EI to different constructs. Another way to examine these results is by using probability statements, which is one of the advantages of using Bayesian inference. In this sense, the probability that cognitive competencies are more strongly associated with GMAT scores than the EI competencies ranges between 81.5 percent for professional raters, 92.7 for personal raters and 97.8 for self-evaluations. Therefore, the data offers strong evidence for hypotheses 3.

To provide deeper insight into the consistency of the distributions, Figure 3.3 shows the caterpillar plot of all the 52 $\theta_{c,r}$ parameters, one per each of the 14 ESCI-U competencies, and the three rater groups. As can be seen, the parameters' distributions are quite consistent within the EI and cognitive types of competencies results shown in Figure 3.2. The figure can be read as follows, taking as an example the first element of Figure 3.3: an increase of 1 unit in the competency score of pattern recognition by professional raters is expected to generate an on average increase of about 7.5 in the GMAT score. Yet, regardless of which rater perceptions are considered, cognitive competencies always show higher association with GMAT scores than EI competencies.

3.7.2 The moderator effect of gender

Regarding the moderator effects of gender, females showed substantially lower associations between EI and *g* than males, as shown in Figure 3.4. In fact, it is negative for observations from each of the self and professional observers and non-significant for personal observers for females. Meanwhile, there is a positive relationship between EI and *g* for males as viewed from professional observers. Although varying in intensity, for all sources for both EI and cognitive competencies, males show a stronger relationship to *g* than females. Regarding cognitive competencies, the relationship to *g* is stronger for males than females from all sources. This provides further support for hypotheses 3 and clarifies why hypothesis 4 is important.

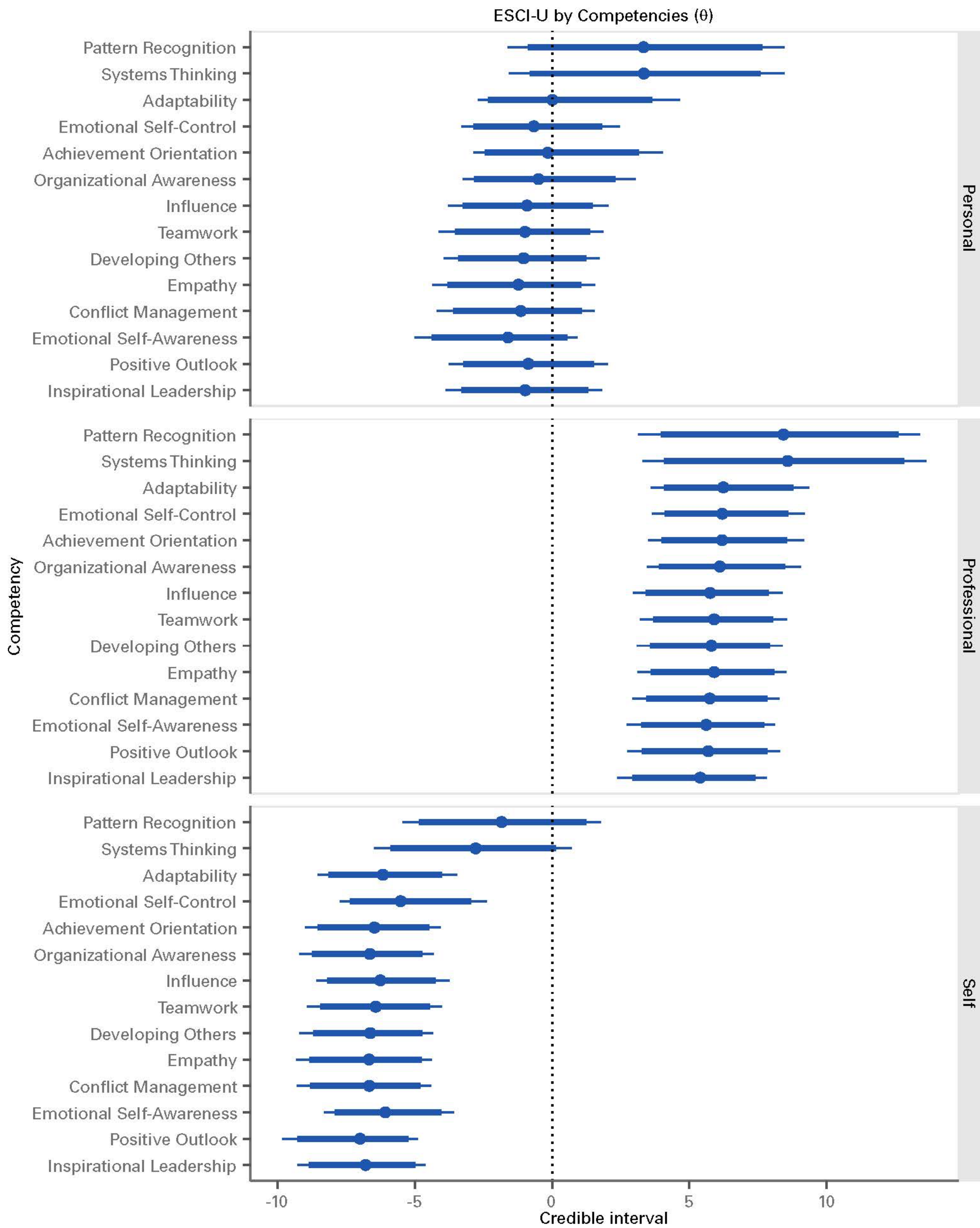

Figure 3.3 | Catterpillar plot of the posterior distribution of the effects of each competency on GMAT scores. Credible intervals (median, 90 – thick line – and 95% – thin line) of the distribution of the θ parameters that account for the association between each competency and the GMAT scores.

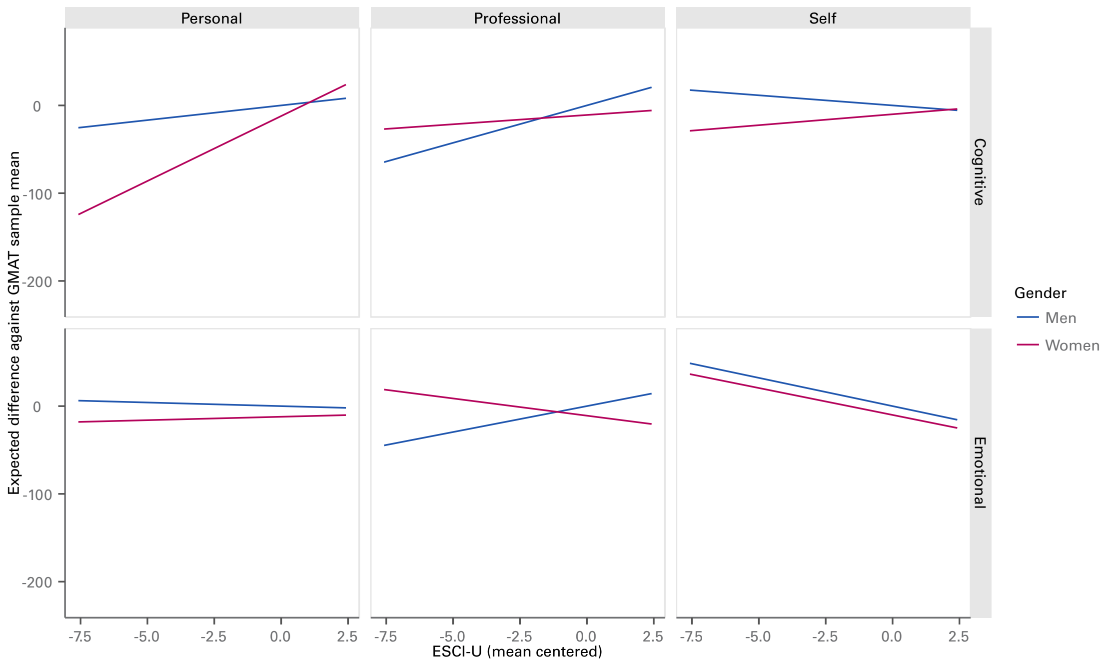

Figure 3.4 | Expected moderating effect of gender on the relationship between ESCI-U score on congnitive and emotional competencies and GMAT, by type of rater. The lines represent the expected effect of ESCI-U scores (as departures from the sample mean in the horizontal axis) and GMAT scores (as departures from the sample mean in the vertical axis). Flat lines represent situations in which the association between ESCI-U and GMAT is not clear. Increasing lines can be read as follows: a unit increase in the ESCI-U score for a male/female in an emotional/cognitive competency as measured by a specific rater is expected to increase the GMAT score by a certain amount given by the vertical axis.

3.8 Discussion

The study examined the relationship between behavioral EI and *g*. We found that cognitive competencies are more strongly related to *g* than EI competencies. EI, as seen by others, is slightly related to *g*, in particular for observations from professional raters for males, but there is no relationship from observations of personal raters, and a slightly negative relationship of EI and *g* from self-assessment. When we examined the gender moderating effects, there appears to be a relationship between EI and *g* for males with observations from professional raters. With females, there is no relationship between EI and *g* with observations from personal raters, and a slight negative relationship with observations from professional raters and self-assessment.

In alignment with both Fernández-Berrocal and Extremera (2006) and Boyatzis (2009) frameworks of the research on EI, these results offer further support to distinguish between approaches to EI that are based on self-perception and those that are behavioral. This would add to the literature by supplementing the other approaches and levels of EI with the behavioral approach and helps us develop a more holistic model of the EI. Even with this approach, for males with assessment from professional colleagues, there is a relationship between EI and *g*. It is not as strong as the relationship with cognitive competencies and *g*. But it is there. These findings support the idea reported in other studies that to be effective in management, leadership or professions, we probably need some distribution of EI, cognitive competencies and *g* (Boyatzis, 2006; O'Boyle et al., 2011).

Self-assessment showed a slight negative relationship between EI and *g*. This raises the question as to whether self-perception approaches to EI will be as good in predicting job performance (Taylor and Hood, 2010). But a recent meta-analysis of self-assessment methods did show consistent predictive effects of EI (Joseph et al., 2014). Perhaps for those jobs and professions that involve more analytic activities and tasks which require a higher level of *g* – e.g., a bench scientist, engineering programmer, creative artist or mathematician, self-perceived EI may be relatively less accurate in performance prediction than a behavioral approach.

The gender moderating effects noted may be interpreted as a result of the different expectations and attributions from others to males and females. Whether emerging from stereotyping or social comparison processes, they force what appears to be a more generous attribution of the link between EI and *g* to males than females. One dilemma is that some studies may confound such processes by using a measure of *g* that appears gender biased. For example, the Ravens Progressive Matrices, although considered one of the best measures of *g*, is a visual comparison task (i.e., choosing a figure that fits into a sequence more than others). Since males appear to handle such spatial reasoning more quickly, as a result of prior gender based training and socialization, may give males a different distribution on the results than females. It is recommended that these "male normative" intelligence tests (Furnham, 2001), are paired with the Mill Hill Vocabulary or some such similar test that balances a measure of *g* with specific skills in which females do better than males (Boyatzis et al., 2012).

Overall, the different results from different raters are a reminder that the reality of what you see depends on the direction in which you look, and the color of the lenses you wear.

3.8.1 Implications

The results suggest that research on EI should examine at more than one level within studies, the ability, trait, self-perception or behavioral levels. It may help in understanding the relevance of EI to life and work outcomes, as well as other constructs in psychology. They also suggest that research on EI should include measures of *g* to show the unique variance contributed by each concept and show the relative power of each. When collecting behavioral EI data, these results suggest that analyses should examine the sources of the observations as a possible moderator or mediator on the dependent variables. For example in this research, it is likely that the professional environment provides more opportunities for the raters to assess *g*-related competencies than the personal environment. It is also crucial to analyze data for gender effects that may not be apparent in more direct, statistical analysis.

Professionals using 360° assessments to coach or develop EI should be prepared to identify systemic differences across gender and rater types. Otherwise, individuals may leave their coaching session thinking they have an actual "problem" with certain raters, when in reality it is a systematic bias shared across the population.

3.8.2 Limitations

One of the limitations of this study emerges because the data came from a single school with diverse nationalities. As such, it threatens external validity. The study should be replicated in other schools to insure that a specific school's selection and admissions criteria have not biased results.

By focusing on MBA students, we also threatened construct validity. Social desirability is one of the most common validity threats associated with the use of questionnaires in this postgraduate population. Raters provided by the individual rated might create a halo effect, an overall positive feeling leading to inflate their perception of how often desirable behaviors are present. Specially, self-assessment is often misguided for this overall positive feeling about oneself, or because being competent is desirable, thus increased positive self-assessment tends to occur. Future research should address this issue as well.

3.9 Conclusions

Emotional intelligence exists at multiple levels. The behavioral level of EI shows a different relationship to *g* than other levels or approaches to EI. Different people around us, at home and at work, will see different facets of our behavior, depending on the kind of relationship and rapport they have established. Some raters are best equipped to assess certain competencies than others because they witness frequently the activities that elicit those behaviors. While our study reveals that raters from a professional sphere are more apt to evaluate cognitive competencies, future research would benefit from looking further into discovering which rater type among professionals (boss, colleagues or subordinates) is best suited to assess which ESCI-U competency. The same can be said of the pervasive impact that gender stereotypes and social comparison processes have on observations of others and their interpretations of it. Regarding EI, to be of most help in discovering insights that will be useful to improving our lives, we should be more comprehensive about the variety in approaches to EI and more sensitive to their differences at the same time.

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Chapter 4 | When EI competencies catalyze the relationship between intelligence and learning performance: A task-dependent interaction model

ABSTRACT

The fundamental principle of emotional intelligence (EI) lies on the integration of emotion into cognitive processes that facilitate mental activities such as thought, memory and decision-making. Yet, prior research on EI has mainly focused on testing additive models that assume EI and cognitive abilities make independent contributions to performance; little attention has been devoted to investigating their potential interaction effects. We develop and test a task-dependent interaction model that reconciles the divergent findings in previous interaction studies. We posit that whenever tasks require the social cognitive domain and involve interpersonal interactions, EI and general cognitive ability (or *g*) are mutually reinforcing, such that the association between EI and *g* becomes stronger as *g* increases. Otherwise, in non-social tasks, a negative interaction between EI and *g* is expected. Using a behavioral approach to EI, also known as EI competencies, we collect observations of actual EI behavior as is seen by others who work and live with the person. Based on a sample of 849 MBA students including 23 nationalities, we test a hierarchical model that is contingent on the types of task (social vs. non-social) and rater (professional, personal and self). Our results reveal that aside a positive main effect on the classroom performance of professional executives, behavioral EI moderates the relationship of *g* and academic performance. Whereas we find evidence that in non-social tasks, behavioral EI has a stronger effect on MBA performance among candidates with low *g*, our data was short to support the hypothesis whereby, in social tasks, EI boosts the effect of cognitive abilities on performance. Moreover, while females had an advantage in social tasks, man had relatively higher performances in non-social tasks. Professional raters had a relatively small measurement error as compared to the other rater types, and thus produced the highest estimates in our model.

Keywords: emotional intelligence, emotional intelligence competencies, general cognitive ability, opposing cognitive domains, social tasks, non-social tasks, individual performance

4.1 Introduction

Educational psychologists, along with parents, teachers and society at large, are concerned with how best to enhance learning performance. Herein defined as one's ability to apprehend knowledge, skills, attitudes or behaviors that are required and/or reflected by the objectives of certain learning experiences (LePine, LePine & Jackson, 2004), we study learning performance in this paper, as assessed within a population comprising managers and professional executives enrolled in an international MBA programs at a leading business school. To this end, higher education institutions such as ours attempt to select those students that are most likely to succeed in their programs, based on a set of pre-defined criteria (Romanelli et al., 2006). Among these, general cognitive ability, or *g*, has been the most studied and well-established predictor of both academic and job performance (Nisbett et al., 2012). However, the last 20 years have witnessed the rise of emotional intelligence (EI), fuelled by claims that it is superior to IQ in predicting performance (Goleman, 1995, 1998). While some researchers have shown that emotional intelligence, as conceptualized by a set of abilities ranging from perception to regulation of emotions in the self and in others (Mayer & Salovey, 1997), has an incremental impact on job performance – even beyond *g* and personality traits (Boyatzis et al., 2012), an increasing number of studies and meta-analyses attest to an overall accumulation of conflicting results, particularly in academic settings (Van Rooy & Viswesvaran, 2004; Zeidner, Matthews & Roberts, 2004; O'Boyle et al., 2011; Brackett, Rivers & Salovey, 2011).

It is our contention that the lack of consistency across findings in the field may be due, in part, to the prominence of additive linear models in the study of EI's contribution to performance. In the attempt to show EI's incremental validity, researchers have built the case for EI by arguing it can explain variance in performance that is not yet accounted by extant constructs, such as cognitive intelligence (Goleman, 1998; Mayer, Salovey & Caruso, 2000). This argument presumes that emotional and cognitive intelligences make independent contributions to performance, an assumption that overlooks the integration of emotional and cognitive processes (Damasio, 1994) that is core to the concept of EI, particularly since it “combines the ideas that emotion makes thinking more intelligent and that one thinks intelligently about emotions.” (Mayer & Salovey, 1997, p. 5). While it is clear that individuals who score high (low) in both EI and *g* achieve top (bottom) performances, less is known about predicting performance when EI is high (low) and *g* is low (high). To tap into this gap, the present study examines the interaction effects of EI and *g* on individual performance.

To be sure, the scant research addressing EI’s interaction effects on performance is gathering mixed findings. Three studies in academic institutions find evidence of a negative interaction between *g* and EI on performance (Agnoli et al., 2012; Côté & Miners, 2006; Petrides et al., 2004). Thus, such studies propose a compensatory model, whereby individuals characterized by low levels of cognitive intelligence use emotional intelligence skills to cope and compensate for their performance. Notwithstanding, research conducted in business organizations draws opposite results. Notably, Ferris et al. (2001) proposes social skill positively moderates the relationship between general mental ability and job performance. Here the authors argue that for those individuals characterized by low levels of cognitive intelligence, incapable of offering effective solutions to a task, social skill is of little help to their performance. Similarly, Verbeke et al. (2008) and Kidwell et al. (2011) confirmed the positive interaction by which EI enhances cognitive ability in boosting sales performance.

Reconciling such puzzling findings, we contend that whether EI and cognitive ability interact in the way of complementing or substituting one another for raising performance, ultimately depends on the type of task requirements. Specifically, we adopt Jack et al. (2012)’s categorization of tasks regarding two broad and opposing cognitive domains, namely social vs. physical reasoning. We hypothesize that in tasks requiring social reasoning, i.e., thinking about social cognitions and the mental states of other persons, EI and *g* may function as strategic complements, mutually reinforcing their effects on performance. By contrast, in non-social or physical reasoning tasks, i.e., that require thinking about mechanical properties of inanimate or abstract objects, we may observe that EI is most beneficial as a coping device for individuals lacking the intellectual ability needed to effectively perform the task.

To study a task-dependent interaction model of EI and *g* on performance, the present research involved the collaboration of 864 business professionals as they enrolled in an international Master of Business Administration (MBA) program. Unlike most academic programs, the MBA is well known for its business-laden environment and diversity across subjects. With courses spanning from social reasoning (e.g., International Marketing or Leadership) to physical reasoning (e.g., Finance or Statistics), the MBA is a particularly suitable setting to test our hypotheses.

The purpose of this study is to articulate a coherent framework that advances early research on the moderating role of EI in affecting performance (Van Rooy and Viswesvaran, 2004; Fiori, 2015), while internalizing task-dependence in the analysis. Additionally, we are first, to our knowledge, to examine the interaction effects of a behavioral approach to emotional intelligence.

4.2 Emotional Intelligence

Capturing the philosophical spirit of modern day's emotional intelligence, Aristotle first noted that "those who possess the rare skill to be angry with the right person, to the right degree, at the right time, for the right purpose, and the right way are at an advantage in any domain in life" (Langley, 2000: 177). Yet, the Stoics of Ancient Greece insisted that emotion and emotion-laden aspects of life were inferior to reason, a view that, to the exception of the European romanticists of the eighteen-century, prevailed throughout millennia. Only recently, in the mid-twentieth century, the first mentions of "emotional intelligence" begin to appear; the first in Van Ghent's (1953) literary account of Jane Austen's *Pride and Prejudice*, noting how the lead character displayed this quality. A few decades later, we witness the emergence of emotional intelligence as a new scientific concept in Salovey & Mayer's (1990) seminal article that launched EI into psychology research.

To be sure, during the previous decade of the 80s, groundbreaking research in two areas of psychology had been vital for EI to arise. First, a cognitive revolution had been underway: narrow cognitive conceptions of analytical intelligence were expanding towards the idea of multiple intelligences, spanning across social, practical, and personal intelligences (Gardner, 1983; Sternberg, 1985). In parallel, research on emotion was showing unequivocal evidence of the integration of emotion within cognitive processes, facilitating such facets of mental functioning as memory, attention, and decision-making processes (Damasio, 1994; Forgas & Moylan, 1987; Mayer & Bremer, 1985). These discoveries, although countering millenary wisdom that emotion was an "acute disturbance of the individual as a whole" (Young, 1943: 263), were lighting up a lively inquiry among psychologists and neuroscientists alike, about the possibility of an overlap between emotion and intelligence. This way, an articulate conception of emotional intelligence came to form as a true intellectual ability, meeting traditional standards for an intelligence (Mayer, Caruso & Salovey, 1999) and being defined as a set of interrelated skills, including "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotions and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth." (Mayer & Salovey, 1997: 10).

Although Salovey and Mayer's articles (1990a, 1990b, 1997) initially stirred the scientific community with the idea of a new form of intelligence pertaining to emotions, Goleman’s (1995, 1998) best sellers galvanized public interest with claims that EI was superior to traditional intelligence in predicting workplace performance. With the rise of EI’s cachet came the widespread use of the concept by organizational consultants, coaches, educators and researchers alike. Soon, the diversity of people interested in the topic matched the variety of EI assessments available. To such an extent that, today, EI researchers embrace alternative approaches to its measurement, assessing EI through different facets other than formal intelligence.

Despite EI’s field being deep in controversy with several definitions and assessments over its first 25 years of research, emotional intelligence, as a concept that comprises a set of inter-related abilities pertaining to the perception and regulation of emotions in the self and in others (Mayer & Salovey, 1990), provides a common content domain to existing EI measures (Joseph et al., 2014). What distinguishes existing EI models is the choice of measurement theory, a decision that is tied to the reflective facet of EI one wishes to observe. Notably, EI may be observed as a standard mental ability, a self-perceived quality within the personality realm, or ultimately, as it manifests into real life behavior. This way, three distinct but complementary EI approaches exist in the literature (cf. Fernández-Berrocal & Extremera, 2006; Boyatzis et al., 2015): 1) Ability EI, following Salovey & Mayer’s work, assumes EI can be measured similarly to traditional forms of intelligence, with a performance-based questionnaire (e.g., MSCEIT; Mayer, Salovey & Caruso, 2000) in which item responses are judged wrong or right by a panel of Emotion experts. Studies using MSCEIT have shown consistent prediction of *g*, even when controlling for personality (Webb et al., 2013). Regarding performance, although some studies shown relationships with school (Brackett et al., 2004), and job outcomes (Mayer et al., 2008), three meta-analyses find that relative to other EI approaches, Ability EI is not as good predicting job performance (Van Rooy & Vaswervaran, 2004; O’Boyle et al, 2011; Joseph & Newman, 2010). 2) Self-report EI is based on self-perceptions of EI reflecting facets within the personality realm (Bar-On, 1997; 2000), attitudes and behavioral tendencies (Petrides & Furnham, 2000; 2001). This approach uses self-report questionnaires, which although show acceptable validity (e.g., Trait EI Questionnaire (TEIQue); Petrides & Furnham, 2001), oftentimes need correction for social-desirability bias (Paulhus and Reid, 1991). While Self-report EI is not as strongly related to *g* nor job outcomes, it does show a significant relationship to personality (Joseph and Newman, 2010; O'Boyle et al., 2011); and 3) Behavioral EI assesses a person's emotional intelligence as it manifests through behavior in real-life situations. It's most representative model is probably emotional and social competencies (e.g., ESCI; Boyatzis, 2009; Goleman & Boyatzis, 2007). What is distinctive about this approach is that it does not rely on the self as a source of information. Instead, behavioral EI collects observations from others, the people who live or work with the person being assessed (also known as multi-source or 360º assessment), regarding what and how frequently they see the person behave in ways that are emotionally or socially competent (Boyatzis, 2009; Boyatzis et al., 2015). Behavioral EI as measured with ESCI (Boyatzis & Goleman, 2007) is only mildly related to *g*, but shows evidence of a strong relationship to workplace performance (Boyatzis et al., 2012; Downey, Lee & Stough, 2011).

Other classifications of EI literature exist, but are based on a division of the field that sets apart EI research on Salovey & Mayer's (1997) Ability EI - corresponding to streams 1 and 2 in Ashkanasy & Daus (2005) – from all other EI approaches, notably self-report and behavioral EI, which are clustered together and labeled as "mixed EI" (Mayer et al., 1999; Ashkanasy & Daus, 2005). Referring to the obscure nature of this label, Joseph et al. (2014: 2) names it as "black box" and notices how prior theoretical work on mixed EI is scant. To be sure, not one theoretical article exists on mixed EI. This is probably due to the fact that mixed EI was not created as a construct by any of the research it represents; rather it is an uninformative label originated by Mayer et al. (1999), to designate other researchers' work on the field, particularly that which provides original contributions and falters to stay inside the narrow borders of Ability EI (Mayer & Salovey, 1997). Instead, the classification offered above provides a balanced organization of EI research, based on the three existing methodological themes through which research on EI is flourishing. This way, we subscribe Fernández-Fernández-Berrocal & Extremera's (2006, p. 8) comprehensive view of the EI field, wherein "[all] these approaches try to discover the emotional components that underlie *emotionally intelligent* people and the mechanisms and processes that set off the use of these abilities in our everyday life".

4.3 Behavioral EI

In this paper we choose to follow a behavioral approach to EI, as it allows capturing emotional intelligence at a facet that is closer to action and consequential to real-life and work performance, i.e., actual behavior in situated contexts. Considering the etymological roots of emotion come from the Latin word *emovere*, a combination of *ex* (out) + *movere* (to move) is a good reminder that emotion is strongly associated with external movement that provides signals to others. Darwin's, (1872)'s treatise on emotional expression performed a comparative study of humans and animals and gathered unequivocal evidence on the breadth of emotional communication that is captured through body movements and facial expressions. Similarly, emotional intelligence can be seized in both verbal and non-verbal behavior that is visible and consequential to others, offering a sound basis to establish a behavioral approach to EI.

Particularly, we use the Emotional and Social Competencies Inventory (ESCI; Boyatzis et al., 2015; Boyatzis & Goleman, 2007; Boyatzis, 2009; Boyatzis, Goleman & Rhee, 2000), a behavioral EI measures that shows evidence of construct and discriminant validity (Byrne, Dominick, Smither & Reilly, 2007; Cherniss, 2010; Cherniss & Boyatzis, 2013). The ESCI model is empirically supported by 40 years of research identifying competencies that predict work success (Boyatzis, 1982; McClelland, 1973; Spencer & Spencer, 1993). Competencies are defined as learned capabilities that lead to effective or superior performance, wherein each competency is reflected by a set of behaviors sharing a common underlying intent (Boyatzis, 2009). Competencies have been derived inductively from qualitative studies of human performance using behavioral event interviews with managers in many positions and across several countries (Boyatzis, 2009). Because the identification of competencies and their refinement emerges from performance based criterion sampling, they are expected to be closely related to work and life outcomes.

As mentioned above, behavioral EI concerns the same content domain as other EI approaches, i.e., the concept of emotional intelligence as defined in Mayer & Salovey (1990). Specifically, the ESCI model parallels the definition of EI, in that it addresses: 1) the same core abilities of perception (or awareness) and regulation (or management) of emotion; 2) the same targets, that is, whether abilities are directed at self or others. The distinction between approaches is in the facet of the construct they observe. In a critical review of the field, Zeidner et al. (2004: 377) clarifies that what differentiates the approach of ability EI from its behavioral counterpart is akin to the distinction between fluid and crystallized ability. As the authors explain: "EI (as a fluid ability) does not guarantee that individuals will actually manifest competent behaviors at the workplace. (…) Whereas [ability] EI may determine a person's potential for learning practical job-related emotional and social skills, the level of emotional competencies (as a crystallised ability) manifested by that person shows how much of that potential she or he has actually realised". Indeed, some individuals may be good at mindfully thinking and coming up with solutions to hypothetical emotional-laden problems, but lack the training or experience for actually performing the behaviors they prescribe (Fiori, 2009).

Overall, the ESCI model comprises 12 EI competencies that are structured into four clusters, resulting from the Cartesian product of 2 EI abilities (awareness and management of emotion) by 2 targets (self and others): 1) *Emotional self-awareness* represents one competency by the same name; 2) *Emotional self-management* includes the competencies of Emotional self-control, Adaptability, Achievement orientation and Positive outlook; 3) *Social awareness* involves Empathy and Organizational awareness competencies; and 4) *Relationship Management* includes the competencies of Coach and mentor, Inspirational leadership, Influence, Conflict management and Teamwork. When the ESCI model is used for the purposes of development and/or outcome assessment, two cognitive competencies, which have traction in predicting effective leadership, management and executive performance, are added. They are: Systems thinking and Pattern recognition (Boyatzis, 2009).

In its most distinctive feature, the ESCI model measures behavioral EI as is seen and assessed by others. For this matter, it uses a 360º assessment instrument (Boyatzis & Goleman, 2007; Boyatzis & Sala, 2004; Sala, 2002), which enables multiple raters from different life spheres – notably, professional (i.e., bosses, peers and subordinates), personal (i.e., relatives, spouses and friends), and other raters – to provide behavioral observation scores to the person being assessed. The instrument assesses how frequently observers have seen 5 specific behavioral indicators for each competency, using an 11-point frequency scale from 0 (never) to 10 (always), which has been shown to have superior reliability (Batista-Foguet et al., 2009). This way, competencies as a behavioral approach to EI as observed and scored by others who live and work with the person (as opposed to self-assessment) shows a consisting prediction to job and life outcomes (Boyatzis, 1982, 2006; Boyatzis et al., 2012; McClelland, 1998; Dulewicz et al., 2003; Law et al., 2004; Sy et al., 2006; Ryan et al., 2009, 2012; Boyatzis et al., 2011, 2012; Aliaga Araujo & Taylor, 2012; Gutierrez et al., 2012; Sharma, 2012; Spencer & Spencer (1993); Amdurer et al., 2014; Victoroff & Boyatzis, 2013; Mahon et al., 2014).

4.4 EI, cognitive ability and learning performance

Throughout the past century, general cognitive ability, also known as general intelligence, general mental ability or simply *g*, has taken the leading role in enlightening our understanding of human performance. As a global ability concerning the "the general efficacy of intellectual processes" (Ackerman et al., 2005, p. 32), *g* is thought of as the underlying common factor to all types of cognitive processing (e.g., verbal, mathematical, spatial, logical, musical, emotional). As a latent construct, *g* is therefore not observed directly; it must be inferred from the positive correlations among different abilities (Spearman, 1904; Jensen, 1998). Based on the large body of evidence showing *g* has a strong relationship to school and workplace performance across tasks and settings (Gottfredson, 1997; Jensen, 1998; Ree & Carretta, 1998, 2002; Salgado, Anderson, Moscoso, Bertua, & de Fruyt, 2003; Salgado et al., 2003; Schmidt & Hunter, 1998), researchers have referred to *g* is the best single predictor of performance (Gottfredson, 1986; Schulte et al., 2004).

But, although *g* strongly correlates between .30 and .50 with several performance measures, it actually only explains about 25% of their variance (Goldstein et al., 2002; Hunter & Hunter, 1984). Research on novel psychology constructs echoes this finding to argue there remains a large amount of variance in performance (i.e., 75%) that can only be explained by other factors (e.g., Gardner, 1993; Song et al., 2010). Notably, the case for EI was built over claims that it explains the variance in human performance that is not accounted for by cognitive intelligence or *g* (Mayer & Salovey, 1997; Goleman, 1998; Mayer, Salovey & Caruso, 2000). This argument has led to an emphasis on identifying the main linear effect of emotional intelligence on performance. In consequence, today, the majority of empirical research on EI is based on additive model specifications, which assume that emotional and cognitive intelligences make independent contributions to human performance. It is our contention, however, that this assumption of independence is in contradiction with the very concept of emotional intelligence, which lies at the intersection of emotion and cognition and "combines the ideas that emotion makes thinking more intelligent and that one thinks intelligently about emotions" (Mayer & Salovey, 1997: 5). Notably, at the core of EI lies an important neuroscience discovery: the integration of emotion within cognitive processes across a variety of mental functions such as memory, attention, and decision-making (Damasio, 1994; Forgas & Moylan, 1987; Mayer & Bremer, 1985). Therefore, additive independent models may indeed be too "simplistic and incomplete" to represent the contribution of EI to performance (Côté & Miners, 2006, p. 2).

The fundamental problem with relying on additive independent models when explanatory variables are interdependent concerns the presence of multicollinearity, which by inflating coefficient standard errors contributes to the instability of model estimates. This may help explaining why empirical research on the relationship between EI and performance has long produced mixed results (Zeidner, Matthews & Roberts, 2004; Côte & Miners, 2006; Rode et al., 2007; Van Rooy & Viswesvaran, 2004). Particularly regarding learning performance, studies report conflicting findings (Brackett, Rivers & Salovey, 2011): whereas some research shows that EI explains achievement in high school (Márquez, Martín & Brackett, 2006) and undergraduate programs (Lam & Kirby, 2002), other studies suggest there is no relation or a non-significant one between emotional intelligence and academic performance (Petrides et al., 2004). In fact, it is often the case that studies will initially show positive effects of EI on academic performance until they eventually become non-significant after controlling for related variables, such as cognitive intelligence and personality traits (Barchard, 2003; Bastian, Burns & Nettelbeck, 2005; Brackett & Mayer, 2003).[11] Such large variation across studies is

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[11] However, regarding job performance, recent findings are relatively more consistent than academic performance, as confirmed by two meta-analyses wherein existing approaches to EI were found to positively associate with workplace performance (Joseph & Newman,

leading EI research to adopt multiplicative models, whereby the interaction effect of EI and *g* on performance is explored (e.g., Côté & Miners, 2006; Petrides et al., 2004; Kidwell et al., 2011). In this line, we are first, to our knowledge, to study the interaction effect of behavioral EI on the relationship between *g* and academic performance.

Besides the dominance of additive linear models, two other issues may also be hindering previous findings on EI. First, prior research often uses a domain-general assessment of EI (e.g., Mayer et al., 2003), which may convey the idea that high EI individuals have all the right ingredients to succeed and in so doing "invite the attribution of a halo effect" (Boyatzis, 2008, p. 8). Instead, EI's contribution to performance may best be captured through specific abilities, whereby each may enhance problem-solving in some contexts (e.g., street sales) but not in others (e.g. formal presentations). This may explain why research based on unidimensional assessments of EI has shown mixed findings across different tasks (e.g., Austin, 2004; Day & Carroll, 2004; see Zeidner et al., 2004). Therefore, a general assessment of EI may feasibly address broad domains, but do poorly when studying performance in specific contexts (Bearden et al., 2001). Contributing to solve this issue, this study uses 12 specific measures of behavioral EI, i.e., different competencies that may enhance performance differently depending on which task and context they are being studied.

Second, research on EI has devoted little attention to examine how EI may differently relate to performance in different *types* of tasks. Notably, EI may be specially relevant in tasks that require interpersonal interaction, an idea that finds supports in studies showing how EI affects group processes (Jordan & Troth, 2004;

2010; O'Boyle et al. 2011). In particular, emotional and social competencies have been shown to positively affect management (Ramo, Saris & Boyatzis, 2009; Boyatzis et al., 2012) and entrepreneurship performance (Ahmetoglu, Leutner & Chamorro-Premuzic, 2011; Camuffo, Gerli & Gubitta, 2012).

Druskat & Wolff, 2001) and particularly the quality of social interactions (Lopes et al., 2004).

To address these issues, we offer three main contributions to the EI-performance literature: First, we study the moderating role of EI on the relationship between *g* and performance. Second, we use a multidimensional behavioral measure of EI that features 12 specific competencies. Third, we internalize task-dependence in the analysis, by considering two types of tasks (social and non-social) within the same sample. Thus, in the following section, we propose a task-dependent interaction model of EI, *g* and performance.

4.5 A task-dependent interaction model of EI, *g* and learning performance

We propose that the interaction between EI and *g* on learning performance depends on the type of task. Herein we adopt LePine et al.'s (2004) definition of learning performance as the *"degree to which individuals acquire the knowledge, skills, attitudes or behaviors reflected in the objectives of a particular learning experience."* (LePine et al., 2004, p. 883). We use a taxonomy of tasks that is based on two opposing cognitive domains: The *social* cognitive domain, relates to tasks that require social information processing, i.e., reasoning about the minds of others, and the *non-social* (or physical) cognitive domain pertains to tasks that require reasoning about the causal or mechanical properties of inanimate objects (Jack et al., 2012). According to Jack et al. (2012) and prior neuroscience research (Shulman et al., 1997; Nagel, 1974; Hill, 1997; Levine, 1999; Jack & Shallice, 2001; Robbins & Jack, 2006), these cognitive domains have been found to consistently associate with two antagonistic neural networks, namely the task-positive network (TPN) and the default mode network (DMN; see Jack et al., 2012;

Boyatzis et al., 2014). Specifically, non-social tasks are found to activate the TPN (and deactivate the DMN), a cortical network that is thought to be most relevant for problem solving, focusing of attention, making decisions and action control, whereas social tasks tend to activate the DMN (and deactivate the TPN), which plays a leading role in emotional self-awareness, social cognition and ethical decision making (for a review see Boyatzis et al., 2014).

To study these two types of tasks within the same sample of individuals, we chose to conduct this study within the academic setting of an MBA, where we could assess the course performance of professionals and executive managers according to social and non-social tasks.

4.5.1 Social tasks

When individuals engage in social tasks, wherein interpersonal interactions are a requirement, how does the interactive nature of the relationship between EI and *g* on performance takes form? We suggest that among individuals with low levels of EI – those who may be less apt at getting along or influencing others - *g* may contribute relatively little to performance. Similarly, among professionals characterized with lower levels of cognitive ability, who are short of knowledgeable contributions for the task at hand, EI may be of little consequence to performance. Indeed, even if these professionals were highly competent in their mastery of EI skills, as much as they could empathize with or influence others, their inability to identify and create effective solutions would undermine their overall performance. In fact, in a study of the interaction of social skill and *g* on job performance and salary, Ferris et al. (2001, p. 1076) notes how "the focus on interpersonal interaction that is characteristic of workers high in social skill without the prerequisite intellect needed to perform tasks and derive innovative solutions to problems may even be viewed negatively by decision makers, resulting in lower evaluations and salary increases." Interestingly, the authors find evidence of this phenomenon, by which increases in social skills when combined with low *g*, actually lead to lower salary levels.

A second mechanism that accounts for the interactive dynamics between EI and *g* concerns how their contributions to performance are mutually reinforcing. In a way, EI and *g* can be said to function as *strategic complements*, by which investing in EI skills can particularly boost the performance among those who have also developed their intellectual abilities. Yet, it is our contention that such positive interaction of EI and *g* on performance is tied to the type of task; only if the task involves actual social cognition and interpersonal interaction may we observe the mutual reinforcement between EI and *g*. This is because the facets of EI that may be most helpful to an otherwise "competent jerk" (see Casciaro & Lobo, 2005 for a scientific definition) are those related with the ability to empathize, influence or lead others, competencies that may only be required in tasks that require interpersonal interaction. Indeed, we notice how among previous interaction studies on EI, those that found a positive interaction were conducted in settings where tasks required interpersonal exchanges to be performed, such as in sales jobs (e.g., Kidwell et al., 2011; Verbeke et al., 2008). Therefore, we propose the following:

Hypothesis 1: In social tasks, EI positively moderates the relationship between g and performance.

4.5.2 Non-social tasks

When engaging in non-social tasks, including those requiring logical reasoning, such as mathematical thinking and causal/mechanical inferences, EI skills may add little to the performance of those individuals, who have strong cognitive abilities to meet the intellectual demands of the task. This is because in tasks that are primarily cognitive-intensive, those individuals characterized with a high *g* are able to achieve top performances, regardless of their level of EI abilities. Indeed, when task performance is high, the room for further improvement is so small, that EI abilities may only play a minimal role. Therefore, we suggest that in non-social tasks, wherein little or no interpersonal interaction is required, there is a negative interaction between EI and *g* on performance, such that the higher the level of one's cognitive abilities, the smaller the effect of EI skills on performance.

This is aligned with previous studies conducted with children and high-school students that show how EI, as assessed with a self-report measure of emotional intelligence, is most helpful for those students with low levels of cognitive ability (Petrides et al., 2004; Agnoli et al., 2012). As the authors argue, students with weaker cognitive abilities are able to reap more benefits from their EI skills as these are used for overcoming feelings of fear and anxiety, which tend to arise when facing cognitively challenging tasks. Similarly, in a university setting, a compensatory model was used to describe how individuals might resort to EI abilities for balancing out their shortcomings in cognitive intelligence such that they manage to keep focused and finish the task (Côté & Miners, 2006).

Our contention to these findings, though, involves recognizing that they may only hold when tasks are of a non-social nature and require no interaction with others. Only in these tasks can individuals with strong cognitive abilities achieve high performances by themselves, regardless of their level of EI. In fact, to succeed in non-social tasks, and according to Casciaro & Lobo (2005), a "competent jerk" is all one ever needs to be. No empathy or ability to influence others is required to achieve high performances in non-social tasks. This may help explaining how the negative interaction between EI and *g* has only been found in academic settings, wherein interpersonal interaction, while recommended, is not required to deliver a course assignment. Moreover, as aforementioned, as soon as tasks introduce elements from the social domain, and require interpersonal interaction, EI abilities - particularly those pertaining to social awareness and relationship management (e.g. to be able to get along with and influence clients to adopt a particular solution to a problem) -, may be most consequential to those individuals who also meet the cognitive requirements for the task at hand. From the preceding discussion we suggest the following hypothesis:

Hypothesis 2: In non-social tasks, EI negatively moderates the relationship between g and performance.

4.5.3 The moderator effect of rater type

As we have discussed in other work (Boyatzis et al, 2015) research on social cognition shows that individuals give more weight to their own thoughts and feelings than to their behavior when forming self-perceptions, but this effect goes in the opposite direction when forming perceptions of others (Vazire, 2010). Disparate types of raters may provide distinct information on the person being assessed (Borman, 1997). Individuals may behave differently depending on the situation (e.g. at home vs. work) (Lawler, 1967). Friends and family may observe a person using different behavior as a function of the setting (i.e., having a family meal at home versus having lunch with colleagues at the work canteen). Yet, in general, empirical studies tend to dismiss family or friends as raters (Bracken et. al., 2001). In order to be comprehensive in assessments, in this study we collected data from a wide range of a person's relations – those from work and from their personal life.

Several studies exhibit the existence of differences among bosses', peers' and subordinates' views as well as consultants, customers or clients. Atkins and Wood (2002) claims certain types of raters are best positioned to observe and evaluate specific types of competencies depending on the personal and working relationships they had with the person being evaluated. For instance, subordinates were found to be the best evaluators of competencies such as coaching and developing people, when compared to bosses or peers (Luthans et. al., 1988). Also, each rater source may have idiosyncratic tendencies leading to different observations and measurement errors, such as leniency bias, central tendency, and range restriction (Saal, Downey, & Lahey, 1980). These may, in turn, be moderated by cultural assumptions (Ng, Hynie & MacDonald, 2012).

Whereas personal raters show leniency bias, and self-evaluations for development purposes tend to reveal an underestimation of own abilities, professional raters have been shown to be most accurate in their assessment of competencies (Boyatzis et al., 2015). Therefore, if personal and self-raters have relatively higher measurement error than professional raters in their assessment of EI competencies, we should expect an attenuation bias in the estimated effects of EI on performance, when EI is assessed by the formed types of raters. Therefore we propose the following hypothesis:

Hypothesis 3: Among professional, personal and self-assessment of EI competencies, professional sources will show the strongest relationships between EI and performance.

Figure 4.1 below shows the overall path diagram of the task-dependent interaction model of EI competencies and cognitive ability for enhancing learning performance, including both structural and measurement relationship**s.**

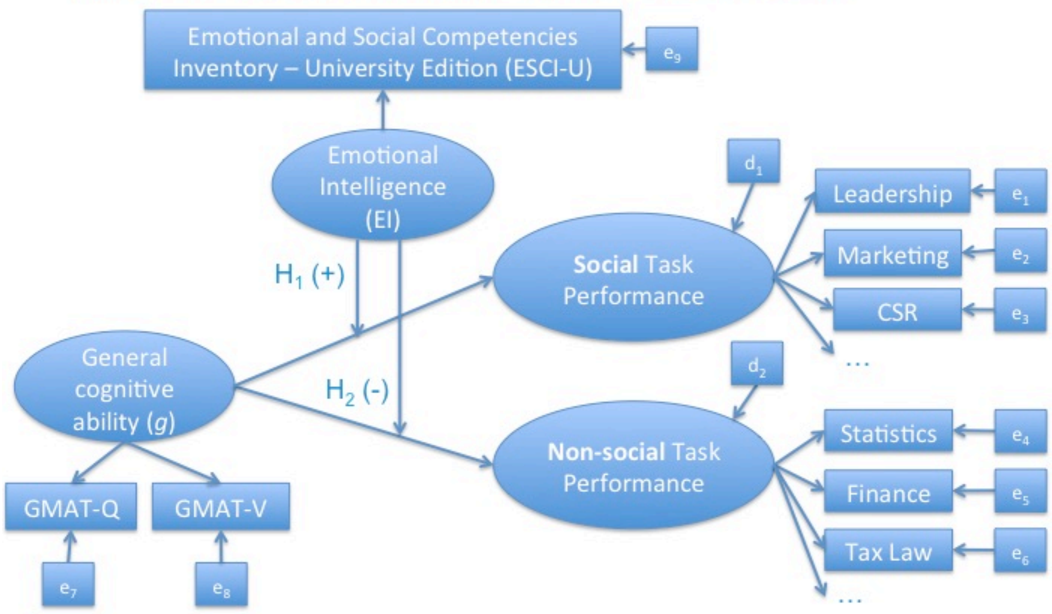

Figure 4.1 | Path diagram of the task-dependent interaction model of EI and cognitive ability for enhancing learning performance in social versus non-social tasks.

4.6 Data and methods

4.6.1 Participants

Data were collected on 864 part-time and full-time MBA candidates, from a top European business school, between 2006 and 2013. There were 30% females, and the average age of candidates was 29 years (SD=2.8). As part of the MBA, the candidates took a compulsory course called Leadership Assessment and Development, which is based on the Intentional Change Theory (Boyatzis, 2008). In this course, the candidates were asked to complete a self and multisource assessment of EI competencies. All data were collected under the informed consent and ethical guidelines of ESADE Business School.

Figure 4.2 below offers a visual summary of the descriptive statistics of the individuals, regarding the key variables in our model.

4.6.2 Measures

Emotional Intelligence Competencies

We used the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis and Goleman, 2007), a 70-item survey instrument which measures 14 competencies of two types: cognitive and emotional. In this paper, however we focused on the 12 emotional competencies: emotional self-awareness, emotional self control, adaptability, achievement orientation, positive outlook, empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. Because the behavioral manifestations of these competencies are frequently observed in a variety of different situations they have been operationalized with as many as five indicators per competency. Psychometric properties of the test based on samples of 62,000 completions of the ESCI and 21,000 of the ESCI-U both reveals each scale shows model fit and satisfies criteria for discriminant and convergent validity (Boyatzis et al., 2014). A wide variety of validation studies on the test were reviewed earlier in this paper as well as in Wolff (2006) and Byrne et al. (2007).

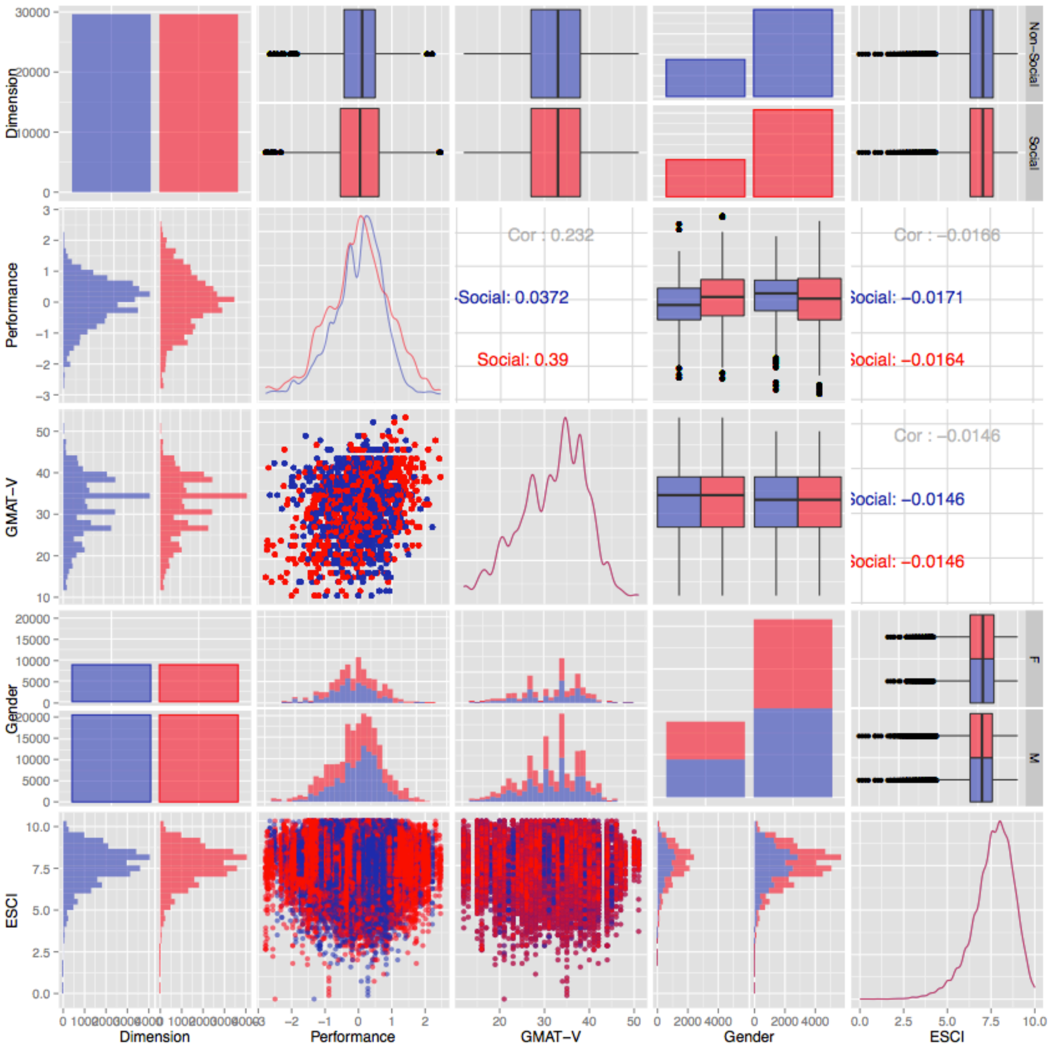

Figure 4.2 | Visual summary of the key variables in the model, including the independent variables, ESCI and GMAT-V, the dependent variable, learning performance, and the moderating variables of type of task (social and non-social) and gender.

Competencies can be considered to be the behavioral approach to emotional, social, and cognitive intelligence (Boyatzis, 2009). As such, the MBA candidate is asked to solicit others from their work and personal life to complete the test about their behavior. The students had an average of 4.2 others complete the test for each of the 864 subjects in this analysis (standard deviation equals to 1.6). It is believed that multi-source assessment, such as 360˚, provides protection against social desirability because of the distinct sources of responses.

Since we suspected that the ESCI factorial structure provided by the personal and the professional raters could be different as a function of their different perspectives of the MBA students' behavior, we have modeled the data separately[12].

For purposes of exploring our research question, we distinguished three types of sources, or assessments in this study. We used a classification provided by each respondent at the time of completing the test. The responses were grouped as either: self, personal, or professional. One is the assessment provided by the student about himself or herself. Another source was personal, such as a spouse/partner, friends, or family members. Professional sources were bosses, peers, subordinates or clients from work or classmates in the MBA program. There were a few cases in which personal or professional assessments were missing; these cases were dropped resulting in a final sample of 624 individuals with personal and 611 with professional assessments available. All had self-assessment.

MBA participants and their raters were asked to indicate the frequency of the behavior on each item on an eleven point-scale ranging from (0) 'the behavior is never shown' to (10) 'the behavior is consistently shown.' This response set provides higher quality data on this predominantly European MBA population than

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[12] Because we did not assume that Personal and Professional raters have the same perception and aggregate them under the usual "other" category of raters, we have tested their measurement or factorial equivalence (Meredith, 1993).

the usual 5-point scale (Batista-Foguet et al., 2009). The final ESCI-U scores have been mean-centered to ease the interpretation of the parameters in the model. To compute the 360◦ assessments on the 70 items that constitute the ESCI-U survey, we first obtained for each item, its average score across all professional and personal raters separately, and then averaged across the five items per each competency.

General cognitive ability (g)

We used the Graduate Management Admission Test (GMAT) as a measure of *g*. For this study we chose to collect our GMAT data from the GMAC, the entity that owns and administers the GMAT, and not through the Admissions Office at the University. We collected the students' GMAT scores from the first time they took the test. Using GMAT first time scores as compared to the scores with which students were admitted in the MBA program (usually obtained after repeatedly taking the test), enabled a wider range of variation in GMAT with higher dispersion and lower means. We, thus, attempted to minimize the issue of range restriction in GMAT (Oh et al., 2008) and the resulting attenuation bias in the model coefficients. In our sample, the GMAT mean is 602.6, which is a little higher than the overall GMAT for all test takers of 545. The sample's standard deviation of the GMAT is 78.8, almost two thirds of the reported GMAT deviation (at 121). Therefore, our sample contains individuals with slightly higher GMAT and less "heterogeneous" scores than the population of GMAT applicants.

Learning performance

We assessed learning performance using two performance scores accounting for the MBA candidates' grading performance in social and non-social domain courses, obtained from the university registrar after the end of each term. These scores were computed, based on a factor analysis of 21,350 grades, with a mean of about 25 grades per individual. To obtain the learning performance measures per cognitive domain (social vs. non-social), we specified a factor analysis model that allowed us to identify which course topics referred to the social domain and which belonged to the non-social. The basic descriptive statistics showed how the grades were negatively skewed. Each individual grade was however a standardized score of the position of the individual in the group/year for a course. Standardizing by group/year is an efficient way of eliminating Professor effects, or the differences in ratings regarding the idiosyncrasies of certain topics. So what learning performance is really measuring is how well students perform as *compared to other students* (or, in other words, considering the group), but not raw grade performance. Each course was classified in one of the 16 topics, and the courses in each of the topics were averaged by student. Therefore, a student having three courses in one topic is averaged on the three courses, while not having any course on a topic is a missing value. This generates a matrix of *IxT* (individuals x topics) equal to 864 x 16, where missing values are 22 percent. The measurement model is, hence, a factor analysis performed to the matrix of grades and topics, retrieving two different factors.

4.6.3 Procedures

The data analysis process is divided into two different models: the measurement model and the explanatory model.

The explanatory model is a non-nested hierarchical robust linear model between performance and the covariates (gender, cognitive intelligence, emotional and social intelligence and the interaction between the last two). The hierarchical structure is necessary in order to account for the different ways in which the data is naturally structured: first because there are two measures of performance per individual and some of the effects may or may not be shared across the two cognitive domains; and second because emotional and social competencies are measured in a two-level clusters and rated by three different groups. Equation (1) describes the explanatory model of the linear association between performance (y, for two different cognitive domains d) and the covariates (X), when ESCI competencies (*c*) are measured by different groups of raters (*r*) and organized in clusters (*cl*) and higher-level clusters (*CL*), for each of the individuals (*i*).

$$
\begin{array}{rcll}
Performance_{id} & \sim & \tau\left(\mu_{id},\sigma_{id},\upsilon\right) & \\
\mu_{id} & = & \alpha_{d,c,r} & + \left(Female_i, GMAT_i, ESCI_i, GMAT*ESCI_{i,c,r}\right)\theta_{d,c,r} \\
\theta_{d,c,r} & \sim & N\left(\Theta_{d,cl,r},\sigma_{\theta d,r}\right) & \\
\Theta_{d,cl,r} & \sim & N\left(\mu_{\theta d,CL,r},\sigma_{\theta d,r}\right) & \\
\mu_{\theta d,CL,r} & \sim & N\left(0,100\right) & \\
\sigma_i & = & \exp\left(Intercept, Female_i, GMAT_i, ESCI_{i,c,r}\right)\lambda & \\
\lambda & \sim & N\left(0,10\right) & \\
\upsilon & \sim & U(0,1) &
\end{array}
\qquad (1)
$$

The equation can be read as follows: performance for any individual in any of the two cognitive domains is a linear combination of an intercept (α), an effect for gender, for general intelligence, for EI competencies and for the interaction between cognitive intelligence and EI competencies.

In addition to the linear effect, the model is a robust model specification accounting for the fact that performance can be better or worse predicted depending on gender, cognitive intelligence and emotional and social intelligence (the λ effects). Taking into account controls for heteroskedasticity improves the inference process by generating unbiased and more efficient estimates of the parameters.

Inference is performed using Bayesian procedures, namely the Gibbs sampler and MCMC methods. There are three reasons to prefer Bayesian inference for addressing our research: first, the sample is in itself an entire population; second, it is not a random sample; and third, inference of a factor analysis model with missing data is not possible using frequentist models. These issues pose problems in many statistical analyses because traditional frequentist methods are based upon the assumption that the data are created by a repeatable stochastic mechanism. While mainstream statistics treat the observable data as random and the unknown parameters of the population are assumed fixed and unchanging, in the Bayesian view, it is the observed variables that are seen as fixed whereas the unknown parameters are assumed to vary randomly according to a probability distribution. Therefore, in Bayesian models, the parameters of the population are no longer treated as fixed and unchanging as a frequentist approach would assume[13].

In sum, the main advantages of the Bayesian approach are twofold: (1) it enables highly flexible model specifications (as the one needed to account for the hierarchical structure of our data); and (2) is more appropriate for settings where the data is not a random sample, but the entire population. In addition, it offers a clear and intuitive way to present results. For example, it appears more intuitive by generating *probability* statements about the findings (for more readings on the advantages of Bayesian inference, check the introductory chapters of Gill, 2002; Gelman et al., 2003; Jackman, 2009).

4.7 Results

4.7.1 Measuring learning performance

Figure 4.3 shows the weights of the topics in the factor analysis model. First, the topics scoring higher in the first dimension are non-social, therefore the first dimension accounts for performance in non-social courses, whereas the second dimension accounts for performance in social courses. Second, topics that weight higher in the non-social dimension tend to weight less in the social dimension.

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[13] Instead of a frequentist approach, in this approach a parameter is assigned a prior distribution (based on previous research in the field), which is then updated with the actual data by means of a specified likelihood function, so as to produce a posterior distribution of the parameter (Wagner and Gill, 2005). In fact, in our approach we are not entitled to use a *p*-value (as in frequentist statistics) as the probability of obtaining the observed sample results under the null hypothesis. As mentioned the data is not a sample of a larger population but it is a population.

Third, there are several topics that have from very low to no weight in the non-social dimension but high weights in the social one. All in all, the measurement models raises a clear non-social performance based on a selected group of courses (Statistics, Tax Law, Finance, Economics, Business Law) and a social performance that is a more complex combination of virtually all the courses.

4.7.2 Explanatory model

Figure 4.4 shows the coefficient estimates obtained through robust regression, of the direct effects of gender, GMAT-V, ESCI, and the interaction effect between ESCI and GMAT-V on learning performance in social (red line) and non-social (blue line) cognitive domains. Reading the panels corresponding to the professional raters, which are on average the most reliable raters, there are 4 main findings: (1) females tend to score slightly higher than males on those courses that engage the social cognitive domain, whereas males score higher than females on non-social courses (average difference in scores between male and female is about 0.2 points on non-social courses); (2) GMAT-V, the verbal component of GMAT has a higher effect on the learning performance of social courses than non-social, an intuitive result seen that social courses are verbally more intense than the non-social ones; (3) the direct effect of emotional and social competencies is positive and higher on the learning performance of non-social courses, particularly in social intelligence competencies, than in the social courses; and (4) the interaction effect of ESCI and GMAT-V on the learning performance of social and non-social is slightly negative, however in social courses the effect is higher, especially if we refer to social intelligence competencies, i.e., empathy, organizational awareness, conflict management, coach and mentor, influence, inspirational leadership and teamwork. The latter finding informs the central research question in this paper. It supports hypothesis 2 of a negative interaction between EI competencies and cognitive ability on the learning performance of non-social courses, however it shows little support to our first hypothesis of a positive interaction, despite the effect being higher in social courses than in non-social. These findings, and particularly the lack of evidence in our sample to support what is a central hypothesis in this paper, H1, will be fully debated in the discussion section of this paper.

Figure 4.5 provides a visual summary of the interaction effects between each EI competency and GMAT-V on the learning performance of social and non-social courses. In other words, the figure shows the estimated effect of different GMAT and ESCI values on performance scores. Expected performance is shown in red for social courses and in blue for non-social courses. Solid lines represent individuals with the minimum observed GMAT verbal scores, whereas dashed lines represent individuals with highest GMAT verbal observed. The horizontal axis accounts for the range of the potentially observed ESCI values (between 5 and 10).

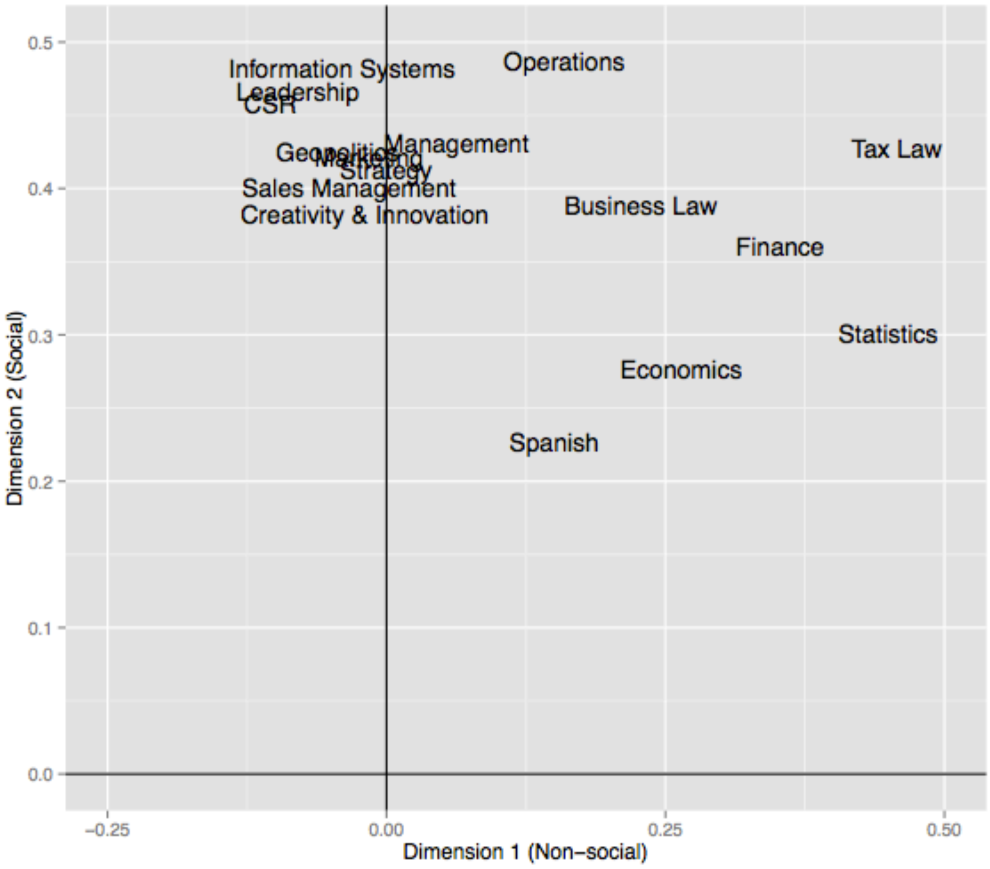

Figure 4.3 | Scatterplot of the topic weights on two cognitive dimensions: social and non-social, obtained by a factor analysis model on the individual scores in each topic.

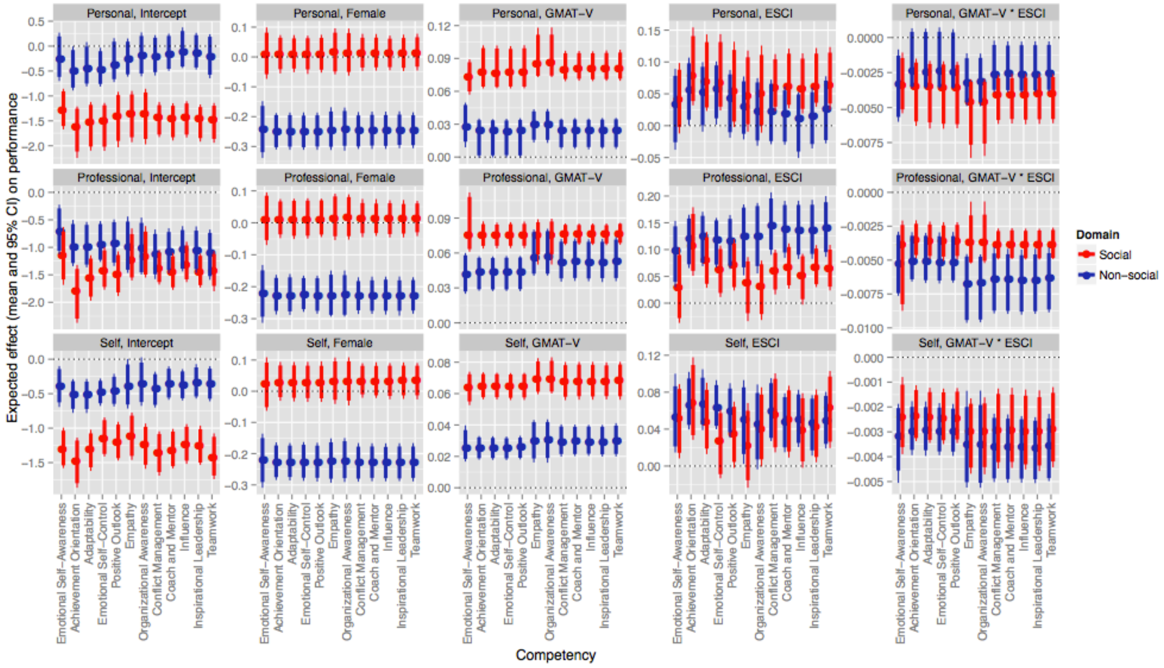

Figure 4.4 | Coefficient estimates of the direct effects of ESCI, GMAT-V and gender and the interaction effect of ESCI*GMAT-V on learning performance.

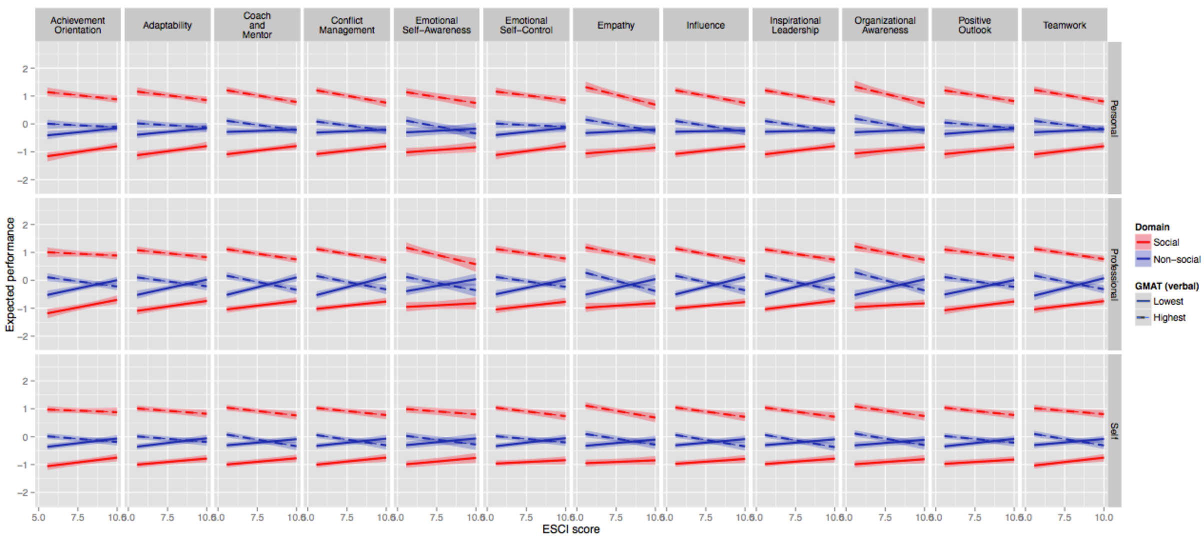

Figure 4.5 | Interaction effect between ESCI and GMAT-V on the learning performance of social and non-social tasks.

Effects accounting for unequal variances of performance using λ are quite different by domain. For social topics women have less variability in their performance, as well as individuals with higher GMAT. However, ESCI is not associated with higher or lower variability of performance on the social domain. For non-social domain topics, the picture is quite the opposite. Females have more variability in their performance, GMAT does not play any role in the variability and individuals with higher ESCI are more volatile in their performance (more difficult to predict).

4.8 Discussion

Earlier research has proposed that emotional intelligence and cognitive abilities contribute to performance in independent and incremental ways (Goleman, 1998; Mayer, Salovey & Caruso, 2000). The present study shows, however, that the contribution of EI to the classroom performance of 864 professional business executives and managers is dependent on their level of cognitive abilities. As predicted in hypothesis 2, we find evidence that in non-social tasks, those that primarily involve analytical thinking and logical reasoning about abstract concepts (e.g. course assignments in Statistics or Finance subjects), the lower cognitive ability the stronger the effect of EI competencies on performance. In agreement with Côté & Miners (2006), Agnoli et al. (2012) and Petrides et al. (2004), we find that those individuals who face bigger cognitive challenges have in compensation the opportunity to reap more benefits from deploying EI competencies. Facing a cognitive challenge, i.e. when a tasks' intellectual demands outweighs one's cognitive abilities, can be emotionally taxing, as sentiments of fear and frustration emerge, sabotaging one's focus, and approach motivation. In these situations, being trained to effectively use EI competencies such as emotional self-control, achievement orientation or positive outlook may help individuals keep their eye on the prize and their head in the game, with the confidence that, regardless of the cognitive difficulties they face, they can choose not to give up, but give in to keep a clear and focused mind until the task is finished. This way, EI competencies have in these cognitive struggles an opportunity to make a significant difference in performance. Otherwise, when individuals' cognitive resources outweigh task demands, the absence of a cognitive challenge or emotional threat, enables them to reach high performances in non-social tasks, regardless of their emotional competence.

On the contrary, when tasks engage the social cognitive domain, involving reasoning about people's minds and requiring interpersonal interactions to be accomplished, having high cognitive resources alone may not be enough to succeed. Hypothesis 1 proposed that in social tasks, EI competencies should be more consequential to performance when coupled with stronger rather than weaker cognitive abilities, i.e., a positive interaction, wherein EI and *g* mutually reinforce each other's contributions to performance. However, although our data showed a relatively higher interaction between EI and *g* on the performance of courses within the social domain as compared to the non-social, this increase was not sufficient to support hypothesis 1. We suspect this was due to a few limitations related to this study and the academic context in general. First, there was a limitation we detected after conducting an ex-post focus group with 15 MBA students (3 teams) to understand the nature of their teamwork. In a revealing discussion, the MBA candidates admitted how, regardless of the many team projects they had, particularly in social domain courses, such as Human Resources or Marketing, they had learned, early on into the MBA program, to work individually in all team projects. Specifically, they discovered the most efficient system to produce such large number of group projects across all MBA courses, was to assign different group projects to individual team members. For example, the team member with a HR management position, would be in charge of the Human Resources group project, whereas the one who held a sales job would take care of the Marketing team assignment, and so forth. In the end, all team members would review each other's "team" projects, but they would never meet to discuss different perspectives or exchange feedback. Therefore, even if the courses within the social domain had a higher percentage of teamwork, and should normally require more discussion and interaction within teams, the fact that students forge an individual work system to get through all team projects without interpersonal interaction, may have blurred the distinction between social and non-social tasks within our performance measures.

Second, although an MBA is an educational program known for being specifically designed to mimic the tasks of real business environments, the performance of those tasks is assessed in a remarkably different way in an academic setting than in the real workplace. Projects and assignments are graded in a bounded 1-10 scale, which limits the ability to distinguish good from outstanding performances, particularly if there is a tendency in private business schools such as ours, to observe a positive skew in grading (notably most passing grades fall between 8 and 10). Consequently, if students having just enough cognitive resources to meet the tasks demands, already score top grades on their projects, it leaves little room in the grading scale to discriminate the substantial quality improvements that might accrue to those individuals that, on top of good cognitive abilities have solid EI competencies to facilitate the discussion of distinct perspectives and experiences within their teams, which fosters the production of superior innovative projects (cite Druskat & Wolf, 2001). Otherwise, the use of an unbounded grading scale to assess performance, such as the market value of products and services that rules real business exchanges and is the base of performance measures at the workplace, allows capturing the full extent of the contribution of EI competencies to performance. This may help explaining why all studies on the interaction between EI (or social skill) and *g* on performance that are conducted in actual business environments show EI positively moderates the effect of cognitive abilities on performance (Ferris et al., 2001; Verbeke et al., 2008; Blair et al., 2011), whereas those studies conducted in academic settings do not (Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012).

Furthermore, by controlling results for gender, we are able to confirm a well-known finding by which females tend to have an advantage in social tasks, whereas males are at an advantage in performing non-social tasks. This phenomenon has been referred to as the gender equality paradox (), which is thoroughly studied in the Nordic countries, particularly Norway, where gender equality policies are relatively stronger than in the rest of Europe. In addition, this finding provides further validation that our confirmatory factor analysis across the various MBA courses was appropriately done, regarding the content distinction between social and non-social domains.

4.8.1 Limitations

A first limitation in this study concerns the range restriction in the GMAT, our measure of general cognitive ability. This is due to an MBA admission criterion that requires candidates to score above a certain threshold in their GMAT (usually above 600 points). Our attempt to correct for range restriction, by using the students' GMAT scores collected from the first time they took the test, as opposed to the scores with which they were admitted in the MBA (scores that may have been obtained after attempting the test several times), was effective insofar as it increased the variation in GMATs, but was limited to solve the selection bias within our sample.

In addition, by focusing on MBA candidates, even if our sample included business professionals with diverse nationalities and career backgrounds, we may have threatened the external validity of our findings. Moreover, the fact that the data came from a single school where, as we observed ex-post, there was a considerable absence of interpersonal interaction or actual teamwork among MBA teams, (regardless of the school's emphasis in group projects, particularly in social topics), may have threatened the construct validity of our measure of task performance in social domains.

Furthermore, our performance measures were based on grades given by professors in various MBA disciplines. Teachers' assessments of performance may be biased by the quality of relationships they establish with students, a phenomenon known as leader-member exchange (Graen & Uhl-Bien, 1995), which we were unable to control for. An alternative measure of performance we considered using to complement professors' grades is the peer-evaluations students do within their teams. However in our school, professors are not allowed to disclose their students' peer-evaluations, therefore we were unable to collect peer-evaluations in our sample.

4.8.2 Implications for future EI research and practice

To our knowledge, only 7 studies, including the present one, have examined the interaction between EI and cognitive ability on academic and job performance; all have found statistically significant interactions (Verbeke et al., 2008; Blair et al., 2011; Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012; Fiori, 2015). We thus hereby join their shared call for further research in EI that moves beyond incremental effects and pays attention to the interaction of EI with interdependent intelligences or abilities that have been thoroughly studied for their impacts on performance, particularly cognitive ability. This involves recognizing the false myth in our scholarship by which EI, or any other construct for that matter, may only be valuable for organizational research and practice, if it makes an incremental linear contribution to performance (Landy, 2005; Zeidner et al., 2004). Emotional intelligence, as a predictor of human performance, can be particularly more important and consequential in ways other than their incremental linear effects (Murphy, 1996; Hough, 2003). Exploring the indirect paths, such as the multiplicative effects of interaction, enables researchers to discover EI is valuable for ultimate performance, in part because it determines other variables' capacity to influence performance more effectively.

The most helpful contribution this paper offers to future research lies in the theoretical framework we develop for studying the interaction of EI and *g* on performance: the task-dependent interaction model of EI. By internalizing distinct types of tasks within the same sample, this model provides a potential way to reconcile the divergent findings among previous interaction studies conducted in job roles that require interpersonal interaction, and those conducted in academic settings where such interaction is oftentimes absent. In agreement with Rode et al. (2007) EI may be distinctively helpful whenever tasks require a high degree of interpersonal interaction, an observation that has been thoroughly explored in preliminary research studying the impact EI has on group processes (Jordan & Troth, 2004; Druskat & Wolff, 2001; Druskat & Wolff, 2008) and the quality of social interactions (Lopes et al., 2004). Therefore we invite researchers to explore task-dependent models, such as the one found here, for considering both multiplicative and additive effects of EI on human performance.

Nonetheless, insofar as schools are challenged to effectively engage students in interpersonal interactions, even in their group assignments, we may be at odds to observe the catalyzing power of EI on the relationship between cognitive abilities and academic achievement. This suggests that the replication of this study in organizations, where most work is developed in teams and interpersonal interactions abound, would provide a better chance to gather evidence in support of hypothesis 1 in our model, and show that EI boosts the relationship between *g* and performance. One challenge in such replication would concern the identification of jobs roles where employee's performance can be feasibly assessed in social and non-social tasks separately (e.g. a product manager has non-social tasks related to the technical product development as well as social tasks such as discussing product customization with potential clients).

Furthermore, our results along with previous work (Boyatzis et al., 2015; Furnham et al., 2014) show the importance of considering 360º multi-source assessments of EI. Different people, at work and at home, have unique vantage points from which to observe distinct facets of our behavior, particularly depending on the specific relationship and rapport they have established with us. Similarly to Boyatzis et al. (2015), our study shows that professional raters in general provide a more balanced assessment of EI competencies, with relatively smaller measurement error, as compared to self and personal raters, providing the smaller attenuation bias of our model estimates (i.e., had the higher coefficients). This suggests future research should benefit from introducing multi-source assessments in their EI measures. Specifically, it is interesting to dig deeper into the distinctive perspectives across the raters within each type (e.g., collaborators, bosses, peers; friends; relatives; spouse), and look into identifying which particular competencies each rater is best apt to observe and assess.

Finally, we join researchers working on different EI approaches (e.g., Fernández-Berrocal et al., 2006; Boyatzis et al., 2015; Petrides & Furnham, 2000) in a shared call for research that promotes a comprehensive vision for EI, one that acknowledges the unassailable contribution each existing measure, be they ability, self-report or behavioral EI, makes to the advancement of our understanding of what an emotional intelligent person thinks like, feels like and acts like.

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Appendix of Chapter 4

Table 4.1 | Correlation matrix between learning performance in social and non-social domains, cognitive abilities (as measured by GMAT) and EI competencies as scored by professional raters (*n*=864)

	Constructs	Social	Non-social	GMAT-V	GMAT-Q	GMAT-T	AO	A	CM	CFM	ESA	ESC	E	I	IL	OA	PO
[Social]	Performance Social																
[Non-social]	Performance Non-social	0.140															
[GMAT-V]	GMAT-V	0.380	0.032														
[GMAT-Q]	GMAT-Q	0.094	0.360	0.150													
[GMAT-T]	GMAT-T	0.320	0.240	0.790	0.730												
[AO]	Achievement Orientation	0.100	0.039	0.015	0.032	0.032											
[A]	Adaptability	0.039	0.053	0.038	0.037	0.049	0.780										
[CM]	Coach and Mentor	0.006	0.007	0.025	0.000	0.018	0.660	0.680									
[CFM]	Conflict Management	-0.024	0.072	-0.002	0.049	0.030	0.700	0.730	0.760								
[ESA]	Emotional Self-Awareness	-0.074	-0.018	-0.003	0.051	0.030	0.560	0.620	0.700	0.690							
[ESC]	Emotional Self-Control	-0.006	0.034	0.074	0.021	0.062	0.490	0.600	0.570	0.660	0.460						
[E]	Empathy	-0.026	-0.005	0.027	0.000	0.021	0.590	0.690	0.780	0.750	0.690	0.700					
[I]	Influence	-0.046	-0.002	0.023	0.034	0.039	0.670	0.750	0.710	0.770	0.670	0.550	0.710				
[IL]	Inspirational Leadership	0.009	0.004	0.020	-0.014	0.007	0.700	0.720	0.790	0.760	0.620	0.530	0.660	0.770			
[OA]	Organizational Awareness	-0.036	-0.007	0.033	0.002	0.026	0.600	0.760	0.680	0.700	0.630	0.620	0.750	0.760	0.680		
[PO]	Positive Outlook	-0.010	-0.008	-0.014	-0.038	-0.034	0.660	0.650	0.630	0.680	0.550	0.560	0.660	0.610	0.700	0.620	
[T]	Teamwork	-0.002	0.034	-0.006	-0.008	-0.007	0.630	0.700	0.820	0.760	0.620	0.660	0.810	0.700	0.730	0.750	0.650

Table 4.2 | Correlation matrix between learning performance in social and non-social domains, cognitive abilities (as measured by GMAT) and EI competencies as scored by personal raters (*n*=864)

	Constructs	Social	Non-social	GMAT-V	GMAT-Q	GMAT-T	AO	A	CM	CFM	ESA	ESC	E	I	IL	OA	PO
[Social]	**Performance Social**																
[Non-social]	**Performance Non-social**	0.140															
[GMAT-V]	**GMAT-V**	0.410	0.042														
[GMAT-Q]	**GMAT-Q**	0.092	0.360	0.160													
[GMAT-T]	**GMAT-T**	0.340	0.250	0.790	0.730												
[AO]	**Achievement Orientation**	0.052	0.030	-0.003	0.005	-0.001											
[A]	**Adaptability**	0.035	0.004	0.061	0.015	0.048	0.690										
[CM]	**Coach and Mentor**	-0.003	-0.074	0.007	-0.094	-0.053	0.570	0.600									
[CFM]	**Conflict Management**	-0.037	-0.032	-0.029	-0.021	-0.037	0.580	0.700	0.680								
[ESA]	**Emotional Self-Awareness**	-0.062	-0.100	-0.037	-0.052	-0.063	0.490	0.560	0.660	0.690							
[ESC]	**Emotional Self-Control**	0.010	0.066	0.011	0.008	0.009	0.470	0.600	0.480	0.620	0.450						
[E]	**Empathy**	-0.076	-0.058	-0.022	-0.068	-0.060	0.470	0.610	0.720	0.680	0.670	0.620					
[I]	**Influence**	-0.029	-0.095	0.008	-0.022	-0.009	0.520	0.680	0.620	0.690	0.590	0.440	0.530				
[IL]	**Inspirational Leadership**	-0.007	-0.083	0.008	-0.048	-0.027	0.650	0.700	0.710	0.710	0.610	0.490	0.570	0.760			
[OA]	**Organizational Awareness**	-0.037	-0.079	0.016	-0.055	-0.026	0.550	0.720	0.580	0.640	0.530	0.520	0.650	0.650	0.660		
[PO]	**Positive Outlook**	-0.072	-0.045	-0.057	-0.017	-0.051	0.540	0.560	0.490	0.540	0.450	0.510	0.470	0.450	0.610	0.510	
[T]	**Teamwork**	-0.012	-0.022	-0.037	-0.082	-0.078	0.550	0.650	0.720	0.660	0.520	0.600	0.690	0.530	0.640	0.670	0.560

Table 4.3 | Correlation matrix between learning performance in social and non-social domains, cognitive abilities (as measured by GMAT) and EI competencies as scored by self-evaluations (n=864)

	Constructs	Social	Non-social	GMAT-V	GMAT-Q	GMAT-T	AO	A	CM	CFM	ESA	ESC	E	I	IL	OA	PO
[Social]	**Performance Social**																
[Non-social]	**Performance Non-social**	0.130															
[GMAT-V]	**GMAT-V**	0.380	0.037														
[GMAT-Q]	**GMAT-Q**	0.085	0.360	0.150													
[GMAT-T]	**GMAT-T**	0.310	0.250	0.790	0.730												
[AO]	**Achievement Orientation**	0.036	0.020	-0.075	-0.061	-0.090											
[A]	**Adaptability**	-0.003	0.027	-0.022	-0.051	-0.048	0.550										
[CM]	**Coach and Mentor**	-0.033	-0.087	-0.073	-0.097	-0.120	0.350	0.330									
[CFM]	**Conflict Management**	-0.001	0.032	-0.035	-0.110	-0.093	0.490	0.470	0.460								
[ESA]	**Emotional Self-Awareness**	-0.008	-0.054	-0.019	-0.057	-0.051	0.340	0.340	0.400	0.440							
[ESC]	**Emotional Self-Control**	-0.065	0.031	0.011	-0.001	0.008	0.340	0.400	0.180	0.360	0.180						
[E]	**Empathy**	-0.096	-0.026	-0.075	-0.078	-0.099	0.320	0.460	0.450	0.480	0.470	0.390					
[I]	**Influence**	-0.037	-0.029	-0.008	-0.058	-0.043	0.390	0.490	0.420	0.520	0.360	0.250	0.390				
[IL]	**Inspirational Leadership**	-0.050	-0.076	-0.067	-0.110	-0.120	0.470	0.490	0.560	0.500	0.340	0.260	0.370	0.600			
[OA]	**Organizational Awareness**	-0.045	-0.079	-0.052	-0.110	-0.100	0.340	0.470	0.390	0.400	0.390	0.320	0.430	0.540	0.470		
[PO]	**Positive Outlook**	-0.089	-0.038	-0.150	-0.082	-0.160	0.450	0.420	0.300	0.380	0.220	0.300	0.330	0.280	0.480	0.300	
[T]	**Teamwork**	0.017	-0.048	-0.047	-0.110	-0.100	0.400	0.480	0.570	0.530	0.310	0.330	0.500	0.400	0.520	0.420	0.370

Chapter 5 | General Discussion, Limitations, Implications and Future Research

5.1 General discussion

5.1.1 Research questions revisited

The main purpose of this doctoral thesis is to inform and contribute to future research in emotional intelligence and its role in enhancing learning performance. As such, this concluding chapter revisits the central research questions that have guided the three studies comprised in this thesis, to offer an overall discussion of the findings and, while taking into account the research quality of each study, provide pointers to orient future research on emotional intelligence. Thus, in this thesis we have addressed the following three main research questions, with the first question split into two interrelated questions:

1_A. Is the multi-rater assessment of behavioral EI valid and reliable?

1_B. Are there some raters who are more apt to assess specific EI behaviors than others?

2. What is the relationship between behavioral EI and general intelligence?

3. How does behavioral EI moderate general intelligence for enhancing learning performance in social versus non-social tasks?

Collectively, these questions aim to expand our understanding of behavioral EI and its relationship with general intelligence, as well as how they interact together to enhance learning performance in specific types of tasks, particularly social and non-social tasks.

The first main question comprising two interrelated questions *"Is the multi-rater assessment of behavioral EI valid and reliable?"* and *"Are there some raters who are more apt to assess specific EI behaviors than others?"* are answered in the first empirical article (Chapter 2) and concern the conceptual and epistemic aspects of the operationalization of behavioral EI.

To respond to the second main question *"What is the relationship between behavioral EI and general intelligence?"*, we conducted an empirical study (Article 2, Chapter 3), wherein we formulate and empirically test four hypotheses, in particular that EI competencies are only slightly associated with general intelligence and that this association is moderated by the subject's gender and the type of rater – professional, personal or self – that is assessing the competencies. Based on a sample of 641 business professionals enrolled in an MBA program at a leading European business school, our findings indicate that behavioral EI, as observed and assessed by others, is slightly related to general intelligence. This finding is in contrast to the high correlations that have been found between cognitive intelligence and other EI approaches, especially ability EI. In fact, the high levels of association between measures of EI and *g* have been the basis of severe criticism to the construct's lack of divergent validity (Landy, 2005). This way, behavioral EI takes distance from other approaches in the way that it only captures EI if it is manifested through behavior that is visible to others. Because the behavioral manifestations of emotional intelligence have more to do with one's experience of dealing with emotional-laden situations rather than with fluid intelligence per se, we may observe that individuals have varying levels of EI competencies regardless of the level of cognitive intelligence they have developed thus far.

The fact that behavioral EI is only slightly related to general intelligence implies that we may observe a balanced distribution of these two individual abilities across the population. This offers the ideal conditions to inquire about the relatively unclear and less studied prediction of learning performance when EI is high (or low) and cognitive ability is low (or high). To inform this inquiry we must investigate the nature of the interactive relationship between emotional intelligence and general intelligence on learning performance. To this end, the third article (Chapter 4) in this thesis poses the question of "*How does behavioral EI moderate general intelligence in enhancing learning performance in social versus non-social* *tasks?"*. While previous research has proposed that emotional intelligence and cognitive abilities contribute to performance in independent and incremental ways (Goleman, 1998; Mayer, Salovey & Caruso, 2000), we show that the contribution of behavioral EI to the learning performance of 864 professional business executives and managers in an MBA program does depend on their level of cognitive abilities.

Moreover, in support of our second hypothesis in the third article, we find evidence that when individuals are engaged in non-social tasks, i.e. tasks that primarily involve analytical thinking about abstract concepts (e.g., course assignments in Statistics or Finance subjects), the lower is their level of cognitive ability relative to the intellectual demands of the task, the stronger is the effect of EI competencies on their learning performance. Indeed, when students face intellectually demanding tasks that outweigh their cognitive resources, they may experience an emotional upheaval, overwhelmed by negative emotions such as fear and frustration. These emotions can be incapacitating if they sabotage one's ability to focus on and drive away the needed motivation to approach the task. Under such cognitive challenges and emotional strain, our findings show that those students who, according to their professional or personal peers, are seen to have solid EI competencies, especially emotional self-control, achievement orientation or positive outlook, are able to keep their eyes on the prize and their head in the game until the task is finished. It is thus, in the presence of such cognitive struggles that often lead students to give up, that EI competencies find an opportunity to shine and make a considerable difference in performance. Instead, if students have a high level of cognitive abilities such that there is no cognitive challenge, i.e. the individual's cognitive abilities outweigh the task demands, the absence of an emotional struggle makes EI competencies appear less necessary to an individual's learning performance, to the extent that we observe high *g* students have high performances regardless of their level of emotional competencies. Although this finding illustrates the compensatory model devised by Côté & Miners (2006), which has also found support in other studies of academic performance (Agnoli et al., 2012; Petrides et al. 2004), we propose that it is best observed when tasks are non-social or require no personal interaction.

Otherwise, when tasks engage the social cognitive domain, involving reasoning about people's minds and requiring interpersonal interactions, we consider that having high cognitive abilities alone may not be enough to succeed. Our first hypothesis in the third article, which is central to this doctoral thesis, specifies that EI competencies are more consequential to performance when coupled with stronger rather than weaker cognitive abilities. That is, we expect a positive interaction in social tasks, wherein EI and *g* mutually reinforce each other's contributions to performance. This hypothesis bears logic in the way that the presence or absence of EI competencies can effectively "make or break" the manifestation into action of whichever abilities one may have, be they cognitive, visual, musical, or any other. This should be best observed if the task depends on the quality of personal interactions with other collaborators. In a way, the more an individual has developed his or her cognitive abilities, the more he or she has at stake, and thus the greater the impact that EI competencies may have in determining or undermining the successful display, without fear nor hesitation, of cognitive abilities into action. Notwithstanding, although our data show a relatively higher interaction between EI and *g* on the learning performance of courses from the social domain as compared to the non-social, this increase is not sufficient to support our original hypothesis. However, rather than shrug into questioning the logic and sense making of this hypothesis, we surmise this lack of evidence in our sample may be due to a few limitations related to our study and the academic context in general, issues that will be discussed in the following subsection.

5.1.2 Rater type moderator effect

One common aspect to all articles in this thesis is that each set of results is contingent or moderated by the type of rater that is assessing the individuals' behavioral EI, the main independent variable of interest. In the first article, which is devoted to the evaluation of the operationalization of behavioral EI through an inventory of 12 EI competencies, we perform a comparative analysis between the six types of raters that observe and assess the EI competencies – bosses, peers and subordinates within the professional entourage, and friends, relatives and partners within the personal. One of its main findings refers to the identification of a systematic pattern in the ratings whereby self-assessments provide the lowest ratings on all competencies, followed by professional raters and lastly the personal raters who offer the highest ratings in general. Typically, self-assessments observe an upward bias due to social desirability tendencies. Yet, that is not the case in our study. Much on the contrary, because the strictly developmental purposes of the ESCI assessment were clearly explained to every participant, individuals may have chosen to be honest with themselves or towards the individuals they were assessing, so as to offer the best contribution to a real human development agenda. Perhaps most intriguing is the fact when individuals choose to be honest with themselves they tend instead to underestimate their competencies as compared to others' assessment. Whether this is symptomatic of self-esteem issues or leniency bias on the part of others' assessment we cannot really tell with certainty. For instance, personal contacts offered on average the highest ratings, which may denote some form of leniency bias, which is expected to occur in close relationships. Notwithstanding, among all rater types, friends and work peers offered the most similar ratings, which can be understood from the fact that both rater types have a parallel vantage point of observation: both types of relationship share a parallel symmetry "among equals" which may provide for a more transparent relationship with less filters or attempts to influence certain behaviors in one another. Indeed, peers are known for providing more accurate and well-informed appraisals of their coworkers' behavior than supervisors (Druskat & Wolff, 1999; Kane & Lawler, 1978; Lewin & Zwany, 1976; Yammarino & Waldman, 1993).

Overall, amongst all findings in the first article, perhaps the most consequential to the remainder two articles in this thesis refers to the fact that rater types within each context were found to provide similar enough ratings to enable their aggregation into the larger context clusters of professional and personal raters. For this reason, articles two and three refer to these two groups of external raters (i.e., professional and personal), rather than to each of the six existing rater types.

Also, since professional raters were found to report the most conservative ratings among the external observers, with less leniency bias and measurement error, we expected they would sustain a smaller attenuation bias of the relationship between EI competencies and cognitive abilities. Indeed, while professional assessments observed a positive, although slight, relationship between behavioral EI and *g*, there was no relationship from observations of personal raters, and a slightly negative relationship of EI and *g* from self-assessment. Similarly, in the third paper we observe that the effect of EI competencies on learning performance is highest when professionals rate the competencies.

All in all, the different results from distinct raters are a reminder that the reality of what we see depends on the direction in which we look, and the emotion with which we color our lenses.

5.1.3 Gender differences

Another common feature across the three articles is the analysis of gender differences. In the first article we observe how females are generally perceived as more apt than men in competencies such as emotional self-awareness, achievement orientation and adaptability, but less agile in emotional self-control and conflict management. Perhaps the most unexpected yet revealing finding refers to how partners, of all raters, report the most discriminating assessments of women as they give them the lowest evaluations in achievement orientation, emotional self-control, inspirational leadership and cognitive competencies. Nonetheless, supervisors, who are in general the most conservative of all external observers, rate women the highest and ahead of men in achievement orientation, adaptability, conflict management, influence, inspirational leadership and teamwork. These findings appear to make justice to social stereotypes about women being more emotional and thus less able to manage the public manifestation of their emotions, which relates to their socially perceived nurturing role in the family and society. This role also bears fruits in the way women may do better as motivational and mentoring agents, being more adaptable to situations and having high emotionality when it comes to their achievement orientation.

Regarding the relationship between EI competencies and *g*, the second article (Chapter 3) finds that gender has a moderator effect on the results. Among men there appears to be a positive although slight relationship between EI and *g*, whereas women have a negative, albeit slight as well, relationship between their EI competencies and *g*, especially if the competencies are rated by professional raters or self-assessments. Whether emerging from sexist stereotyping or social comparison processes, the gender moderation we identified suggests a more generous attribution of the link between EI and *g* to males than females.

Furthermore, in the third article, we find evidence of gender stereotyping with respect to the types of tasks people tend to do best, such that our results show that females reach higher performances in social courses, whereas males do better in non-social courses. Gottfredson (1981) claims that sex-type boundaries in seeking knowledge about the world and choosing professional careers are set around the age of nine years old. Later in life these stereotypes are expressed as preferences for doing certain tasks or entering certain jobs (Gottfredson, 1981; Spain & Bianchi, 1996). Ultimately, this finding provides reassurance that our confirmatory factor analysis on the diverse MBA courses was appropriately carried out as it correctly distinguished the course contents between social and non-social cognitive domain tasks.

5.2 Limitations

Knowledge claims, propositions or inferences can be deemed valid if they represent to some extent an approximation to the truth (Shadish, Cook & Campbell, 2002). While we may never be certain that any particular inference is true, nor be sure that other inferences or previous theories are determinately falsified we can, however, identify the specific elements in our scientific exploration of reality, that may have limited our access to knowledge. As our field of research lies deep within the reign of social sciences, we are well aware of its susceptibility to certain limitations or threats to validity. While it is unnecessary to re-list all the limitations that have already been identified in each article, we will focus on discussing three of the most important, following the validity typology suggested in Shadish, Cook and Campbell (2002).

First, all three studies presented in this doctoral thesis, were based on data collected at a single school, ESADE, and particularly within the graduate population of MBAs. Although our MBA programs include business professionals with diverse nationalities and educational backgrounds, these two aspects are considered *threats to external validity* as they limit our ability to extrapolate or generalize results to a broader population. Future research could therefore replicate these three studies in other universities and educational programs to guarantee that a specific school's admissions criteria have not biased the results. Considering that European educational policies are investing in the development of emotional and social competencies – it is in fact one of the criteria within the Bologna program for higher education in Europe – it should be revealing to conduct comparative studies between European educational institutions that share similar competency development programs as ESADE's LEAD program.

A second limitation present in studies two and three concerns the restriction of range in the GMAT, our proxy measure of general cognitive ability, which poses a *threat to statistical conclusion validity*. Due to the MBA admission criterion that requires candidates to score above a certain threshold in their GMAT (usually above 600 points), our sample only covered individuals with medium-high to high levels of cognitive abilities. Notwithstanding we devised a way to limit the extent of range restriction by only considering the GMAT scores from the first test ever taken by the MBA candidate, instead of using the scores with which they were effectively admitted in the MBA (i.e., the school's admission office scores, which are all above 600 and may have been obtained after taking the test several times). This way, although we were able to increase the variance in GMAT scores, we could not completely eliminate the selection bias within our sample.

Possibly the most limiting threat to validity is the one we identified in the third article as we conducted ex-post focus groups with 15 MBA students (3 teams). These focus groups were conducted to both understand the qualitative nature of the teamwork involved in MBA courses, as well as to help explain the lack of support our data was showing for the first hypothesis in the article. In a revealing discussion, the MBA candidates admitted how, regardless of the many team projects they had, particularly in social domain courses, such as Human Resources or Marketing, they had learned, early into the MBA program, to work individually in all group projects. Specifically, they identified an efficient system to produce a large number of group projects across the many MBA subjects, whereby they would assign different group projects to individual team members. For example, the team member with a HR management position, would be in charge of the Human Resources group project, whereas the one who held a strategic marketing job would take care of the International Marketing team assignment, and so on. In the end, all team members would review one another's "team" projects, but they would seldom meet to neither discuss specific issues and perspectives nor exchange feedback. Therefore, even if the courses within the social domain had a higher percentage of group work, and should normally require more discussion and interaction within teams, the fact that students forged an individual work system to get through all team projects without actually engaging in any teamwork, the distinction between social and non-social tasks within our performance measures was effectively blurred. Although we identify this to be a *threat to construct validity*, in our measure of social tasks, it also limited the internal validity of the inferences from the third study. In a way, however, this limitation allows us to reflect on alternative explanations as to why our data could not show support to a central hypothesis in this thesis, regarding the positive mutual reinforcement of behavioral EI and cognitive abilities for enhancing learning performance.

Lastly, although an MBA is an educational program known for being specifically designed to mimic the problems and tasks of real businesses, the performance of those tasks is assessed in a remarkably different way in an academic setting than it is in the real workplace. Projects and assignments are graded in a bounded 1-10 scale, which limits the ability to distinguish good from great performances, in what we consider to be a *threat to internal validity* due to a restriction of range in performance. Consequently, if students with just enough cognitive abilities to pass the tasks' requirements are able to score good grades on their projects, that means we are leaving little room in the grading scale to discriminate any substantial quality improvements that might accrue to those individuals that excel well beyond the requirements. Notably, those individuals that on top of good cognitive abilities also make use of solid EI competencies to facilitate team discussions, namely easing the navigation through conflicting perspectives among team members, they are able to raise excellence standards in solutions and product innovations (Druskat & Wolff, 2001), yet their school grade performance is bounded to signal the real value of their contributions. Unless we use unbounded scales to assess performance, such as the market value of products and services that rules real business exchanges and is the base of performance measures at the workplace, we may never capture the full extent of the contribution that EI competencies have on learning performance. This difference in the grading scales between the real world of business and business schools may indeed help explain why all studies on the interaction of EI and *g* on performance when conducted in actual business environments show EI positively moderates the effect of cognitive abilities on performance (Ferris et al., 2001; Verbeke et al., 2008; Kidwell et al., 2011), whereas when conducted in academic settings show a negative interaction instead (Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012).

5.3 Practical implications

5.3.1 Democratizing EI into specific learnable competencies

The first article in this doctoral thesis lends support to extant research efforts directed at establishing behavioral EI as a valid and reliable approach. The behavioral approach to EI expands our knowledge of emotional intelligence by gaining insight about what an emotionally intelligent person acts like. More than valid, the behavioral approach to EI as measured by the ESCI (Boyatzis, 2009; Boyatzis & Sala, 2004; Boyatzis & Goleman, 2007) is valuable to educational institutions and organizations wishing to implement EI development programs for their students and employees, in at least three ways: (1) The ESCI democratizes emotional intelligence by demonstrating that EI can be found in specific daily behaviors and not just as a form of intelligence we may only access when rigorously prompted by tests in a lab; (2) It identifies 12 EI competencies with 5 behavioral indicators which anyone who lives or works with us may observe and assess, thus, alleviating the burden of relying on subjective and oftentimes unreliable self-evaluations of emotional-laden competencies; (3) Because behavioral EI focuses on several particular competencies covering specific EI facets – e.g., exploring some level of emotional self-awareness, or being empathetic with others – it does not invite the attribution of a halo effect, often associated with single construct measures that may deem someone to have or nor a high emotional intelligence. (Boyatzis, 2008); (4) Lastly, by approaching EI at the level of behavior, we are able to translate the intelligence in EI, an abstract notion we may know little about how to develop, into action-packed behaviors we cannot gain awareness through multisource feedback, we have full agency to practice and develop, if we so intend to (cf. Boyatzis, 2001, 2006).

5.3.2 Enabling a selective multi-rater assessment of behavioral EI

A second implication stems from our first article as it paints a clear landscape as to what EI competencies may be better assessed by which raters across the personal and professional spheres. For example, we find evidence that organizational awareness is best assessed by partners and friends. Or that emotional self-control is more frequently observable by work colleagues or peers. These findings support the streamlining of multi-rater assessment protocols, by, for instance, having each rater type evaluate only the few competencies he is most qualified to observe and assess. This could considerably reduce the number of items in the survey each rater type needs to assess, fostering their focus on just a few competencies, thus increasing the quality of the overall assessment.

Professionals using 360° assessments to coach or develop EI should be prepared to identify systemic differences across gender and rater types. Otherwise, individuals may leave their coaching session thinking they have an actual "problem" with certain raters, when in reality it is a systematic bias shared across types of raters.

5.3.3 EI is for everyone, and particularly for "geniuses"

Our third article offers a central theoretical contribution within this doctoral thesis. The conventional view that has been shared by Goleman's best sellers, and researchers throughout in the field, is that EI helps performance in those places where cognitive intelligence cannot. Under this premise, emotional intelligence has, in a way, been sold to those who would rather eat dust than solve a math's problem. That is, EI has gained a certain face validity by which it can do what cognitive intelligence cannot. Instead, our third article counters this credo, as it lends support to the argument that emotional and cognitive intelligences are mutually reinforcing in their effects on learning performance (see Ferris et al., 2001; Verbeke et al., 2008; Kidwell et al., 2011). This implies that those individuals that have developed strong cognitive abilities are able to reap more benefits from investing in EI competencies, as compared to those individuals that are at lower levels of their cognitive intelligence development. This theoretical finding, which may hopefully gather further support from future empirical studies in all of EI's streams, shows that emotional intelligence can, in a way, "make or break" any other abilities we may have developed. For example, if a music genius is suffering from stage fright, s/he can solve that emotional problem by learning EI competencies such as emotional self-awareness. In all likelihood, gaining EI competencies will make the difference between what would otherwise be a humiliating performance and a brilliant spectacle. We believe this is a finding worth debating about in schools and organizations, because it has strong implications in the quality of collaborations students and work colleagues are willing to engage in within their teams. This finding may provide the much needed incentive for top performing students or employees to realize and test for themselves that it is in using emotional intelligence behavior when conversing with others that their most brilliant ideas may come about (Druskat et al., 2001). That is, this type of conversations, that are embedded within an emotionally sensible atmosphere, make up what real teamwork is about, a safe place where learning is both limitless and joyful to everyone, but that tends to be more consequential in terms of performance to those students that are already at an advanced level of their cognitive development. All in all, truly "genius" is to outsmart our egos and collaborate.

5.4 Avenues for future research

We join researchers working on different EI approaches (e.g., Fernández-Berrocal et al., 2006; Boyatzis et al., 2015; Petrides & Furnham, 2000) in a shared call for research that promotes a comprehensive vision for EI, one that acknowledges the unassailable contribution each existing measure, be they ability, self-report or behavioral EI, makes to the advancement of our understanding of what an emotional intelligent person thinks like, feels like and acts like. Indeed, our results suggest that research on EI should examine at more than one level within studies, the ability, trait, self-perception or behavioral levels. It may help in understanding the relevance of EI to life and work outcomes, as well as other constructs in psychology.

When collecting behavioral EI data, analyses should examine the sources of the observations as a possible moderator or mediator on the dependent variables. For example, in our research, it is likely that the professional environment provides more opportunities for the raters to assess *g*-related competencies than the personal environment. It is also crucial to analyze data for gender effects that may not be apparent in more direct, statistical analysis.

To our knowledge, the third article in this thesis is first to study the interactive role of behavioral EI and cognitive ability on enhancing learning performance. Yet, it joins six other studies that have examined the interaction between EI and cognitive ability on academic and job performance; all have found statistically significant interactions (Verbeke et al., 2008; Kidwell et al., 2011; Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012; Fiori, 2015). We thus hereby join their shared call for further research in EI that moves beyond incremental effects and pays attention to the interaction of EI with interdependent intelligences or abilities that have been thoroughly studied for their impacts on performance, particularly cognitive ability. This involves recognizing the false myth in our scholarship by which EI, or any other construct for that matter, may only be valuable for organizational research and practice, if it makes an incremental linear contribution to performance (Landy, 2005; Zeidner et al., 2004). Emotional intelligence, as a predictor of human performance, can be particularly more important and consequential in ways other than their incremental linear effects (Murphy, 1996; Hough, 2003). Exploring the indirect paths, such as the multiplicative effects of interaction, enables researchers to discover EI is valuable for ultimate performance, in part because it determines other variables' capacity to influence performance more effectively.

The most substantial contribution this thesis offers to future research lies in the theoretical framework we develop in the third article for studying the interaction of EI and *g* on performance: the task-dependent interaction model of EI. By internalizing distinct types of tasks within the same sample, the model provides a potential way to reconcile the divergent findings among previous interaction studies conducted in job roles that require interpersonal interaction, and those conducted in academic settings where such interaction is oftentimes absent. In agreement with Rode et al. (2007) EI may be distinctively helpful whenever tasks require a high degree of interpersonal interaction, an observation that has been thoroughly explored in preliminary research studying the impact EI has on group processes (Jordan & Troth, 2004; Druskat & Wolff, 2001a; Druskat & Wolff, 2001b; Druskat & Wolff, 2008) and the quality of social interactions (Lopes et al., 2004, Lopes et al., 2005). Therefore, we invite researchers to explore task-dependent models, for considering both multiplicative and additive effects of EI on human performance.

Nonetheless, insofar as schools are challenged to effectively engage students in interpersonal interactions, even in their group assignments, we may be at odds to observe the catalyzing power of EI on the relationship between cognitive abilities and academic achievement. This suggests that the replication of our third study in organizations, where most work is developed in teams, would provide a better chance to gather evidence in support of the hypotheses in this model, and show that

EI competencies catalyze the relationship between general intelligence and learning performance.

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Table 1.1 | Synopsis of the three empirical articles

Articles / Chapters	**Article 1 / Chapter 2**	**Article 2 / Chapter 3**	**Article 3 / Chapter 4**
Topic	EI Competencies	EI Competencies ~ Intelligence	EI Competencies × Intelligence ➚ Learning Performance
Title	The 360º Assessment of EI Competencies within the Professional and Personal Entourage: A validation study	EI Competencies as a Related but Different Characteristic than Intelligence	When EI Competencies Catalyze the Relationship between Intelligence and Learning Performance: A task-dependent interaction model
Research questions	Is the multi-rater assessment of behavioral EI valid and reliable?; Are there some raters who are more apt to assess specific EI behaviors than others?	What is the relationship between behavioral EI and general cognitive ability?	How does behavioral EI moderate general cognitive ability in enhancing learning performance in social versus non-social tasks?
Theoretical framework	Emotional Intelligence (Salovey & Mayer, 1990) Behavioral approach to EI (Sala, 2002; Boyatzis & Sala, 2004; Boyatzis, 2009; Byrne et al., 2007; Boyatzis et al., 2015) Intentional Change Theory (Boyatzis 2001, 2006a, 2006b; Kolb & Boyatzis, 1970) Theory of multiple selves (Ibarra, 1999)	Emotional Intelligence (Salovey & Mayer, 1990) Behavioral approach to EI (Sala, 2002; Boyatzis & Sala, 2004; Boyatzis, 2009; Byrne et al., 2007; Boyatzis et al., 2015) Intentional Change Theory (Boyatzis 2001, 2006a, 2006b; Kolb & Boyatzis, 1970) Three-stratum theory of intelligence (Carroll, 1993)	Emotional Intelligence (Salovey & Mayer, 1990) Behavioral approach to EI (Sala, 2002; Boyatzis & Sala, 2004; Boyatzis, 2009; Byrne et al., 2007; Boyatzis et al., 2015) Intentional Change Theory (Boyatzis 2001, 2006a, 2006b; Kolb & Boyatzis, 1970) Three-stratum theory of intelligence (Carroll, 1993)
Method	Quantitative: 360-degree assessment; Confirmatory Factor Analysis; Inter-rater agreement	Quantitative: Confirmatory Factor Analysis; Bayesian hierarchical model	Quantitative: Bayesian hierarchical model; Qualitative: *ex-post* focus group
Sample	555 full-time, part-time and executive MBA candidates in a leading European business school between 2006-14	641 full-time and part-time and executive MBA candidates in a leading European business school, between 2006-13	864 full-time, part-time and executive MBA candidates in a leading European business school, between 2006-13

Table 1.1 | (continued)

Articles / Chapters	Article 1 / Chapter 2	Article 2 / Chapter 3	Article 3 / Chapter 4
Topic	EI Competencies	EI Competencies ~ Intelligence	EI Competencies × Intelligence ➚Learning Performance
Expected findings	Validation of the ESCI-U as a behavioral EI measure; Identification of a systematic pattern in competency ratings by rater type	Behavior EI is slightly related to general cognitive ability; This relationship is moderated by rater type and gender	In non-social tasks, EI negatively moderates the relationship between *g* and performance
Unexpected findings	Supervisors are the raters that most rate women's EI competencies ahead of men's, particularly in the competencies of achievement orientation, adaptability, organizational awareness, conflict management, coach and mentor, influence, inspirational leadership and teamwork	No	We find little evidence in our sample that in social tasks, behavioral EI positively moderates the relationship between *g* and performance
Publication status	Loewe, N., Batista-Foguet, J. M., Canboy, B., Mosteo, L. & Truninger, M. (2013). Friends, relatives and couples' perspectives on multisource assessments of emotional and social competencies. *IV International Congress in Emotional Intelligence Proceedings*. New York, NY Truninger, M., Loewe, N., Batista-Foguet, J. M., & Serlavós, R. The 360º Assessment of EI Competencies within the Professional and Personal Entourage: A validation study. (Preparing submission to the *International Journal of Human Resource Management*)	Boyatzis R. E., Batista-Foguet, J.M., Fernández-i-Marín, X., & Truninger, M. (2015). EI competencies as a related but different characteristic than intelligence. Frontiers in Psychology, 6 (72): 1-14. doi: 10.3389/fpsyg.2015.00072	Truninger, M., Batista-Foguet, J. M., Serlavós, R. & Boyatzis, R. (2013). The emotionally competent highway from IQ to performance: Testing an interaction effect model. European Survey Research Association. Lljubljana, Slovenia. Truninger, M., Fernández-i-Marín, X., Batista-Foguet, J. M., Boyatzis, R. E., & Serlavós, R. When EI Competencies Catalyze the Relationship between Intelligence and Learning Performance: A task-dependent interaction model. (Preparing submission to *Frontiers in Psychology*)

1.5 Main contributions

From a theoretical perspective we contribute to establishing an alternative approach to the role of behavioral EI in learning performance (Côté & Miners, 2006; Verbeke et al., 2008; Kidwell et al., 2011). As we step aside from the swarmed discussion over which of EI or cognitive ability is the strongest predictor of life and work outcomes, we propose that both are fundamental to performance. Furthermore, we hypothesize that it is in the interaction and mutual reinforcement between behavioral EI and intelligence that lies the power of EI.

Specifically, the most valuable contribution we offer to future research rests on the theoretical framework we develop for studying the interaction of EI and *g* on performance: the task-dependent interaction model of EI. By internalizing distinct types of tasks within the same sample, we propose that in social tasks we may best observe the positive moderation of EI on the relationship between cognitive abilities and learning performance, whereas in non-social task this interaction may have the opposite sign, i.e., EI may be more helpful to those that face greater cognitive challenges in their tasks. This model provides a potential way to reconcile the divergent findings among previous interaction studies conducted in job roles that require interpersonal interaction, and those conducted in academic settings where such interaction is oftentimes absent. Therefore, we invite researchers to explore task-dependent models, such as the one found herein (see Chapter 4), for considering both multiplicative and additive effects of EI on learning performance.

Our construct validation study of the Emotional and Social Competencies Inventory (Boyatzis & Goleman, 2007), is also an important contribution as we help foster the establishment of behavioral EI as a valid and reliable approach with which to observe the EI abilities in action, embedded within real contexts, and not just on paper in a laboratory setting.

Furthermore, our results along with previous work (Boyatzis et al., 2015; Furnham et al., 2014) show the importance of considering 360º multi-source assessments of EI. Different people, at work and at home, have unique vantage points from which to observe distinct facets of behavior, particularly depending on the specific relationship and rapport they have established with others. Similarly to Boyatzis et al. (2015), our study shows that professional raters in general provide a more balanced assessment of EI competencies, with relatively smaller measurement error, as compared to self and personal raters, providing the smaller attenuation bias of our model estimates (i.e., had the higher coefficients). This suggests future research should benefit from introducing multi-source assessments in their EI measures. Specifically, it is interesting to dig deeper into the distinctive perspectives across the raters within each type (e.g., collaborators, bosses, peers; friends; relatives; spouse), and look into identifying which particular competencies each rater is best apt to observe and assess.

Finally, we join other researchers working on different EI approaches (Fernández-Berrocal et al., 2006; Boyatzis et al., 2015; Petrides & Furnham, 2000) in a shared call for research that promotes a comprehensive vision for EI, one that acknowledges the unassailable contribution each existing measure, be they ability, self-report or behavioral EI, makes to the advancement of our understanding of what an emotional intelligent person thinks like, feels like and acts like.

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Chapter 2 | The 360º Assessment of EI Competencies within the Professional and Personal Entourage: A validation study

ABSTRACT

Conventionally, 360-degree competency assessments only incorporate the focal manager self-evaluations and feedback from co-workers, omitting the perspective of those that observe a manager's personal-life. Personal sources, however, may provide feedback of particular interest when assessing behaviors that manifest across multiple life contexts, as is the case of competencies related to leadership effectiveness. In addition, communication technologies have changed working habits, places, and schedules, giving personal sources more opportunities to observe managers working. Accordingly, this article examines whether extending *sources* beyond the traditional organizational setting provides complementary feedback to the manager, which might be relevant for his or her leadership development at work. Using a repertoire of emotional, social, and cognitive competencies that have been related to leader effectiveness, we perform a comparative analysis across the ratings from self-assessments and six different external rating sources from both personal and professional life spheres: supervisors, peers, subordinates, friends, relatives, and couples. Despite the presence of leniency bias in personal ratings, we find evidence that personal sources provide higher levels of agreement in ratings of competencies such as organizational awareness, teamwork and inspirational leadership. Among personal raters, friends and partners provide the closest ratings to professional sources, particularly those from peers and subordinates, while offering a more knowledgeable perspective in the evaluation of certain leadership competencies.

Keywords: Multisource assessment; 360º assessment; Emotional intelligence competencies, rater types

2.1 Introduction

In organizations, multisource evaluation techniques such as 360º assessments are often used to provide comprehensive feedback to a manager – or target[1] - as multiple observers that live or work with the person are invited to participate in the assessment and anonymously disclose their views. Ideally, 360º assessments incorporate as many complementary perspectives as needed to draw a multilayered landscape of the person's behavior. This article focuses on the analysis of a repertoire of emotional, social, and cognitive competencies provided by various sources or rater types from the target's professional and personal life domains.

The purpose of this article is twofold: (1) It evaluates the quality of a behavioral instrument measuring Emotional Intelligence competencies, by verifying the constructs' validity and reliability and testing the overall model fit using Structural Equation Modeling (SEM) techniques and (2) it performs a comparative analysis of the different perspectives that various observers have when appraising the competencies. The main research question we address inspects whether there are some types of raters that may be more apt at assessing specific EI competencies than others. Specifically, how do self-evaluations compare with external raters judgment? Are all observers equally adequate to assess all competencies, or on the contrary, are there raters that being more exposed to specific behaviors can provide better judgments of certain competencies than others? What about gender differences? Are there competencies in which women are perceived as more apt than men, and vice-versa?

The central premise underlying multisource assessment is that the focal managers profit more when feedback is provided from multiple perspectives (London &

[1] The terms "(focal) manager", "target" and "student" are used interchangeably throughout the article.

Smither, 1995). Managers behave differently around different types of raters, or rating sources. Different ratings sources have unique opportunities to observe manager's behavior and consequently provide different perspectives (Lawler, 1967). Even if the manager engages in relatively stable behavior across rating sources, raters from different groups may selectively attend to different aspects of an identical behavior and attach different levels of importance to the behavior (Borman, 1974; Tsui & Ohlott, 1988). Consequently, different rating sources often have varied, yet equally valid views of a manager's performance. Rather than creating a problem, rating discrepancies are seen as an opportunity under the multisource assessment approach to feedback. Managers and their coaches can take advantage of these different perspectives if they clarify the bases for feedback discrepancies and use them in creating managers' development plans. Therefore, according to the multisource assessment approach to feedback, 360-degree programs should ideally incorporate as many complementary perspectives as required to capture a comprehensive view of the focal manager's relevant behavior to leadership effectiveness at the workplace.

While there is no doubt on the value of co-workers' perspectives in appraising a manager's perceived strengths and weaknesses, sources from the manager's personal-life – such as manager's friends, relatives, and couple – are usually not considered for 360-degree programs assessing leadership at the workplace. However, most of the competencies related to leadership at work (Boyatzis & Goleman, 2007; Wolff, 2006) – like emotional self-awareness, optimism, and teamwork – manifest themselves across multiple life contexts, not only at the workplace. Also, communication technologies have blurred the traditional workplace boundaries, giving personal sources more opportunities to observe managers' behaviors while they work. Taking together, both factors may legitimate personal sources to provide relevant feedback on leadership-related behaviors at work. However, including extra sources in 360-degree programs is not without its costs. Although technology has greatly facilitated the task of gathering, analyzing, and reporting feedback, more raters may imply additional work. Therefore, the logic to justify the inclusion of sources from managers' personal-life sphere requires that these sources can provide substantially unique and relevant performance information about the managers.

This article empirically examines the assessment of emotional, social and cognitive competencies as observed by self, professional and personal sources in all-inclusive 360-degree assessment. Using repeated measures ANOVA we compare ratings provided by the managers themselves and their supervisors, peers, subordinates, friends, relatives, and partners. The data consists of managerial ratings from a sample of 555 MBA students assessed on a repertoire of emotional, social, and cognitive competencies shown to be crucial for effective leadership. Findings show evidence that personal sources complement professional raters in the assessment of leadership-related competencies.

2.2 Theoretical Framework

Most of the research on multisource assessment advocates for incorporating different rating sources in the design of 360-degree feedback programs. The rationale is that different rating sources provide substantially unique performance information about managers (Borman, 1997; Dalessio, 1998; Murphy & Cleveland, 1995), or what is often referred to as the "discrepancy hypothesis". There are three commonly accepted explanations for dissensus among rating sources: (1) differences in the performance information available to different sources (Lawler, 1967; Lance et al., 2008), (2) differences in criterion type and criterion weight used to evaluate performance (Borman, 1974; Tsui & Ohlott, 1988), and (3) sources' idiosyncratic rating tendencies leading to different measurement errors (Campbell et al. 1970; Saal et al., 1980). Evaluators rate managers based on perceived information, which may differ widely across individuals observing identical behavior (DeNisi et al., 1984; Landy & Farr, 1980). Also, managers behave differently in the presence of different groups of evaluators, therefore, different rating sources have unique opportunities to observe manager's behavior depending on the nature of the evaluator's relationship to the manager being rated (Lawler, 1967; Kavanagh et al. 1971; Thomson, 1970). Different evaluators might also attend to distinct aspects of the same observed behavior (Borman, 1974). Even if evaluators attend to the same aspects, they might still place different levels of importance, thus, arriving at different assessments of the same manager's performance. Further, different response bias – like halo, leniency, central tendency, and range restriction (e.g., Saal et al., 1980) - may affect sources differently reducing their rating accuracy. In any case, diverse rating sources often have distinct, yet equally valid views of a manager's performance, leading to rating discrepancies.

There are also situational factors that may influence dissensus among different groups of raters. Different rating sources are likely to observe managers in situations that are fairly different in nature. For example, while a manager's partner or spouse can observe how he or she fights back to recover from illness or is willing to offer selfless help to a stranger, a supervisor normally has more opportunities to observe the manager in formal situations that oftentimes follow a standard protocol of behavior. However, situations vary in terms of relevancy for a given competence, trait, or skill of interest (Haaland & Christiansen, 2002; Tett & Guterman, 2000). In other words, some situations have more potential than others to provide cues to trigger - or to activate - certain competency-relevant behavior (Murtha et al., 1996). Despite the multiple reasons for dissensus among different rating sources, some researchers have also found evidence that raters from the same organizational level disagree as much as raters from different levels (Viswesvaran, et al. 2002; Mount et. al, 1998; Lebreton et. al, 2003; Barr & Raju, 2003; Scullen et. al, 2000). Given the contradictory empirical findings of previous research on the level of discrepancy among professional sources, in this article we treat supervisors, peers, and subordinates separately.

Finally, the leadership competencies used in this study (Boyatzis, 2009; Boyatzis & Goleman, 2007) manifest themselves across multiple life contexts, not only at work. Also, communication technologies have blurred the traditional workplace boundaries, giving personal sources more opportunities to observe managers working. Still, it is reasonable to assume that professional sources have more opportunities to observe manager's leadership behaviors relevant to work. However, Landy and Farr (1980) found that the relevance of the interaction between rater and target to the dimensions being evaluated was more important than frequency of observation. Thus, competency-relevance differences among the situations in which personal sources and professional sources observe managers may compensate for differences in frequency of observation. In sum, there is no reason to expect personal sources to be less adequate than professional raters to assess the leadership-competencies used in this study. As Heger (2007) found a positive relationship between opportunity-to-observe and interrater agreement (between two raters) or consensus (among three or more raters), we expect that sources will attain more interrater agreement indices in those competencies for which the source is better suited and vice versa. On the basis of the above discussions, we formulated and tested the following four hypotheses:

Hypothesis 1: In the context of competency assessments designed for personal development purposes only, self-evaluations tend to consistently underestimate one's competencies as compared to others' ratings.

Hypothesis 2: Professional rater types have a higher level of interrater agreement in their ratings of emotional and social competencies than personal rater types.

Hypothesis 3: There are no significant rating differences within professional sources (i.e., between supervisors, peers and subordinates) and within personal sources (i.e., between friends, relatives and partners)

Hypothesis 4: There is a systematic rating pattern across self, professional and personal sources: self < supervisors < peers < subordinates < friends < relatives < partners.

2.3 Method

2.3.1 Participants

As part of a leadership development course (LEAD) at a Spanish Business School, students participate in a 360º competency assessment, whereby they complete a self-evaluation questionnaire on a repertoire of emotional, social and cognitive competencies and in parallel select multiple external observers within their professional and personal entourage, to assess the target student in the same questionnaire.

Our sample includes 555 MBA students who participated in the LEAD course between 2006 and 2014 and had at least one rater of each type. Students' age ranged from 22 to 55 (Mean = 31.2, SD = 6.2) and 33.2% were female. 84.3% of students were from Spain, while the remainder were from 32 different countries such as Germany (1.6%), USA (1.4%) or Mexico (1.3%). Participants' educational backgrounds according to the ISCED 2011 classification (UNESCO, 2012) were: Social sciences, business and law (43.1%), engineering, manufacturing and construction (36.2%), science (11.3%), health and welfare (5.5%), services (2%) and humanities and arts (1.8%). Students had on average 17 external raters (SD = 7.5; Range: 6 – 70). Among the total 8,309 observers who provided ratings, there were 6 rater types: supervisors (13.1%), peers (20.9%), and subordinates (20.5%)

within the professional sphere; friends (23.0%), relatives (15.6%), and partners or spouses (6.9%) within the personal context.

2.3.2 Measures

Individuals are assessed on the fourteen behavioral-based EI competencies included in the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis & Goleman, 2007): emotional self-awareness (ESA), achievement orientation (AO), emotional self-control (ESC), adaptability (A), positive outlook (PO), influence (I), empathy (E), organizational awareness (OA), inspirational leadership (IL), conflict management (CFM), coach and mentor (CM), and teamwork (T). Additionally, the ESCI-U includes two cognitive competencies: system thinking (ST) and pattern recognition (PR). A brief description of the 14 competencies from Boyatzis and Goleman (2007) is presented in the Appendix.

The ESCI-U questionnaire consists of 70 items – 5 per competency – that measure the frequency of observed behaviors associated to the fourteen competencies. A typical item includes a question "How often do you/does the target…?" followed by a behavioral indicator such as "See possibilities rather than problems." The questionnaire uses an 11-point Likert type scale to assess the frequency with which the individual demonstrates each behavior (from 0 = "never" to 10 = "always"). To accommodate for the possibility of external raters' uncertainty regarding a few aspects of the target's behavior, the response scale also includes the option "I do not know" (Batista-Foguet & Saris, 1997). Notwithstanding, for each questionnaire to be considered valid this option cannot be checked more than eight times by external raters, and five times in the case of self-evaluations. Although this scoring procedure often results in item level missing values, the data is complete at the competency level, such that we do not need to replace missing values.

The survey is administered through an online platform, where students self-select multiple external raters within 6 categories: supervisors (SV), peers (PE) and subordinates (SB) from their professional entourage, as well as friends (FR), relatives (RE) and partners (PT) within their personal spheres. Each selected rater receives an automatic email from our institution, with an invitation to participate in the 360º assessment of the target individual wherein they are informed about the strictly developmental purpose of the questionnaire and guaranteed the confidentiality and anonymity of their data, as students only receive feedback reports based on aggregated data.

2.4 Results

To evaluate the quality of the ESCI 360º assessment instrument, we began by examining construct validity[2]. Professional and personal raters have different vantage points from which to observe the target individual's behavior. These differences in perspective reflect the distinction between work and home contexts, as well as the specific nature of each rater's rapport with the target, as each relationship may elicit certain competencies to manifest more than others. This way, because we suspect that the ESCI factorial structure may differ across rater types we have modeled the data separately. After a first exploratory factor analysis (EFA) showing that the two cognitive competencies, systems thinking and pattern recognition, loaded highly on the same factor and had correlations above 0.89 on all rater types, the subsequent confirmatory factor analysis (CFA) failed to reject the unidimensionality of the 5+5 indicators corresponding to the two competencies. We thus modified the original 14-competency model to hypothesize a 13-factor model with one single cognitive competency.

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[2] Construct validity has been defined as "the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests" (American Educational Research Association et al., 1999, p.9).

To test the measurement model of the 13 competency scales we used Lisrel 9.2. In the presence of missing values, we performed a Full Information Maximum Likelihood (FIML) estimation for each rater type, while using the same model specification. Table 2.1 shows that the global fit indexes of the measurement model were acceptably close to the recommended thresholds. Although the FIML chi-squares are considerably high, these were due to a few irrelevant misspecifications, further magnified by the high power in our analysis (i.e., large sample size and high reliabilities). The factor loadings of each item on its respective competency were all above 0.7.

Table 2.1 | Global fit indexes of the ESCI measurement model for each rater type (*n*= 555)

Rater type		Full Information ML χ^2 (df)	90% CI RMSEA	P-value for test of close fit (RMSEA < 0.05)
Self		5790 (2267)	(0.0512; 0.0546)	1.000
Professional	**Supervisors**	6766 (2267)	(0.0582; 0.0614)	1.000
	Peers	7536 (2267)	(0.0631; 0.0663)	1.000
	Subordinates	7323 (2267)	(0.0618; 0.0650)	1.000
Personal	**Friends**	7739 (2267)	(0.0643; 0.0676)	1.000
	Relatives	6499 (2267)	(0.0563; 0.0596)	1.000
	Partners	5862 (2267)	(0.0518; 0.0551)	1.000

In addition, we checked that: 1) all the model estimates were reasonable and had the expected sign; 2) the correlation residuals suggested no further addition of parameters; and 3) the modification indexes led to sensible estimates. Throughout this process we paid more attention to the detection of misspecification errors rather than the global fit per se (Saris et al., 2009), as we must consider the high power of the test and its effect on significance levels. We detected no significant misspecifications in our CFA model as tested with each rater type. Next, we assessed discriminant validity by comparing the square root of the average variance extracted (AVE) of each reflective construct with their correlations. Despite the relatively high correlations between some constructs, all models specifying the correlation coefficient between pairs of competencies as constrained to 1 have been rejected. Therefore, these results indicate that the 13 competencies in the ESCI model are adequately discriminated.

Once established the validity of our scales, we addressed reliability. In Table 2.2 we used Cronbach's α to assess the internal consistency of each set of five reflective indicators per competency. Nonetheless, because Cronbach's α may either underestimate or overestimate reliabilities whenever the assumption of tau-equivalence is not observed (Raykov, 2001), in such cases we used Heise and Bohrnstedt's (1970) Omega (Ω), which only requires the measures to be congeneric (i.e., the items in a scale should be unidimensional). As shown in Table 2.2 all competency reliabilities for every rater type were well above 0.7, except for the self-evaluation of conflict management. In fact, it is worth noting that self-assessments obtain relatively lower reliabilities in all competencies as compared to any of the external rater types.

Table 2.2 | Cronbach's α and Omega reliabilities of EI competencies per rater type (*n* = 555)

	Cronbach's α							Ω						
Competencies	**Self**	**Professional**			**Personal**			**Self**	**Professional**			**Personal**		
		SV	**PE**	**SB**	**FR**	**RE**	**PT**		**SV**	**PE**	**SB**	**FR**	**RE**	**PT**
Emotional self-Awareness	0.797	0.843	0.864	0.843	0.820	0.861	0.834	0.824	0.859	0.884	0.867	0.848	0.868	0.846
Achievement orientation	0.753	0.861	0.859	0.894	0.804	0.821	0.761							
Adaptability	0.731	0.857	0.860	0.871	0.808	0.851	0.767							
Emotional self-control	0.861	0.919	0.929	0.926	0.895	0.901	0.891							
Positive outlook	0.839	0.865	0.880	0.892	0.849	0.876	0.863	0.844	0.870	0.882	0.907	0.850	0.876	0.870
Empathy	0.787	0.906	0.910	0.918	0.903	0.901	0.875							
Organizational awareness	0.798	0.868	0.875	0.875	0.823	0.813	0.778							
Conflict management	0.684	0.847	0.867	0.880	0.806	0.835	0.782							
Coach and mentor	0.840	0.908	0.913	0.920	0.892	0.891	0.847							
Influence	0.748	0.865	0.872	0.873	0.826	0.788	0.798	0.752	0.870	0.875	0.876	0.833	0.800	0.803
Inspirational leadership	0.837	0.926	0.925	0.936	0.899	0.899	0.883							
Teamwork	0.875	0.946	0.951	0.949	0.920	0.941	0.900							
Cognitive	0.858	0.916	0.918	0.926	0.894	0.911	0.892	0.861	0.931	0.923	0.927	0.905	0.918	0.896

After establishing the construct validity and reliability of the measurement instrument regarding each of the 13 competencies in the ESCI model, we computed each competency' summated rating scale, per individual rater. Note that before aggregating the ratings of multiple raters within the same type (i.e., supervisors, peers, etc), in order to obtain their mean rating for each target and competency, we needed to ascertain the similarity of ratings within each group or type of raters. As such, we computed two different estimates of rating similarity: The intraclass correlations (ICC; Shrout & Fleiss, 1979) and the interrater agreement index, r_{WG} (James, Demaree, & Wolf, 1984, 1993). While ICC provides information about rating consensus (interchangeability) and consistency among raters (same rank order), r_{WG} assesses the extent of agreement (LeBreton et al., 2003; McGraw & Wong, 1996). When each target participant is rated by a different set of K judges on an interval response scale, one-way random effects ICC (1, K) provides an estimate of stability (i.e., reliability) of the mean rating among judges (LeBreton & Senter, 2007). Based on sub-samples of students with at least three raters of the same type, we estimated ICC (1, 3) across the thirteen competencies and the six rating sources. The resulting intraclass correlations – presented in Table 2.3 – ranged from 0.261 to 0.666 (Mean=0.527). Previous studies have reported just slightly higher ICCs for sources of the professional domain (Brutus et al., 1999; Johnson & Ferstl, 1999; Ostroff et al. 2004). Although others have argued that values below 0.7 do not justify within-source ratings aggregation if used for psychological measures in the early stages of development (Nunnaly, 1978), this is not our case since the ESCI instrument has been developed over the past two decades.

Regarding the interrater agreement index, we computed $r_{WG(J)}$, the multi-item extension of James, Demaree and Wolf's (1984), by using the five item scores per competency and taking into account all the raters per each target student. r_{WG} measures how the observed variance in ratings compares to the variance of a theoretical distribution representing no agreement (i.e., the null distribution). When factors such as social desirability or leniency affect the ratings (James et al., 1984; LeBreton & Senter, 2007; Smith-Crowe et al., 2014), they can lead to a restricted range of responses (Klein et al., 2001). In these circumstances, Smith-Crowe et al. (2014) recommends researchers to provide an assessment of interrater agreement relative to null distributions with moderate to high skews. Although our questionnaire instructions clearly stated the pure developmental purpose of the multisource assessment, we expected a certain persistence of leniency bias. Therefore, we computed agreement indices using moderate and heavily negative skewed null distributions (σ = 6.32 and 4.02 respectively for a 11-point Likert scale, according to LeBreton & Senter, 2007). Next, following James et al. (1984)

recommendation, out-of-range values were reset to zero. Finally, we averaged individual target's $r_{WG(5)}$ indices into a within-source mean interrater agreement index for each competency.

Table 2.3 presents the mean $r_{WG(5)}$ computed for each rater type and two levels of skewness: moderate (MS), and heavy skew (HS). For the moderate case – which is usually considered the most likely in performance assessments - we report the percentage of targets whose interrater agreement index is over 0.7. Taken together the low ICCs and high $r_{WG(5)}$ values, these results suggest that ratings variance might be substantially restricted. LeBreton et al. (2003) showed that when between-target ratings variance becomes substantially restricted, ICCs grossly underestimate the level of rating similarity. In such cases, the low ICCs may be due to an artifact of the statistical tool rather than a lack of rating similarity. Fortunately, restricted variance in ratings does not affect $r_{WG(J)}$, seen that this statistic is not based on correlations.

Table 2.3 | Competency interrater agreement and intra-class correlations for each rater type: (a) Professional raters; (b) Personal raters

(a)	Supervisors (*n* = 312)				Peers (*n* = 457)				Subordinates (*n* = 391)			
Competencies	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) *n* = 138**	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) *n* = 324**	**%>0.7 (MS)**	**$r_{WG(5)}$ (MS)**	**$r_{WG(5)}$ (HS)**	**ICC(1,3) *n* = 259**
Emotional self-awareness	77%	0.761	0.596	0.307	78%	0.752	0.585	0.656	70%	0.689	0.488	0.487
Achievement orientation	91%	0.877	0.750	0.317	95%	0.915	0.804	0.625	89%	0.861	0.727	0.475
Adaptability	91%	0.870	0.713	0.404	91%	0.887	0.751	0.572	90%	0.863	0.715	0.525
Emotional self-control	80%	0.787	0.626	0.412	85%	0.818	0.665	0.597	79%	0.789	0.608	0.627
Positive outlook	87%	0.835	0.704	0.391	92%	0.879	0.727	0.601	89%	0.867	0.729	0.550
Empathy	82%	0.796	0.666	0.347	83%	0.806	0.650	0.628	84%	0.807	0.645	0.632
Organizational awareness	85%	0.815	0.663	0.409	85%	0.839	0.695	0.666	83%	0.825	0.658	0.562
Conflict management	83%	0.807	0.642	0.261	80%	0.787	0.595	0.623	76%	0.748	0.548	0.588
Coach and mentor	79%	0.781	0.606	0.426	79%	0.771	0.617	0.646	72%	0.730	0.553	0.617
Influence	86%	0.838	0.643	0.469	84%	0.804	0.621	0.569	76%	0.753	0.551	0.531
Inspirational leadership	73%	0.774	0.594	0.439	79%	0.773	0.599	0.599	76%	0.738	0.567	0.638
Teamwork	86%	0.829	0.707	0.553	83%	0.814	0.683	0.653	81%	0.799	0.677	0.646
Cognitive	84%	0.827	0.663	0.300	86%	0.826	0.681	0.555	87%	0.815	0.656	0.402
Max.	91%	0.877	0.750	0.553	95%	0.915	0.804	0.666	90%	0.867	0.729	0.646
Min.	73%	0.761	0.594	0.261	78%	0.752	0.585	0.555	70%	0.689	0.488	0.402
Mean	83%	0.815	0.659	0.387	85%	0.821	0.667	0.615	81%	0.791	0.625	0.560

(b)	Friends (n = 471)				Relatives (n = 400)				Partners (n = 22)		
Competencies	%>0.7 (MS)	$r_{WG(5)}$ (MS)	$r_{WG(5)}$ (HS)	ICC(1,3) n = 347	%>0.7 (MS)	$r_{WG(5)}$ (MS)	$r_{WG(5)}$ (HS)	ICC(1,3) n = 214	%>0.7 (MS)	$r_{WG(5)}$ (MS)	$r_{WG(5)}$ (HS)
Emotional self-awareness	77%	0.756	0.546	0.578	78%	0.774	0.587	0.567	58%	0.601	0.448
Achievement orientation	95%	0.915	0.821	0.386	96%	0.923	0.862	0.644	95%	0.938	0.807
Adaptability	94%	0.892	0.761	0.437	95%	0.907	0.793	0.659	95%	0.930	0.807
Emotional self-control	85%	0.818	0.666	0.499	86%	0.839	0.702	0.558	87%	0.795	0.672
Positive outlook	92%	0.879	0.758	0.448	93%	0.891	0.812	0.583	95%	0.923	0.848
Empathy	85%	0.828	0.669	0.612	85%	0.842	0.693	0.615	87%	0.843	0.774
Organizational awareness	90%	0.889	0.752	0.499	93%	0.895	0.792	0.534	100%	0.983	0.954
Conflict management	84%	0.800	0.619	0.479	82%	0.815	0.665	0.563	66%	0.696	0.523
Coach and mentor	84%	0.801	0.656	0.533	89%	0.858	0.730	0.563	87%	0.883	0.797
Influence	82%	0.800	0.623	0.486	83%	0.820	0.668	0.577	87%	0.847	0.767
Inspirational leadership	81%	0.792	0.646	0.453	87%	0.853	0.729	0.641	95%	0.889	0.824
Teamwork	89%	0.866	0.744	0.525	94%	0.908	0.824	0.602	87%	0.880	0.793
Cognitive	86%	0.848	0.693	0.325	91%	0.883	0.769	0.601	95%	0.888	0.828
Max.	95%	0.915	0.821	0.612	96%	0.923	0.862	0.659	100%	0.983	0.954
Min.	77%	0.756	0.546	0.325	78%	0.774	0.587	0.534	58%	0.601	0.448
Mean	86%	0.837	0.689	0.482	89%	0.862	0.741	0.593	87%	0.854	0.757

In contrast to what we expected in hypothesis 2, we may observe from the mean $r_{WG(5)}$ in the case of moderate skew, that all personal raters have higher levels of interrater agreement across all competencies than professional sources - i.e. the means of $r_{WG(5)}$ (MS) within friends (0.837), relatives (0.862) and partners (0.854) are higher than within supervisors (0.815), peers (0.821) and subordinates (0.791). The higher level of consensus in ratings indicates that observers within the personal entourage are exposed to a relatively more stable and consistent display of the person's behavior than are the raters from the workplace.

Table 2.4 (a) ranks for each rater type, the competencies in which they have the highest level of agreement down to the lowest, according to $r_{WG(5)}$ (MS). Notably, achievement orientation and adaptability are among the top competencies across all raters, as they elicit the highest levels of agreement within each source. This indicates that all sources across personal and professional contexts have been similarly exposed to opportunities to observe these two competencies in action. Conversely, emotional self-awareness is the least agreed upon competency, ranking at the bottom lowest level of agreement for all rater types. According to Wholers and London (1989), self-awareness is among the most difficult competencies for others to rate, oftentimes even for oneself, since people tend to abstain from disclosing the emotions that lay behind their thoughts and actions.

The competencies that obtain a larger consensus within the personal as compared to the professional context these are organizational awareness, inspirational leadership and coach and mentor. Curiously, the raters that are most exposed to a person's organizational awareness are partners and friends. This may be due to organizational awareness involving sensible and possibly classified information that may only be revealed within close and trustworthy relationships. As to the competencies that are best observed within professional surroundings as compared to personal ones, these include influence, positive outlook, conflict management and emotional self-control. Particularly, supervisors have the biggest exposure to influence related behavior, whereas peers have the largest consensus in observing emotional self-control, and subordinates agree the most when assessing positive outlook.

Table 2.4 | (a) Competency levels of interrater agreement within each rater type; (b) Spearman's correlation matrix of levels of agreement between rater types

(a)

Agreement	SV	PE	SB	FR	RE	PT
Highest	AO	AO	PO	AO	AO	OA
	A	A	A	A	T	AO
	I	PO	AO	OA	A	A
	PO	OA	OA	PO	OA	PO
	T	C	C	T	PO	IL
	C	ESC	E	C	C	C
	OA	T	T	E	CM	CM
	CFM	E	ESC	ESC	IL	T
	E	I	I	CM	E	I
	ESC	CFM	CFM	I	ESC	E
	CM	IL	IL	CFM	I	ESC
	IL	CM	CM	IL	CFM	CFM
Lowest	ESA	ESA	ESA	ESA	ESA	ESA

Key:

ESA	Emotional self-awareness
AO	Achievement orientation
A	Adaptability
ESC	Emotional self-control
PO	Positive outlook
E	Empathy
OA	Organizational awareness
CFM	Conflict management
CM	Coach and mentor
I	Influence
IL	Inspirational leadership
T	Teamwork
C	Cognitive

(b)

	SV	PE	SB	FR	RE	PT
SV	1	0.80	0.77	0.76	0.64	0.54
PE		1	0.96	0.93	0.75	0.70
SB			1	0.91	0.72	0.69
FR				1	0.88	0.76
RE					1	0.83
PT						1

SV	Supervisors
PE	Peers
SB	Subordinates
FR	Friends
RE	Relatives
PT	Partners

In panel (b) of Table 2.4 we quantified the degree of similarity with respect to the levels of agreement between rater types, using Spearman's correlations. The resulting correlation matrix shows that among all sources, peers, subordinates and friends are the raters that most coincide in their levels of agreement, with all three inter-correlations above 0.90. Also, among the personal sources, the relatives and couples have the least agreement with supervisors ($r_{SV\text{-}FR}$=0.76; $r_{SV\text{-}RE}$=0.64; $r_{SV\text{-}PT}$ =0.54).

Next, Figure 2.1 shows the competencies rating means by rater type. First, a grand mean of 7.81 across competencies and external raters suggests a certain degree of leniency in ratings. Second, means ranged from 6.92 to 8.72, implying a moderate to heavy restriction of variance in the ratings, a situation that is amply described in LeBreton et al. (2003). Taken together, these two data characteristics make rating mean differences between sources to be fairly small (e.g., the maximum difference on average are the 1.05 points relatives score above self-evaluations in the competency of inspirational leadership).

Most interesting, Figure 2.1 shows a systematic order in the ratings across all competencies: raters within the personal sphere – friends, relatives, and partners – offer higher ratings on average than any of the three co-workers in all of the competencies, except in emotional self-control and positive outlook, which were rated higher by subordinates than partners. Moreover, within each context, personal and professional, there is a systematic pattern in ratings, as follows: relatives give the highest ratings, followed by partners and then friends, which rate the closest to subordinates and peers; supervisors in turn rate all competencies the lowest (only above self-evaluations), followed by peers and subordinates. In sum, the systematic pattern in source ratings from lowest to highest evaluations in all competencies on average partially confirms hypothesis 4 and is as follows:

Self < Supervisors < Peers < Subordinates < Friends < Partners < Relatives

Notably, self-evaluations are the lowest among all raters and in all competencies, confirming hypothesis 1 that within the context of competency assessments that serve purely developmental purposes, one's self-evaluation is an underestimate of the true score in any competency, as compared to any of the external ratings.

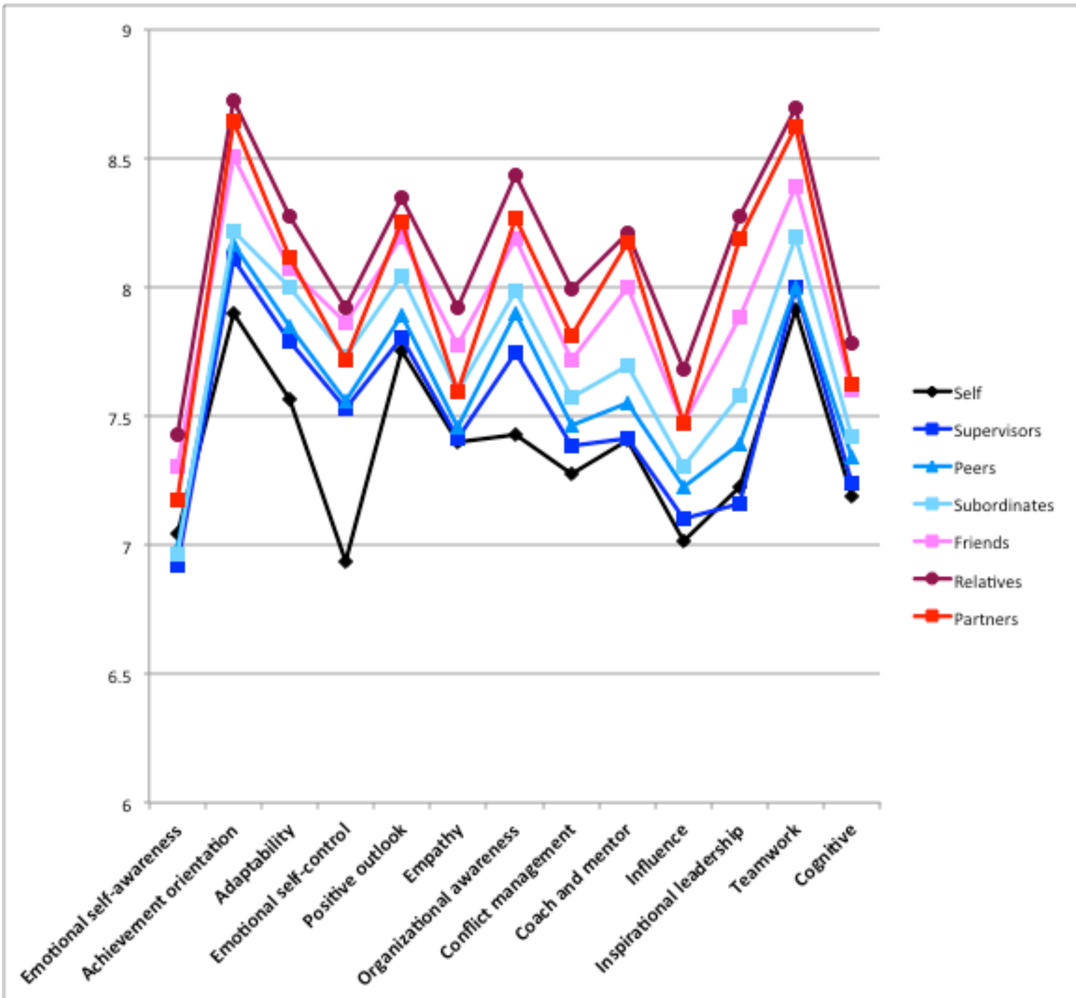

Figure 2.1 | EI competencies rating means by rater type

To investigate whether the mean differences between the seven rating sources are statistically significant, we conducted an analysis of variance (ANOVA). Although previous research has found correlations between the ratings from co-worker groups to be fairly low (e.g., Conway & Huffcutt's, 1997; Landy & Farr, 1980), as we are introducing new types of rating sources, we perform repeated measures ANOVA, which does not assume independent samples. Using Huynh-Feldt corrected values, F-tests are significant at $p<0.05$ for all the competencies. Therefore, we conclude that the scores of the seven rating sources differ significantly. However, in order to figure out which sources are most responsible for these differences, we need to conduct a post hoc test. Table 2.5 shows the results of the post hoc test (multiple paired t-tests) where the p-values are corrected according to Bonferroni criterion.

Table 2.5 | Mean Differences. Post Hoc Test (Multiple Tests of Significance)[3]

Emotional self-awareness

	SE	SV	PE	SB	FR	RE	PT
SE	0	0.121 (1.000)	0.055 (1.000)	0.080 (1.000)	-0.264 (0.013)	-0.385 (0.000)	-0.133 (1.000)
SV		0	-0.066 (1.000)	-0.041 (1.000)	-0.385 (0.000)	-0.506 (0.000)	-0.254 (0.020)
PE			0	0.025 (1.000)	-0.319 (0.001)	-0.440 (0.000)	-0.188 (0.305)
SB				0	-0.344 (0.000)	-0.464 (0.000)	-0.213 (0.119)
FR					0	-0.121 (1.000)	0.131 (1.000)
RE						0	0.251 (0.023)
PT							0

Achievement orientation

	SE	SV	PE	SB	FR	RE	PT
SE	0	-0.207 (0.005)	-0.267 (0.000)	-0.319 (0.000)	-0.606 (0.000)	-0.822 (0.000)	-0.745 (0.000)
SV		0	-0.060 (1.000)	-0.112 (1.000)	-0.399 (0.000)	-0.615 (0.000)	-0.538 (0.000)
PE			0	-0.052 (1.000)	-0.339 (0.000)	-0.555 (0.000)	-0.478 (0.000)
SB				0	-0.287 (0.000)	-0.503 (0.000)	-0.426 (0.000)
FR					0	-0.216 (0.003)	-0.139 (0.292)
RE						0	0.077 (1.000)
PT							0

Adaptability

	SE	SV	PE	SB	FR	RE	PT
SE	0	-0.225 (0.002)	-0.285 (0.000)	-0.434 (0.000)	-0.513 (0.000)	-0.712 (0.000)	-0.554 (0.000)
SV		0	-0.060 (1.000)	-0.208 (0.006)	-0.288 (0.000)	-0.487 (0.000)	-0.329 (0.000)
PE			0	-0.148 (0.203)	-0.228 (0.002)	-0.427 (0.000)	-0.269 (0.000)
SB				0	-0.079 (1.000)	-0.279 (0.000)	-0.121 (0.736)
FR					0	-0.199 (0.011)	-0.041 (1.000)
RE						0	0.158 (0.125)
PT							0

Emotional self-control

	SE	SV	PE	SB	FR	RE	PT
SE	0	-0.597 (0.000)	-0.624 (0.000)	-0.794 (0.000)	-0.929 (0.000)	-0.985 (0.000)	-0.780 (0.000)
SV		0	-0.028 (1.000)	-0.198 (0.281)	-0.333 (0.001)	-0.389 (0.000)	-0.184 (0.451)
PE			0	-0.170 (0.698)	-0.305 (0.003)	-0.361 (0.000)	-0.156 (1.000)
SB				0	-0.135 (1.000)	-0.191 (0.351)	0.014 (1.000)
FR					0	-0.056 (1.000)	0.149 (1.000)
RE						0	0.205 (0.216)
PT							0

Positive Outlook

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.050 (1.000)	-0.139 (0.721)	-0.292 (0.000)	-0.441 (0.000)	-0.597 (0.000)	-0.501 (0.000)
SV		0	-0.089 (1.000)	-0.242 (0.005)	-0.390 (0.000)	-0.547 (0.000)	-0.450 (0.000)
PE			0	-0.153 (0.422)	-0.302 (0.000)	-0.458 (0.000)	-0.362 (0.000)
SB				0	-0.149 (0.490)	-0.306 (0.000)	-0.209 (0.031)
FR					0	-0.157 (0.358)	-0.060 (1.000)
RE						0	0.097 (1.000)
PT							0

Empathy

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.013 (1.000)	-0.057 (1.000)	-0.191 (0.164)	-0.374 (0.000)	-0.521 (0.000)	-0.194 (0.143)
SV		0	-0.044 (1.000)	-0.178 (0.280)	-0.361 (0.000)	-0.508 (0.000)	-0.181 (0.247)
PE			0	-0.134 (1.000)	-0.317 (0.000)	-0.464 (0.000)	-0.137 (1.000)
SB				0	-0.183 (0.232)	-0.330 (0.000)	-0.003 (1.000)
FR					0	-0.147 (0.849)	0.179 (0.264)
RE						0	0.327 (0.000)
PT							0

Organizational awareness

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.314 (0.000)	-0.470 (0.000)	-0.557 (0.000)	-0.760 (0.000)	-1.005 (0.000)	-0.836 (0.000)
SV		0	-0.157 (0.254)	-0.244 (0.002)	-0.446 (0.000)	-0.691 (0.000)	-0.522 (0.000)
PE			0	-0.087 (1.000)	-0.289 (0.000)	-0.535 (0.000)	-0.365 (0.000)
SB				0	-0.203 (0.025)	-0.448 (0.000)	-0.279 (0.000)
FR					0	-0.245 (0.002)	-0.076 (1.000)
RE						0	0.169 (0.144)
PT							0

Conflict management

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.114 (1.000)	-0.193 (0.106)	-0.300 (0.000)	-0.448 (0.000)	-0.724 (0.000)	-0.537 (0.000)
SV		0	-0.078 (1.000)	-0.186 (0.144)	-0.334 (0.000)	-0.610 (0.000)	-0.422 (0.000)
PE			0	-0.107 (1.000)	-0.256 (0.004)	-0.531 (0.000)	-0.344 (0.000)
SB				0	-0.148 (0.649)	-0.424 (0.000)	-0.237 (0.012)
FR					0	-0.276 (0.001)	-0.088 (1.000)
RE						0	0.187 (0.136)
PT							0

Coach and mentor

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.005 (1.000)	-0.138 (1.000)	-0.283 (0.004)	-0.590 (0.000)	-0.801 (0.000)	-0.762 (0.000)
SV		0	-0.133 (1.000)	-0.278 (0.005)	-0.584 (0.000)	-0.796 (0.000)	-0.756 (0.000)
PE			0	-0.145 (1.000)	-0.452 (0.000)	-0.663 (0.000)	-0.624 (0.000)
SB				0	-0.306 (0.001)	-0.518 (0.000)	-0.478 (0.000)
FR					0	-0.212 (0.104)	-0.172 (0.468)
RE						0	0.040 (1.000)
PT							0

Influence

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.092 (1.000)	-0.215 (0.038)	-0.291 (0.001)	-0.457 (0.000)	-0.668 (0.000)	-0.458 (0.000)
SV		0	-0.123 (1.000)	-0.199 (0.082)	-0.365 (0.000)	-0.575 (0.000)	-0.366 (0.000)
PE			0	-0.076 (1.000)	-0.242 (0.010)	-0.452 (0.000)	-0.243 (0.009)
SB				0	-0.166 (0.340)	-0.376 (0.000)	-0.167 (0.326)
FR					0	-0.210 (0.048)	-0.001 (1.000)
RE						0	0.209 (0.051)
PT							0

Inspirational leadership

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	0.068 (1.000)	-0.169 (0.539)	-0.353 (0.000)	-0.658 (0.000)	-1.049 (0.000)	-0.967 (0.000)
SV		0	-0.236 (0.038)	-0.420 (0.000)	-0.725 (0.000)	-1.116 (0.000)	-1.034 (0.000)
PE			0	-0.184 (0.322)	-0.489 (0.000)	-0.880 (0.000)	-0.798 (0.000)
SB				0	-0.305 (0.001)	-0.696 (0.000)	-0.614 (0.000)
FR					0	-0.391 (0.000)	-0.309 (0.001)
RE						0	0.082 (1.000)
PT							0

Teamwork

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.086 (1.000)	-0.092 (1.000)	-0.283 (0.001)	-0.483 (0.000)	-0.786 (0.000)	-0.715 (0.000)
SV		0	-0.006 (1.000)	-0.197 (0.112)	-0.397 (0.000)	-0.700 (0.000)	-0.629 (0.000)
PE			0	-0.191 (0.145)	-0.391 (0.000)	-0.694 (0.000)	-0.623 (0.000)
SB				0	-0.201 (0.094)	-0.503 (0.000)	-0.433 (0.000)
FR					0	-0.302 (0.000)	-0.232 (0.021)
RE						0	0.070 (1.000)
PT							0

Cognitive

	SE	SV	PE	SB	FR	RE	PT
SE	0.000	-0.054 (1.000)	-0.157 (0.264)	-0.233 (0.004)	-0.413 (0.000)	-0.598 (0.000)	-0.433 (0.000)
SV		0	-0.102 (1.000)	-0.179 (0.091)	-0.359 (0.000)	-0.544 (0.000)	-0.379 (0.000)
PE			0	-0.077 (1.000)	-0.257 (0.001)	-0.441 (0.000)	-0.277 (0.000)
SB				0	-0.180 (0.087)	-0.365 (0.000)	-0.200 (0.030)
FR					0	-0.185 (0.068)	-0.020 (1.000)
RE						0	0.165 (0.184)
PT							0

SE	Self
SV	Supervisors
PE	Peers
SB	Subordinates
FR	Friends
RE	Relative
PT	Partner

[3] Values represent the mean difference in ratings between each pair of sources ($\Delta\mu_{i,j} = \mu_i - \mu_j$, where i stands for the raters in rows and j for those in columns). Values in brackets are the p-value

These results show personal ratings have a greater leniency bias than professional ratings, i.e., their assessment of the targets' competencies is generally higher than professional sources. In particular, relatives provide higher mean scores than any other source. In fact, they provide statistically different ratings from co-workers in all competencies except for emotional self-control, in which relatives' ratings did not significantly differ from subordinates'. Among the external raters, the largest differences occur between relatives and supervisors. The second largest difference is found between relatives and work-peers and third largest between relatives and subordinates. Regarding partners, this personal source differed from all co-worker groups in 9 competencies (inspirational leadership, achievement orientation, organizational awareness, teamwork, positive outlook, influence and cognitive). Partners' ratings differ from supervisors' and work-peers', but not from subordinates', in adaptability and conflict management. Partners' ratings only differ from co-worker ratings in emotional self-awareness, empathy, and emotional self-control. As in the case of relatives, the largest differences occur with supervisors followed by work-peers. Finally, friends are the personal source that offers the most similar ratings to co-workers. Friends only differ with the three groups of co-workers in four competencies: emotional self-awareness, achievement orientation, organizational awareness, and change management.

When we examine the mean differences within the sources of the same context - personal or workplace – we observe that they tend not to significantly differ in their ratings. Therefore, hypotheses 2 was not supported. Friends, relatives, and couples provide similar ratings in emotional self-awareness, emotional self-control, and pattern recognition. Whereas friends-partners and partners-relatives pairs tend to

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associated to each mean difference. The mean difference is significant at the 0.05 confidence level. Adjustment for multiple comparisons is according to Bonferroni criterion.

agree in their ratings, friends-relatives differ significantly. Co-workers also tend to provide similar ratings in most of the competencies. Mean differences among supervisors-peers, supervisors-subordinates, and peers-subordinates did not significantly differ in 10 out 13 competencies (emotional self-awareness, empathy, achievement orientation, teamwork, conflict management, coach and mentor, positive outlook, influence and cognitive). In the case of inspirational leadership and organizational awareness supervisors rate targets significantly lower than work-peers and subordinates, whose ratings did not differ among each other. Similar patterns occurred with adaptability and emotional self-control, in which cases supervisors-peers and peers-subordinates strongly coincide in their ratings, but the mean difference between supervisors and subordinates is not significant.

Lastly, to inspect whether the competencies assessment by either self or the external raters are susceptible to variation by target's gender, we compute the differences in mean ratings (female-male) for each competency and rater type. Figure 2.2 shows the competency rating mean differences between females and males by rater type.

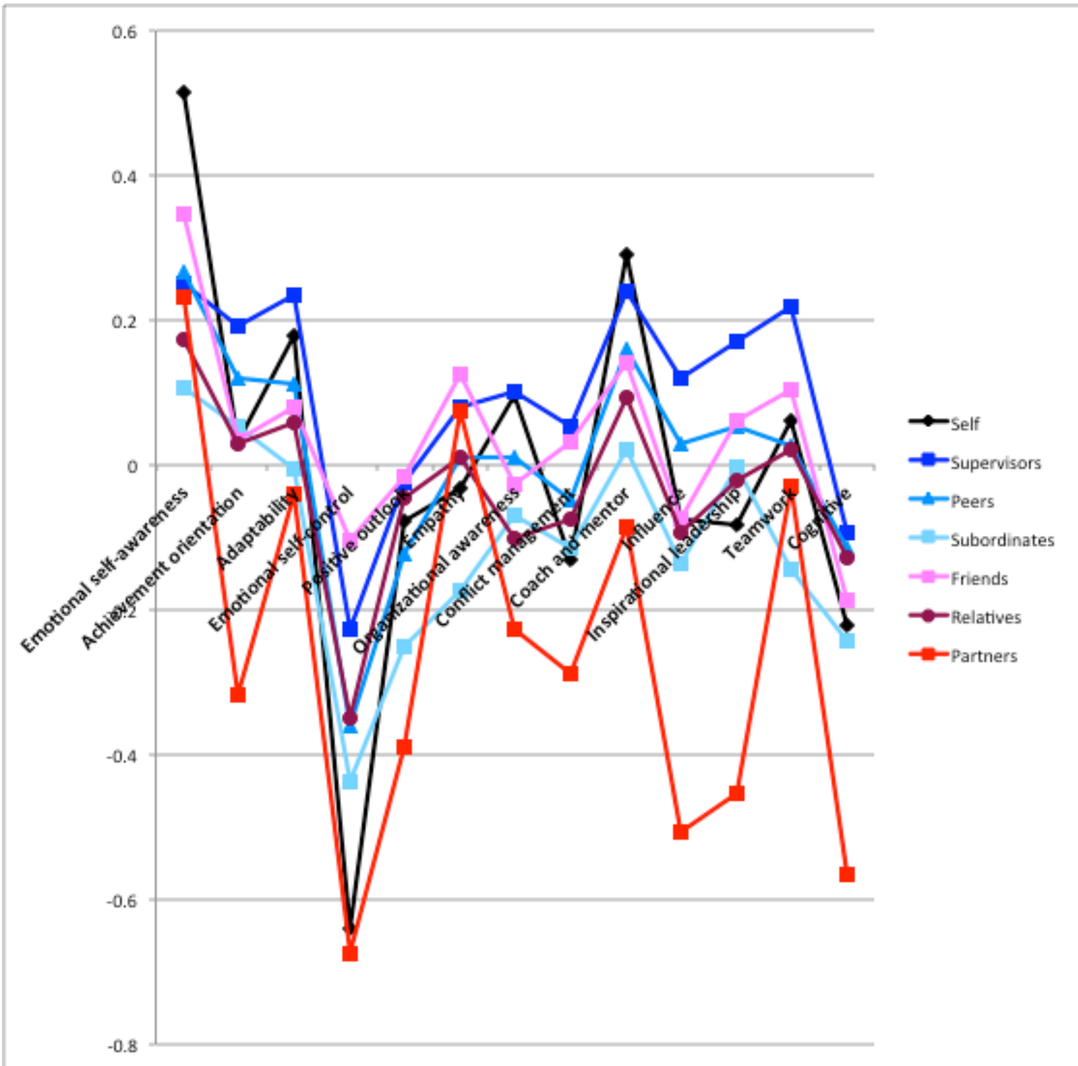

Figure 2.2 | Gender mean differences (female-male) in competency ratings by rater type

Emotional self-awareness stands out as the single competency in which all raters without exception, score women higher than men, on average. Other competencies in which women are perceived as ahead of men, notably by all raters but, to our surprise, their own partner(s), are achievement orientation, adaptability and coach and mentor.

Indeed, the most remarkable and yet disturbing result is the gender discrimination by none less than the target's partner(s). Across all competencies, partners report, on average, the lowest ratings of women's competencies as compared to men's. Overall, four competencies in which partners rate women considerably lower than men, especially when compared to other raters, are achievement orientation, conflict management, inspirational leadership and, perhaps the most shattering, cognitive competencies. In fact, all rater types without exception score cognitive competencies lower in women than in men, although the greatest discrimination is provided by the person's partner(s) no less.

Perhaps, the most reliable findings in Figure 2.2 can be read from supervisors', whom, as noticed before, are the most conservative rater type among all the external observers. Supervisors are the rater source that most distinctively perceives women ahead of men, notably in such competencies as achievement orientation, adaptability, organizational awareness, conflict management, coach and mentor, influence, inspirational leadership and teamwork. Among these, women stand out the most in adaptability, coach and mentor and teamwork (all rated above 0.2 points over men, on average). In contrast, the one competency in which women are rated significantly below men by all raters, self included, is emotional self-control.

2.5 Discussion

Our results show evidence in support of three out of the four hypotheses developed in this study. First, our data shows self-assessments were the lowest in all competencies as compared to any of the external raters, in support of Hypothesis 1. Indeed, when competency assessments have no administrative or promotional purpose, individuals tend to let their guards down, and rather than respond socially desirable answers by self-inflating their competency ratings, they tend serve their best interest to truly pursue a personal development agenda. In so doing, they are more honest in their self-evaluations. When this happens, a well-know truth about human nature is revealed: we tend to be our own worst critic, and have a tendency to underestimate our capabilities, as compared to others assessments. Hypothesis 2 however does not gather much support in our data, on the contrary, our data shows that personal rater types have higher interrater agreement in their assessment of most competencies than professional sources. Regarding the third hypothesis, sources from the same domain – personal or professional – do not significantly differ in their evaluations of targets. This may suggest that individuals tend to be more authentic around their personal connections, whereas they may display multiple or possible selves (Ibarra, 1999, Markus and Nurius, 1986; Roberts and Donahue, 1994), thus adding varying shades to their way of being when surrounded by different co-workers. This finding also indicates that it is reasonable to further aggregate the raters into personal and professional sources, as it is done in previous work (Boyatzis et al., 2015; Chapter 3 in this thesis). Yet, personal sources almost always provide higher ratings than professional sources confirming the presence of leniency bias. Finally, we also find enough evidence to support Hypothesis 4, whereby rating sources follow a systematic pattern from lowest to highest ratings as follows: self < supervisors < peers < subordinates < friends < partners < relatives.

Regarding the second hypothesis, results showed that personal rater types had higher interrater agreement than professional raters. While it is reasonable that all sources have enough opportunities to observe targets in situations that elicit competency-relevant behavior for achievement orientation, positive outlook and adaptability, it is revealing that personal sources, particularly partners, were well prepared to assess organizational awareness with the highest level of agreement. As for emotional self-awareness, it appears to be the least obvious competency to assess, perhaps because it does not manifest as visibly in behavior with others, than other competencies. According to Wohlers and London's (1989), self-awareness is among the most difficult competencies for others to rate. Even individuals often have difficulty assessing their own emotional self-awareness.

As to the third hypothesis, our results are consistent with earlier research, which finds evidence that rating source differences within the same context (i.e., home or workplace) are more significant than individual rater differences (Viswesvaran et al., 2002; Lebreton et al., 2003; Mount et al., 1998). However, our findings contrast with prior studies that finds low correlations between the ratings of supervisors, work-peers, and subordinates (e.g., Conway and Huffcutt, 1997 meta-analysis). LeBreton et al. (2003) call into question the extent and magnitude of discrepancies between different co-worker sources reported in previous research. These authors sustain that the low correlations between rating sources usually reported by previous research are due to the attenuation caused by restriction of variance in ratings. In our data, scores were restricted approximately to two points of the 11-points Likert scales, likely masking some rating underlying differences between sources within the same domain.

Hypothesis 4 was supported. Personal sources evaluated targets significantly higher than professional sources on almost all the competencies. Regardless of the results of the multiple significant tests, we found a systematic order in the ratings from different sources on half of the evaluated competencies, and slight variations of the same order in the other half. Taken together, these results indicate that personal sources might tend to provide more inflated scores than professional sources. . In other words, leniency bias (Saal, Downey, & Lahey, 1980) might affect personal sources more than professional sources. Previous research has found several contextual factors that usually influence rating leniency. Jawahar and Williams (1997) found that when raters are informed of the developmental purpose of evaluations - as opposed to administrative purpose – raters provide less lenient ratings. Also, raters accountable for their ratings tend to provide more accurate ratings (Mero & Motowidlo, 1995). Yet, in this study we treated all rating sources equally, providing them with the same instructions and guarantying them total confidentiality, therefore, other factors may explain rating leniency differences.

Interpersonal affect accounts for significant variance in performance appraisal ratings (Conway, 1998). Raters' positive affect toward a target is positively related to performance ratings leniency (Tsui & Barry, 1986). Given that couple and friends are usually chosen relationships, we can assume that raters from these sources are more likely than co-workers to maintain a positive affective relationship with the target. Also, rater's motivation influences rating accuracy (Harris, 1994; Salvemini et al., 1993) because the process of assessing target' performance requires raters to invest some effort. In some instances, raters even take risks because unfavorable ratings might damage interpersonal relationships or lead to resentment (Tziner et al. 2005). We argue that co-workers might be more motivated to help targets improve their leadership competencies at the workplace, as co-workers may also benefit more than personal sources from improvements. Consequently, it is not surprising that in our study personal sources were more affected by leniency bias, arriving to higher ratings than co-worker groups.

Furthermore, the inclusion of personal sources has the potential for increasing managers' acceptance of feedback. As Kaplan (1993, p. 21) claims: "the principal value of data on personal life…is to counter denial. It is much harder to question the validity of a characteristic reported by co-workers if the same characteristic is quite independently reported by members of one's family". Also, as feedback from co-workers is partially a reflection of the particular target, but also it is a function of the rater's perception of the professional role (Biddle, 1979), incorporating the opinion of personal sources may help to distinguish the two effects.

2.6 Conclusions

The central premise underlying multisource assessment – or 360-degree feedback - is that focal individuals profit more when feedback is provided from multiple perspectives. In the context of leadership assessment, 360-degree feedback programs have traditionally incorporated just the perspective of sources from the managers' professional domain – usually supervisors, work- We have to think a bit of which is the contribution of peers, and subordinates –omitting the perspective of manager's personal life sources. Different rating sources often provide different, yet equally valid perspectives of a manager's performance because of differences in: performance information available to raters, criteria used to assess performance, and source-specific rating bias. Although personal sources have fewer opportunities than co-workers to observe managers' behaviors at work, differences in situation's competence-relevance may compensate for lower frequency of observation. Consequently, personal sources may have enough legitimacy to evaluate manager's leadership-related competencies (Boyatzis, 2009).

In this study, we investigated the worthiness of including personal sources on 360-degree leadership assessments. By performing a comparative analysis between seven rating sources – self, supervisors, peers, subordinates, friends, relatives, and partners – we find that personal sources are adequately suited to evaluate leadership-related competencies, especially those competencies that are not as easy to observe in a formal professional environment as compared to a personal one, such as organizational awareness, inspirational leadership and teamwork. In contrast to what we expected, we did not find statistically significant differences among the ratings provided by supervisors, work-peers, and subordinates. However, personal sources and professional sources significantly differ in their ratings. Personal sources provided higher ratings than professional sources in almost all competencies. We attributed these differences to the fact that positive affect between rater and target makes personal sources more vulnerable to leniency bias. Finally, we conclude our discussion claiming that the inclusion of personal sources may have other benefits beyond the level of true discrepancy, such as increasing managers' acceptance of co-workers' feedback or helping to distinguish how much of co-workers feedback is the reflection of the particular target and how much it is a function of the professional role.

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Appendix of Chapter 2

Table 2.6 | Average variance extracted (AVE; i.e., average communality) per competency (*n*=555)

Constructs	AVE						
	Self	Professional			Personal		
		SV	PE	SB	FR	RE	PT
[ESA] Emotional self-awareness	0.457	0.530	0.569	0.526	0.494	0.562	0.518
[AO] Achievement orientation	0.390	0.564	0.558	0.634	0.472	0.488	0.405
[A] Adaptability	0.357	0.552	0.559	0.585	0.466	0.542	0.412
[ESC] Emotional self-control	0.560	0.702	0.728	0.718	0.641	0.653	0.627
[PO] Positive outlook	0.528	0.567	0.608	0.630	0.540	0.593	0.575
[E] Empathy	0.433	0.662	0.676	0.698	0.658	0.654	0.590
[OA] Organizational awareness	0.458	0.582	0.595	0.594	0.515	0.486	0.441
[CFM] Conflict management	0.321	0.533	0.574	0.605	0.467	0.520	0.439
[CM] Coach and mentor	0.518	0.666	0.681	0.701	0.626	0.625	0.532
[I] Influence	0.379	0.576	0.590	0.585	0.496	0.445	0.458
[IL] Inspirational leadership	0.515	0.718	0.716	0.752	0.644	0.644	0.606
[T] Teamwork	0.585	0.781	0.798	0.792	0.703	0.762	0.645
[C] Cognitive	0.420	0.561	0.567	0.599	0.501	0.533	0.481

Table 2.7 | Correlation matrix of competencies as scored by self-evaluations (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.326											
[A] Adaptability	.397	.508										
[ESC] Emotional self-control	.150	.257	.374									
[PO] Positive outlook	.297	.451	.391	.359								
[E] Empathy	.423	.283	.482	.426	.368							
[OA] Organizational awareness	.412	.373	.507	.362	.326	.479						
[CFM] Conflict management	.377	.402	.485	.410	.419	.566	.457					
[CM] Coach and mentor	.488	.404	.462	.232	.313	.512	.503	.520				
[I] Influence	.401	.431	.514	.271	.340	.431	.648	.569	.502			
[IL] Inspirational leadership	.409	.531	.510	.379	.513	.391	.549	.532	.583	.601		
[T] Teamwork	.300	.352	.498	.349	.346	.562	.484	.534	.589	.456	.517	
[C] Cognitive	.357	.500	.502	.285	.300	.320	.457	.411	.396	.494	.462	.267

Table 2.8 | Correlation matrix of competencies as scored by supervisors (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.486											
[A] Adaptability	.542	.773										
[ESC] Emotional self-control	.414	.478	.588									
[PO] Positive outlook	.501	.611	.624	.600								
[E] Empathy	.624	.539	.672	.687	.607							
[OA] Organizational awareness	.574	.624	.741	.574	.587	.767						
[CFM] Conflict management	.637	.642	.707	.665	.644	.789	.751					
[CM] Coach and mentor	.649	.613	.613	.509	.567	.719	.718	.747				
[I] Influence	.658	.662	.738	.493	.586	.672	.740	.783	.735			
[IL] Inspirational leadership	.606	.703	.715	.522	.642	.645	.708	.754	.824	.830		
[T] Teamwork	.568	.590	.666	.619	.617	.796	.750	.782	.812	.706	.752	
[C] Cognitive	.564	.679	.724	.496	.511	.529	.639	.598	.553	.679	.670	.508

Table 2.9 | Correlation matrix of competencies as scored by peers (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.492											
[A] Adaptability	.562	.749										
[ESC] Emotional self-control	.392	.438	.634									
[PO] Positive outlook	.469	.629	.681	.561								
[E] Empathy	.708	.566	.751	.720	.614							
[OA] Organizational awareness	.583	.632	.767	.597	.566	.735						
[CFM] Conflict management	.647	.609	.759	.647	.617	.811	.711					
[CM] Coach and mentor	.713	.633	.699	.571	.554	.830	.718	.782				
[I] Influence	.641	.587	.725	.553	.558	.723	.718	.759	.710			
[IL] Inspirational leadership	.631	.707	.755	.577	.659	.735	.747	.785	.809	.794		
[T] Teamwork	.619	.610	.744	.658	.621	.841	.748	.814	.865	.669	.810	
[C] Cognitive	.562	.668	.720	.517	.526	.616	.672	.615	.636	.704	.678	.578

Table 2.10 | Correlation matrix of competencies as scored by subordinates (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.505											
[A] Adaptability	.616	.809										
[ESC] Emotional self-control	.432	.463	.593									
[PO] Positive outlook	.570	.640	.689	.603								
[E] Empathy	.685	.628	.751	.706	.659							
[OA] Organizational awareness	.623	.686	.819	.588	.639	.754						
[CFM] Conflict management	.694	.742	.784	.606	.666	.806	.741					
[CM] Coach and mentor	.727	.736	.747	.541	.645	.816	.700	.820				
[I] Influence	.668	.680	.734	.427	.580	.671	.711	.778	.760			
[IL] Inspirational leadership	.653	.790	.787	.534	.681	.740	.739	.828	.841	.810		
[T] Teamwork	.604	.742	.782	.636	.647	.824	.736	.805	.843	.707	.815	
[C] Cognitive	.651	.728	.787	.496	.651	.660	.727	.722	.714	.771	.747	.667

Table 2.11 | Correlation matrix of competencies as scored by friends (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.470											
[A] Adaptability	.539	.722										
[ESC] Emotional self-control	.360	.500	.554									
[PO] Positive outlook	.496	.547	.599	.448								
[E] Empathy	.612	.526	.713	.585	.522							
[OA] Organizational awareness	.477	.594	.753	.476	.500	.674						
[CFM] Conflict management	.672	.610	.698	.609	.579	.741	.607					
[CM] Coach and mentor	.630	.610	.675	.514	.593	.779	.595	.757				
[I] Influence	.472	.508	.578	.351	.482	.464	.509	.577	.563			
[IL] Inspirational leadership	.576	.626	.674	.527	.608	.593	.553	.733	.726	.682		
[T] Teamwork	.554	.598	.701	.570	.555	.764	.663	.752	.794	.518	.703	
[C] Cognitive	.515	.584	.639	.479	.402	.519	.606	.574	.523	.593	.599	.512

Table 2.12 | Correlation matrix of competencies as scored by relatives (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.482											
[A] Adaptability	.610	.704										
[ESC] Emotional self-control	.482	.537	.637									
[PO] Positive outlook	.526	.574	.660	.558								
[E] Empathy	.706	.548	.705	.689	.521							
[OA] Organizational awareness	.543	.622	.719	.550	.545	.631						
[CFM] Conflict management	.670	.592	.722	.693	.571	.797	.604					
[CM] Coach and mentor	.667	.619	.668	.570	.512	.775	.578	.760				
[I] Influence	.505	.489	.600	.446	.528	.488	.578	.585	.503			
[IL] Inspirational leadership	.621	.664	.742	.598	.657	.662	.670	.726	.741	.680		
[T] Teamwork	.615	.610	.704	.598	.506	.774	.622	.749	.791	.492	.751	
[C] Cognitive	.572	.606	.719	.580	.532	.615	.669	.671	.616	.633	.697	.504

Table 2.13 | Correlation matrix of competencies as scored by partners (*n*=555)

Constructs	ESA	AO	A	ESC	PO	E	OA	CFM	CM	I	IL	T
[AO] Achievement Orientation	.364											
[A] Adaptability	.502	.585										
[ESC] Emotional self-control	.306	.459	.503									
[PO] Positive outlook	.354	.465	.528	.467								
[E] Empathy	.610	.444	.617	.534	.461							
[OA] Organizational awareness	.450	.455	.634	.377	.391	.580						
[CFM] Conflict management	.541	.570	.666	.536	.528	.669	.567					
[CM] Coach and mentor	.530	.452	.557	.442	.499	.708	.549	.657				
[I] Influence	.401	.387	.469	.312	.362	.421	.532	.515	.473			
[IL] Inspirational leadership	.382	.563	.617	.462	.534	.512	.579	.632	.622	.627		
[T] Teamwork	.450	.527	.607	.453	.501	.637	.620	.662	.700	.439	.662	
[C] Cognitive	.473	.529	.600	.430	.409	.506	.586	.632	.502	.585	.550	.455

Chapter 3 | EI Competencies as a related but different characteristic than intelligence

ABSTRACT

Amid the swarm of debate about emotional intelligence (EI) among academics are claims that cognitive intelligence, or general mental ability (*g*), is a stronger predictor of life and work outcomes as well as the counter claims that EI is their strongest predictor. Nested within the tempest in a teapot are scientific questions as to what the relationship is between *g* and EI. Using a behavioral approach to EI, we examined the relationship of a parametric measure of *g* as the person's GMAT scores and collected observations from others who live and work with the person as to the frequency of his or her EI behavior, as well as the person's self-assessment. The results show that EI, as seen by others, is slightly related to *g*, especially for males with assessment from professional relations. Further, we found that cognitive competencies are more strongly related to GMAT than EI competencies. For observations from personal relationships or self-assessment, there is no relationship between EI and GMAT. Observations from professional relations reveal a positive relationship between cognitive competencies and GMAT and EI and GMAT for males, but a negative relationship between EI and GMAT for females.

Keywords:

Emotional intelligence, competency, cognitive competency, cognitive ability, emotional intelligence competency, social intelligence

3.1 Introduction

General cognitive ability (*g*) has been consistently shown to predict job performance in many studies and meta-analyses over the decades (Nisbett et al., 2012). But in the last 10–15 years, emotional intelligence (EI) has also been shown to predict job performance in an increasing number of studies (Fernández-Berrocal and Extremera, 2006; Joseph and Newman, 2010; O'Boyle et al., 2011; Joseph et al., 2014). A debate has emerged as to whether these two individual characteristics are the same, different, or complimentary. A meta-analysis of published papers as of 2009 claimed that *g* showed more predictive ability of job performance than EI (Joseph and Newman, 2010), although both were significant. In some recent studies EI has been shown to have greater predictive ability than *g* (Côté and Miners, 2006; Boyatzis et al., 2012). This study is an attempt to examine the relationship between a behavioral approach to EI and *g* and help create a more comprehensive perspective on these characteristics and the implications for future research.

A major criticism of the EI concept was found in Matthews et al. (2002), but they confused theoretical distinctions and measurement issues. More recently, Webb et al. (2013) said, "Although there is general agreement that the ultimate relevance of EI lies in its ability to predict important life outcomes (e.g., quality of interpersonal relationships, academic or occupational success), debate persists in how best to operationalize…and measure EI…" (p. 154). The debate is confusing at times because EI itself has been conceptualized and measured in various ways.

In some approaches, EI is viewed as the ability to be aware of and manage one's emotions and those of others which have been called stream 1 and stream 2 measures (Ashkanasy and Daus, 2005; O'Boyle et al., 2011). For example, Mayer et al. (1999) see their concept of ability EI as a formal type of intelligence specialized in the field of emotions and thus related to *g*. Initially, while they had no intention to relate EI to job and life outcomes, later studies have shown ability EI to associate with performance but not as strongly as other approaches (O'Boyle et al., 2011; Miao et al., unpublished). Another perspective sees EI as a set of self-perceptions, which are different from but related to personality traits (Bar-On, 1997) more than *g*. Although this approach along with some measures known as Trait EI (Petrides and Furnham, 2001) have been shown to predict job performance (O'Boyle et al., 2011), they also show a consistently strong relationship to personality traits (Webb et al., 2013). Regardless, it has been filed under the uninformative label of "mixed models" (Mayer et al., 1999).

Another way to understand EI involves observing behavioral manifestations of EI, in terms of how a person acts, as seen by others (Boyatzis, 2009; Cherniss, 2010; Cherniss and Boyatzis, 2013). Known as behavioral EI, it offers a closer link to job and life outcomes. Notably, it has been shown to predict job performance above and beyond *g* and personality (Boyatzis and Goleman, 2007). Nonetheless, this approach has been clustered incorrectly with self-perception approaches and filed under the same label of mixed models (Mayer et al., 1999), also called stream 3 (Ashkanasy and Daus, 2005; O'Boyle et al., 2011).

Although many issues emerging from these varied studies and meta-analyses call for further research, in this paper, we focus on examining the relationship between behavioral EI and *g*, and assessing the potential moderator effects of gender and type of observer or rater.

3.2 Behavioral EI

Because all of the papers in this special issue of Frontiers in Psychology are devoted to EI and *g*, we will forego an in-depth review of the literature on EI, and instead focus directly on behavioral EI. As mentioned above, EI competencies can be viewed as the behavioral level of EI (Boyatzis, 2009; Cherniss, 2010; Cherniss and Boyatzis, 2013). Competencies have been derived inductively from studies of human performance in many occupations and in many countries (Boyatzis, 2009). Because the identification of a competency and its refinement emerges from performance based criterion sampling, they are expected to be closely related to job and life outcomes. As a result, the EI competencies were discovered and measured as behaviors which were later clustered around intent and became each competency (Boyatzis, 2009).

In Boyatzis and Goleman (2007), EI includes two factors, EI and social intelligence (SI) competencies. EI includes competencies called emotional self-awareness, emotional self control, adaptability, achievement orientation, and positive outlook. In their model, SI includes: empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. For this paper, we are treating EI and SI competencies as a single construct of EI. When universities wish to use this EI model for student development and/or outcome assessment, two cognitive competencies which have a history of predicting effective leadership, management and professional performance are added. They are: systems thinking and pattern recognition (Boyatzis, 2009).

Behavioral EI as seen and measured through others' assessment (as compared to self-assessment) shows a consistent prediction or relationship to job and life outcomes (Boyatzis, 1982, 2006; McClelland, 1998; Nel, 2001; Cavallo and Brienza, 2002; Dulewicz et al., 2003; Law et al., 2004; Sy et al., 2006; Dreyfus, 2008; Hopkins and Bilimoria, 2008; Koman and Wolff, 2008; Williams, 2008; Boyatzis and Ratti, 2009; Ramo et al., 2009; Ryan et al., 2009, 2012; Young and Dulewicz, 2009; Boyatzis et al., 2011, 2012; Aliaga Araujo and Taylor, 2012; Gutierrez et al., 2012; Sharma, 2012; Amdurer et al., 2013; Victoroff and Boyatzis, 2013; Mahon et al., 2014; Badri, unpublished). Boyatzis et al. (2012) showed behavioral EI predicted job performance with significant unique variance, controlling for *g* and personality.

According to the dominant classification in Ashkanasy and Daus (2005), there are three different streams of EI research. Salovey and Mayer's Ability EI as measured by the MSCEIT is stream 1. Although it has shown relationships with school (Brackett et al., 2004), job and life outcomes (Mayer et al., 2008), these were not of primary consideration in its development (Mayer et al., 1999). Whereas ability EI shows no relationship to personality measures, it has shown consistent prediction of *g*, even when controlling for personality (Webb et al., 2013).

Self-perceptions and peer-report measures based on the Ability EI model are clustered within stream 2 (Ashkanasy and Daus, 2005). These measures such as the Trait EI Questionnaire (TEIQue; Petrides and Furnham, 2000, 2001), show similar validity patterns to the MSCEIT but are not as strongly related to *g*, nor job and life outcomes, yet they do show a significant relationship to personality (Webb et al., 2013).

Meanwhile, stream 3 (Ashkanasy and Daus, 2005) clusters both those EI measures based on self-perception and others' behavioral assessments (i.e., 360°, coded behavior from audiotape or videotape work samples or simulations). Consequently, there is a partition in results within this stream: some measures such as the ESCI (Boyatzis and Goleman, 2007) show a strong relationship and unique variance to life and job outcomes beyond *g* and personality (Byrne et al., 2007; Downey et al., 2011), while others such as the EQ-i (Bar-On, 1997) show a consistent relationship in predicting personality (Joseph and Newman, 2010; O'Boyle et al., 2011). We therefore, claim that clustering self-perception and coded or other perception measures confuses these relationships.

Instead, we support Fernández-Berrocal and Extremera's (2006, p. 8) comprehensive view of the EI field by which all "approaches try to discover the emotional components that underlie *emotionally intelligent* people and the mechanisms and processes that set off the use of these abilities in our everyday life" (emphasis added). In the authors' review of the first 15 years of EI research, behavioral EI as seen by others in 360° assessments is considered separately from self-perception approaches focused on moods and internal states, as well as personality traits such as Bar-On's (1997, 2007; Fernández-Berrocal and Extremera, 2006). Therefore, Boyatzis (2009) extends the work of Fernández-Berrocal and Extremera (2006) to propose an organization of the literature that is framed by the three existing methodological themes: EI ability methods; EI self-perception methods; and EI behavior methods.

In sum, the relationships of EI assessed at any level or with any method are still debated with comparative arguments about its link to *g* and personality. In this paper, we will focus on the relationship between behavioral EI and a measure of *g*.

3.3 General cognitive ability (*g*) and intelligence

According to Carroll's (1993) model of intelligence, the various mental abilities are structured hierarchically. General cognitive ability, located at its apex, is "the general efficacy of intellectual processes" (Ackerman et al., 2005, p. 32). Also known as general mental ability, general intelligence, or simply *g*, it is a well-researched construct with a large body of evidence supporting its predictive validity for such important outcomes as job performance and career success (e.g., O'Reilly III and Chatman, 1994; Schmidt and Hunter, 1998; Ferris et al., 2001). As a global ability, *g* can be thought of as the underlying common factor to all types of cognitive processing (i.e., verbal, mathematical, spatial, logical, musical, and emotional). From this perspective, *g* cannot be observed nor measured directly, it must be inferred from the positive correlations among distinct ability measures (Spearman, 1904; Jensen, 1998). As such, *g* subsumes different sets of abilities, each corresponding to a specialization of general intelligence.

General cognitive ability can be assessed through a variety of measures, such as IQ tests (Jensen, 1992; i.e., Ravens Progressive Matrices, Wechsler, Stanford Binet; Nisbett et al., 2012). Similarly, standardized admissions tests have been shown to "fit the general requisites of a measure of general cognitive ability" (O'Reilly III and Chatman, 1994). They also measure verbal and mathematical or quantitative reasoning skills separately. These tests such as the SAT, GRE, GMAT, MCAT, LSAT, and DAT are usually found to have strong correlations with the more direct measures of *g*, (Detterman and Daniel, 1989).

The GMAT is a standardized test that assesses a person's analytical, writing, quantitative, verbal and reading skills for admission into graduate management programs worldwide. Although the GMAT is not formally validated as a measure of general cognitive ability, it is strongly correlated with the Scholastic Aptitude Test (SAT; e.g., Gottesman and Morey, 2006), which is shown to be a valid measure of *g* (Frey and Detterman, 2004). Considering the structural similarity of these tests (both consist of multiple choice questions that measure verbal and quantitative skills) and the general consensus that the *g*-factor can be measured by obtaining factorial scores across tests of different specific aptitudes, usually verbal and quantitative (O'Reilly III and Chatman, 1994), Hedlund et al. (2006, p. 102) concluded that "like the SAT, the GMAT can be characterized as a traditional measure of intelligence, or a test of general cognitive ability (*g*)." Indeed numerous studies have already used the GMAT as a measure of *g* (e.g., O'Reilly III and Chatman, 1994; Kumari and Corr, 1996; Mueller and Curhan, 2006), the latest of which is a study published in *Intelligence* (Piffer et al., 2014).

We suggest that the EI competencies may show a small, if any relationship to *g*. In fact, correlations between behavioral EI competencies coded from audiotapes of critical incident interviews about work samples and GMAT were not significant ($r = -0.015$, $n = 200$, $p =$ ns; Boyatzis et al., 2002). In assessing predictors of sales leadership effectiveness in the financial services industry, Boyatzis et al. (2012) reported that EI as assessed by others showed a non-significant correlation with Ravens Progressive Matrices ($r = 0.04, n=60, p=$ns).

In the inductive competency studies, two cognitive competencies repeatedly appeared to differentiate effective performance of managers, executives and professionals (Boyatzis, 1982, 2009; Spencer and Spencer, 1993). They were systems thinking and pattern recognition. The former is defined as seeing phenomenon as a series of causal relationships affecting each other. The latter is defined as perceiving themes or patterns in seemingly random information. As competencies, they are assessed both with a self-assessment and with observations of others as to how often a person demonstrates these behaviors. They are not defined or assessed as an intelligence measure but an indication of how often a person appears to be using these thought processes. As such, we expect them to be related to *g* more than EI competencies even though they are not a measure of *g*.

This leads us to the first two hypotheses for this study:

Hypothesis 1: EI competencies will have a slight relationship to g. Hypothesis 2: Cognitive competencies will be more related to g than EI competencies.

3.4 Self and multi-rater assessments

Differences in raters or sources of assessment are likely to play an important role in the findings. Self-perception and multi-rater assessment are different approaches to perceiving and collecting observations of a person's behavior (Luthans et al., 1988; Church, 1997; Furnham and Stringfield, 1998; Antonioni and Park, 2001; Taylor and Hood, 2010).

Self-assessment measures generally address how individuals respond to questions pertaining to their own emotions, perceptions or thoughts. These measures are easier and faster to administer than others, allowing for low costs of administration (Saris and Gallhofer, 2007). Social desirability is often an issue in self-reported measures (Paulhus and Reid, 1991). That is, respondents may base their answers on a desired state that often leads to inflated views of themselves. The validity of these measures can be improved by including questions that help control for social desirability (e.g., Paulhus and Reid, 1991; Steenkamp et al., 2010).

Used as a stand-alone measure, self-assessment of personality traits, attitudes or behavioral tendencies show acceptable validity (e.g., Furnham et al., 1999; Petrides and Furnham, 2000; Furnham, 2001; Petrides et al., 2006; Bar-On, 2007). Similarly, self-assessed measures of EI show acceptable validity (Bar-On, 1997; Petrides and Furnham, 2000, 2001). However, with regard to EI, self-assessments are also used in combination with others' ratings. Notably, the difference between self and others' perceptions is known as the self-other agreement. This difference is a highly reliable measure of self-awareness (Yammarino and Atwater, 1997).

Multi-rater or multi-source assessments involve different raters from work such as a person's peers, collaborators, subordinates or bosses, and possibly raters from one's personal environment. Raters provide observations of a person's behavior (i.e., what they have *seen* the person do). Research on social cognition reveals that people give more weight to their own thoughts and feelings than to their behavior when forming self-perceptions, but this effect is reversed when forming perceptions of others (Vazire, 2010). Different types of raters may offer unique information about the person being assessed (Borman, 1997). People may behave differently depending on the situation (e.g., at home vs. work; Lawler, 1967).

Other behavioral assessments such as coding from audio or videotapes of critical incidents or simulations may be considered "pure" behavioral measures, but even these measures require people to code them. In the coding, observers are engaged in subjective perceptions and labeling. In such qualitative research, the scholars increase confidence in the data reported by assessing inter-rater reliability. In 360° assessments, greater confidence in the data is developed from a consensual perception of multiple raters. In EI studies, both types of measures attempt to assess how a person has been acting as seen by others (i.e., a behavioral approach to measurement of EI).

A number of studies show that there are differences among bosses', peers' and subordinates' views, and sometimes even others like consultants, customers or clients. Atkins and Wood (2002) claimed specific types of raters were best positioned to observe and evaluate certain types of competencies depending on the personal and working relationships they had with the person being evaluated. For example, subordinates were found to be the best evaluators of competencies such as coaching and developing people, when compared to bosses or peers (Luthans et al., 1988). Similarly Gralewski and Karwowski (2013) showed how, even though teachers are often accurate at assessing the intelligence and academic achievement of their students (Südkamp et al., 2012), they lack the ability to assess less conventional skill areas, such as students' creativity. Different sources of raters might interpret the same observed behavior in different ways (Tsui and Ohlott, 1988). At the same time each rater source may have idiosyncratic tendencies leading to different observations and measurement error, like errors of leniency, central tendency, and range restriction (Saal et al., 1980). These are likely to be moderated by cultural assumptions (Ng et al., 2012). The research in assessing performance as well as skills and behavior with 360° assessments is summarized in Bracken et al. (2001). Social identity theory would contend that people find more legitimacy in assessing themselves with regard to those of higher status rather than merely more power (Taylor and Hood, 2010), suggesting that raters from work will be more potent than those from home.

Outside of family business, consulting or family therapy, the sources or raters that have been studied do not include family or friends (Bracken et al., 2001), with the exception of Rivera-Cruz (2004). She reported that female managers showed more EI competencies (as seen by others) at home versus work. In a desire to be comprehensive in assessments, data was collected in this study from a wide range of a person's relations – those from work and from their personal life (Boyatzis, 2009).

With regard to intelligence, it is expected that professional sources (i.e., sources from work) will have more of an opportunity to see and label behavior related to cognitive ability rather than those at home or in one's personal life.

This leads us to the third hypothesis for this study:

Hypothesis 3: Among personal, professional and self-assessment of a person's competencies, professional sources will show the strongest relationship of EI and cognitive competencies to g.

3.5 Gender differences

In self-assessment, an extensive body of literature validated by a recent meta-analysis showed strong evidence of male hubris and female humility: the tendency of males to have inflated views of their abilities, opposite to females' propensity to underestimate their worth (Furnham, 2001; Szymanowicz and Furnham, 2011). At the same time, there may be a gender bias in the type of *g* measures themselves as Furnham (2001) proposes that results may be based on the fact that most of these measures are "male normative". That is, they include specific tasks, such as spatial processing or mathematical reasoning at which males have been shown to do better than females.

As to others' ratings of EI competencies, stereotyping will likely affect peers perceptions of males versus females, even in the same setting (Taylor and Hood, 2010). Social identity theory, along with social comparison theory and self-categorization theory are expected to result in attributions made to females differently than those made to males even if their behavior was the same (Sturm et al., 2014). For example, Taylor and Hood (2010) reports that even though female MBAs appear to be more assertive and self-confident than other female samples, sexist bias in perception results in males being seen as more assertive and confident than females. However they did find that predicted ratings of others showed a gender difference: “women leaders believed that others would rate them lower than the actual ratings they received” (p. 542).

In light of these findings, we propose females may be subject to sexist discrimination in their multi-source assessments, particularly those from raters at work. This suggests there may be an interaction of both gender and rater in the relationship between EI and *g*.

This leads us to the fourth hypothesis for this study:

Hypothesis 4: Gender moderates the relationship of EI and cognitive competencies to g.

3.6 Materials and methods

Data were collected on 641 part-time and full-time MBA students from 23 countries, in a leading European business school, between 2006 and 2013. 30% were females, with an average age of 33 years for females and 34 years for males. As part of the MBA, the students took a required course called Leadership Assessment and Development which is based on the Intentional Change Theory (Boyatzis, 2008). In the course, students were asked to complete a self and multi-rater assessment of EI competencies. All data were collected under the informed consent an ethical guidelines of ESADE Business School.

3.6.1 Measures

3.6.1.1 Emotional Intelligence Competencies

We used the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis and Goleman, 2007), a 70-item survey instrument which measures 14 competencies of two types: cognitive and emotional. The first type is composed of two cognitive competencies: systems thinking and pattern recognition. The other, includes 12 EI competencies: emotional self-awareness, emotional self control, adaptability, achievement orientation, positive outlook, empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. Because the behavioral manifestations of these competencies are frequently observed in a variety of different situations they have been operationalized with as many as five indicators per competency. Psychometric properties of the test based on samples of 62,000 completions of the ESCI and 21,000 of the ESCI-U both reveals each scale shows model fit and satisfies criteria for discriminant and convergent validity (Boyatzis et al., 2014). A wide variety of validation studies on the test were reviewed earlier in this paper and in Wolff (2008).

Competencies can be considered to be the behavioral approach to emotional, social, and cognitive intelligence (Boyatzis, 2009). As such, the student is asked to solicit others from their work and life to complete the test about their behavior. The students had an average of 4.2 others complete the test for each of the 641 subjects in this analysis (standard deviation equals to 1.6). It is believed that multi-source assessment, such as 360°, provides protection against social desirability because of the distinct sources of responses.

Researchers have traditionally placed more emphasis on testing hypotheses on the relationships among constructs than on bridging the gap between abstract theoretical constructs and their measurements (i.e., epistemic relationships; Bagozzi, 1984). In our case, measurement error is particularly dangerous because it affects ESCI as a GMAT predictor leading to biased estimates of the structural effects (Frost and Thompson, 2000). Therefore, before estimating these effects, we examined the ESCI construct validity[4].

Since we suspected that the ESCI factorial structure provided by the personal and the professional raters could be different as a function of their different perspectives of the MBA students' behavior, we have modeled the data separately[5]. Two confirmatory factor analysis (CFA) models have shown that both sets of raters were consistent with the hypothesized 13-factor (i.e., the competencies) model[6].

For purposes of exploring our research question, we distinguished three types of sources, or assessments in this study. We used a classification provided by each respondent at the time of completing the test. The responses were grouped as either: self, personal, or professional. One is the assessment provided by the student about himself or herself. Another source was personal, such as a spouse/partner, friends, or family members. Professional sources were bosses, peers, subordinates or clients from work or classmates in the MBA program. There were a few cases in which personal or professional assessments were missing; these cases were dropped

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[4] We define validity as "the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests" (American Educational Research Association et al., 1999, p. 9).

[5] Since we didn't assume that Personal and Professional raters have the same perception and aggregate them under the usual "other" category of raters, we have tested their measurement or factorial equivalence (Meredith, 1993).

[6] Exploratory Factor Analysis (EFA, Promax rotation) has already shown that systems thinking and pattern recognition competencies correlate on both raters' perceptions above 0.94. The subsequent confirmatory factor analysis (CFA) did not reject the unidimensionality of the 5 + 5 items corresponding to the two competencies, that had ex-ante been assumed as distinct competencies. As a result, in this analysis, we used thirteen instead of the usual 14 factors underlying the ESCI model on this MBA population by having combined the two cognitive competencies into one scale.

resulting in a final sample of 624 individuals with personal and 611 with professional assessments available. All had self-assessment.

MBA participants and their raters were asked to indicate the frequency of the behavior on each item on an eleven point-scale ranging from (0) 'the behavior is never shown' to (10) 'the behavior is consistently shown.' This response set provides higher quality data on this predominantly European MBA population than the usual 5-point scale (Batista-Foguet et al., 2009). The final ESCI-U scores have been mean-centered to ease the interpretation of the parameters in the model. To compute the 360° assessments on the 70 items that constitute the ESCI-U survey, we first obtained for each item, its average score across all professional and personal raters separately, and then averaged across the five items per each competency. This way, our database consisted of 26,264 competency scores from 3 types of raters, on the 12 + 1 emotional, social, and cognitive competencies.

3.6.1.2 General cognitive ability (g)

We used the Graduate Management Admission Test (GMAT) as a measure of *g*. For this study we chose to collect our GMAT data from the GMAC, the entity that owns and administers the GMAT, and not through the Admissions Office at the University. We collected the students' GMAT scores from the first time they took the test. Using GMAT first time scores as compared to the scores with which students were admitted in the MBA program (usually obtained after repeatedly taking the test), enabled a wider range of variation in GMAT with higher dispersion and lower means. We, thus, attempted to minimize the issue of range restriction in GMAT (Oh et al., 2008) and the resulting attenuation bias in the model coefficients. In our sample, the GMAT mean is 602.4, which is a little higher than the overall GMAT for all test takers of 545. The sample's standard deviation of the GMAT is 79.3, almost two thirds of the reported GMAT deviation (at 121). Therefore, our sample contains individuals with slightly higher GMAT and less "heterogeneous" scores than the population of GMAT applicants.

The ESCI-U data are configured in two non-nested structures: (1) the rater groups, varying between self, personal or professional raters; and (2) the competencies category with 13 competencies divided into two types of competencies: cognitive and EI. The hierarchal structure of the data model is shown in Figure 3.1.

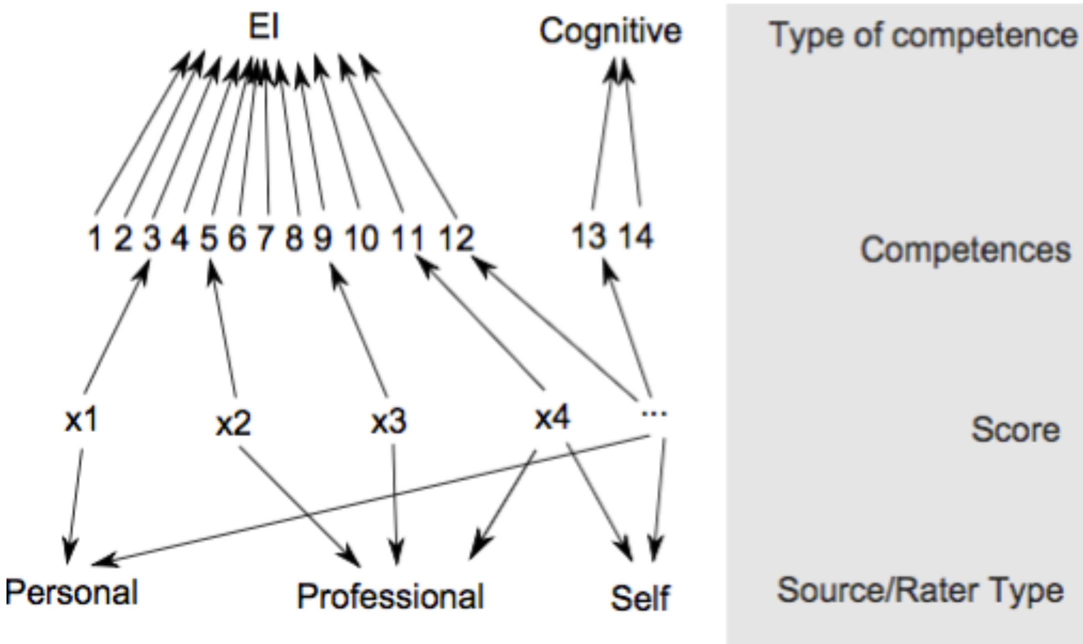

Figure 3.1 | Emotional and Social Competencies Inventory – University Edition (ESCI-U) data configuration. The ESCI-U data is framed within two non-nested structures: (1) the raters group, composed of self, personal and professional raters; and (2) the competencies category, withholding 14 competencies, which in turn are sub grouped into two types of competencies: Emotional and Cognitive.

The relationship between the ESCI-U and the GMAT scores might be affected by whether the ESCI-U scores on each competency are independent or not from the rater group. Therefore, treating each competency and group of raters as independent might mask important information. To adjust for this possibility, we allowed for a possible dependent relationship between the rater source and the competency category to be freely estimated in our model.

In order to be able to accommodate such a complex data structure and the relationships among the competencies (13 in two groups) and three types of raters, we need a specified model with sufficient flexibility to assign the proper systematic and stochastic variations. A multilevel/hierarchical model with non-nested structures in the first level (raters and competencies) and a nested structure in one of the components (competencies in two groups) is needed.

3.6.2 Bayesian model specification

We chose to analyze the data and test our hypotheses by specifying a Bayesian hierarchical model. The choice to work with a Bayesian model was due to two main factors: (1) the sample was an entire population in and by itself; and (2) it was not a random sample. These issues pose problems in many statistical analyses because traditional frequentist methods are based upon the assumption that the data are created by a repeatable stochastic mechanism. While mainstream statistics treat the observable data as random and the unknown parameters of the population are assumed fixed and unchanging, in the Bayesian view, it is the observed variables that are seen as fixed whereas the unknown parameters are assumed to vary randomly according to a probability distribution. Therefore, in Bayesian models, the parameters of the population are no longer treated as fixed and unchanging as a frequentist approach would assume[7].

In sum, the main advantages of the Bayesian approach are twofold: (1) it enables highly flexible model specifications (as the one needed to account for the hierarchical structure of our data); and (2) is more appropriate for settings where

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[7] Instead of a frequentist approach, in this approach a parameter is assigned a prior distribution (based on previous research in the field), which is then updated with the actual data by means of a specified likelihood function, so as to produce a posterior distribution of the parameter (Wagner and Gill, 2005). In fact, in our approach we are not entitled to use a *p*-value (as in frequentist statistics) as the probability of obtaining the observed sample results under the null hypothesis. As mentioned the data is not a sample of a larger population but it is a population.

the data is not a random sample, but the entire population. In addition, it offers a clear and intuitive way to present results. For example, it appears more intuitive by generating *probability* statements about the findings (for more readings on the advantages of Bayesian inference, check the introductory chapters of Gill, 2002; Gelman et al., 2003; Jackman, 2009).

To best accommodate the structure of our data, we used a multilevel or hierarchical model non–nested structure (by competency and rater group). Equation 1 below represents our model specification, which assumes a linear association between GMAT and ESCI-U scores.

$$\begin{array}{lcl} GMAT_{i,c,r} & \sim & N(\mu_i,\sigma) \\ \mu_i & = & \alpha_{c,r} + ESCI-U\theta_{c,r} + Female\beta_r + Female*ESCI-U\delta_{c,r} \\ \sigma & \sim & U(0,100) \\ \alpha_{c,r} & \sim & N(0,1000) \\ \theta_{c,r} & \sim & N(\Theta_{r,t},\sigma_\theta) \\ \Theta_{r,t} & \sim & N(0,1000) \\ \sigma_\theta & \sim & U(0,10) \\ \beta_r & \sim & N(0,\sigma_\beta) \\ \sigma_\beta & \sim & U(0,100) \\ \delta_{c,r} & \sim & N(\Delta_{r,t},\sigma_\delta) \\ \Delta_{r,t} & \sim & N(0,1000) \\ \sigma_\delta & \sim & U(0,10) \end{array} \qquad (1)$$

The *i* subscript refers to the individual, the *c* subscript refers to the competency and the *r* subscript refers to the rater group (self, personal or professional). The intercept, $\alpha_{c,r}$, varies by competency and rater group. The parameters that account for the ESCI-U effect, $\theta_{c,r}$, have a hyper-parameter, $\Delta_{r,t}$, that varies by rater group and by type of competency (i.e., cognitive or emotional)[8].

[8] Hyper-parameters provide a clear illustration of the Bayesian view on population parameters. That is, there are no static assumptions made about the mean of a parameter,

Additionally, the model includes gender as a source of variation, with coefficient β_r varying by group of raters. The moderator effect of gender on the association between ESCI-U and GMAT is also specified, an interaction that is parameterized as $\delta_{c,r}$ – varying by competency category and rater group, with hyper-prior specification that depends on the type of competency.

In total, there are six main parameters of interest to be estimated, which are compared regarding the type of competency (cognitive or emotional) and the rater group. Estimating a model like the one above is not possible using "canned" procedures from mainstream statistical packages. This confounds the other seemingly inappropriate assumptions from frequentist approaches based on maximum likelihood. One technical solution is to use Bayesian simulation techniques, which allow for highly flexible model specifications[9].

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rather the mean is allowed to fluctuate according to its own probability function. The subscript *r* on the hyper-parameter refers to the gender and the subscript *t* refers to the type of competency, Cognitive or Emotional.

[9] As mentioned earlier, Bayesian inference requires researchers to provide prior distributions for the parameters of the model. Given the lack of previous research on this topic, however, the current prior distributions were weakly informative. Consequently, our model has been estimated using Markov Chain Monte Carlo methods, more specifically, the Gibbs sampler. JAGS (Plummer, 2003) has been used for the estimation, while the chains have been analyzed under R with the coda and ggmcmc libraries (Plummer etal., 2006; Fernández-i-Marín, 2013; R Development Core Team, 2013). A total of 5,000 samples of two chains of simulated posteriors have been acquired under different initial values, with a burn-in period of 1,000 iterations. There is no evidence of non-convergence of the series according to the Geweke (1992) test.

3.7 Results

To test the structure of the 13 competency scales, we used LISREL 8.80 with the covariance matrix to estimate the factorial composition. The same CFA model was specified for professional and personal raters. The fit indexes of the measurement model were satisfactory, as shown in Table 3.1. Factor loadings of the items per competency were above 0.65. The usual global indexes shown in Table 3.1 are below or close the appropriate thresholds (Hu and Bentler, 1999). The relatively high values of chi-square were actually due to some irrelevant misspecifications, which were magnified due to the high power situation (large sample size and high reliability). We could have released a few constraints on uncorrelated uniqueness but their estimated values would be negligible.

Table 3.1 | Confirmatory factor analysis (CFA) model fit for different types of raters (n = 641)

Rater type	Satorra-Benter χ^2(df)	90% CI RMSEA	P-value for test of close fit (RMSEA < 0.05)	CFI	SRMR
Professional	4751 (2261)	(0.0404; 0.0437)	1.000	0.992	0.0525
Personal	5399 (2261)	(0.0456; 0.0488)	0.994	0.998	0.0579

In addition, it is well known that these global fit indexes may have limitations resulting in erroneous conclusions (Saris et al., 2009). Therefore, we checked whether: (1) all the estimated values were reasonable and of the expected sign; (2) the correlation residuals suggested the addition of parameters; and (3) the modification indexes and expected parameter changes led to plausible estimates. This process focuses more attention on the detection of misspecification errors rather than solely on the global fit (Saris et al., 2009). It considers the power of the test in addition to the significance levels. The results did not show any significant misspecifications in our CFA model for each set of raters.

Results from a discriminant validity analysis show that all the competencies are adequately discriminated[10]. Discriminant validity was assessed by comparing the square root of the AVE, as shown in Table 3.2, of each reflective construct with the correlations between the constructs, reported in Tables 3.3 and 3.4. Despite the relatively high magnitude of some correlations among competencies, the results suggested that the 13 competencies were adequately discriminated. To be sure, the two cognitive competencies were integrated into one scale for this analysis. Any model that specified a correlation between two competencies constrained to one has been rejected. Therefore, these results suggested the appropriateness of maintaining the 13 competencies rated by others as separate scales.

Table 3.2 | AVE, Cronbach's α and Omega reliabilities of EI competencies for (a) personal and (b) professional raters (n = 641).

Constructs		AVE		Cronbach's α		Ω	
		(a)	(b)	(a)	(b)	(a)	(b)
[AO]	**Achievement orientation**	0.519	0.587	0.842	0.875	0.860	0.880
[A]	**Adaptability**	0.558	0.591	0.856	0.875	0.890	0.910
[CFM]	**Conflict management**	0.497	0.521	0.824	0.854		
[CM]	**Coach and mentor**	0.610	0.617	0.882	0.888		
[ESA]	**Emotional self-awareness**	0.589	0.591	0.874	0.847		
[ESC]	**Emotional self-control**	0.676	0.731	0.905	0.920		
[E]	**Empathy**	0.610	0.654	0.885	0.896		
[I]	**Influence**	0.498	0.534	0.828	0.847	0.840	0.870
[IL]	**Inspirational leadership**	0.693	0.702	0.913	0.920		
[OA]	**Organizational awareness**	0.555	0.578	0.852	0.869		
[PO]	**Positive outlook**	0.652	0.572	0.902	0.868		
[T]	**Teamwork**	0.654	0.695	0.902	0.914		
[C]	**Cognitive**	0.543	0.561	0.909	0.916	0.920	0.929

[10] In addition, as indexes of discriminant and convergent validity (Bagozzi and Yi, 1988), we first checked the average variance extracted (AVE; i.e., the average communalities per competency). As mentioned, the results showed that all items have loadings above 0.65, with competencies having always an AVE above or close to 0.5. In addition, cross-loadings from a previous EFA showed that all the items have much higher loadings with their respective construct (as suggested by Chin, 1998) than with any other competency.

Table 3.3 | Correlation matrix of EI competencies as scored by personal raters (*n* = 641)

	AO	A	CFM	CM	ESA	ESC	E	I	IL	OA	PO	T
[A] Adaptability	0.817											
[CFM] Conflict management	0.685	0.865										
[CM] Coach and mentor	0.626	0.705	0.853									
[ESA] Emotional self-awareness	0.560	0.597	0.726	0.749								
[ESC] Emotional self-control	0.566	0.720	0.809	0.534	0.460							
[E] Empathy	0.588	0.726	0.905	0.814	0.720	0.721						
[I] Influence	0.582	0.805	0.802	0.666	0.605	0.500	0.587					
[IL] Inspirational leadership	0.724	0.802	0.827	0.786	0.644	0.557	0.596	0.845				
[OA] Organizational awareness	0.651	0.870	0.841	0.693	0.568	0.646	0.746	0.783	0.764			
[PO] Positive outlook	0.619	0.696	0.670	0.575	0.534	0.553	0.517	0.552	0.734	0.566		
[T] Teamwork	0.640	0.780	0.890	0.824	0.594	0.675	0.787	0.653	0.786	0.811	0.674	
[C] Cognitive	0.781	0.900	0.793	0.641	0.629	0.632	0.646	0.797	0.769	0.806	0.601	0.646

Table 3.4 | Correlation matrix of EI competencies as scored by professional raters (*n* = 641)

	AO	A	CFM	CM	ESA	ESC	E	I	IL	OA	PO	T
[A] Adaptability	0.892											
[CFM] Conflict management	0.770	0.840										
[CM] Coach and mentor	0.740	0.743	0.875									
[ESA] Emotional self-awareness	0.674	0.730	0.799	0.777								
[ESC] Emotional self-control	0.509	0.627	0.799	0.593	0.527							
[E] Empathy	0.637	0.752	0.930	0.854	0.784	0.788						
[I] Influence	0.762	0.853	0.888	0.785	0.803	0.603	0.784					
[IL] Inspirational leadership	0.757	0.786	0.793	0.833	0.682	0.538	0.689	0.867				
[OA] Organizational awareness	0.686	0.854	0.829	0.738	0.729	0.680	0.825	0.858	0.722			
[PO] Positive outlook	0.734	0.742	0.759	0.662	0.603	0.600	0.683	0.705	0.781	0.669		
[T] Teamwork	0.683	0.753	0.877	0.903	0.683	0.698	0.887	0.757	0.741	0.830	0.692	
[C] Cognitive	0.848	0.908	0.832	0.743	0.776	0.589	0.720	0.869	0.769	0.797	0.652	0.696

With this evidence supporting validity of the scales, we addressed reliability. In Table 3.2 we used Cronbach's α for assessing the internal consistency of each set of five items within each competency. However, for those competencies in which tau- equivalence (Bollen, 1989) was not fulfilled, we used Heise and Bohrnstedt's (1970) W, which only requires fitting a unidimensional factor analysis model.

Although the two models shown in Table 3.2 fulfill the *configural invariance* (same CFA model for personal and professional raters), they showed support for rejecting the condition that the item loadings were the same in both groups of raters (i.e., they had measurement equivalence). Intraclass correlation indexes were not considered because we did not need to aggregate raters into one category of "others." As a result, the two raters' perspectives were considered under a hierarchical model specification.

The outcome of a Bayesian model is not a point estimate of the coefficient with an associated standard error, but a complete density distribution of the parameter, which can then be simply summarized by using its median and standard deviation to resemble the traditional frequentist approach of parameter estimates and standard errors. Moreover, percentiles of the parameter's distribution are used to summarize its credible interval (which is the Bayesian equivalent to a parameter's confidence interval in classical statistics). In addition, results and substantial interpretations of some of the parameters are presented using graphical figures, in accordance with statisticians' advice of "turning tables into graphs" (Gelman et al., 2002).

3.7.1 Cognitive vs. Emotional competencies

As mentioned earlier, the main parameters of interest, $\Theta_{r,t}$, are those that describe the association between GMAT and ESCI-U competencies depending on which type of competency, cognitive or EI, and which of the three groups of raters are considered. A caterpillar plot is shown in Figure 3.2 with the median of the posterior distribution of each parameter and the 90 and 95 percent credible intervals. The parameters can be interpreted as follows: (a) if the distribution crosses the zero point, there is no consistent relationship of significance; and (b) if the line is to the right or the left of the zero point, then it tells us about the relative impact. For example, in Figure 3.2, the cognitive competencies assessed by professional sources have a positive relationship to *g*. The distribution can be said to show that an increase of one unit in the cognitive competencies, as scored by professional raters, is expected to produce an on average increase of around 8.5 units in the GMAT scores. EI and cognitive competencies show no relationship to *g* with observations from personal sources. Observations from professional sources show a positive relationship between EI and *g*. Observations from self-assessment show a negative relationship between EI and *g*. In all three groups of raters the association between GMAT scores and the raters' evaluation of the cognitive competencies is considerably higher than with the raters' evaluation of EI competencies. This clearly indicates that GMAT scores are associated in a different way with the ESCI-U scores produced by the three groups of raters. Adding to the main effects mentioned, these results show that the rater group has a moderator effect on the association between ESCI-U and GMAT scores. Therefore we find support for hypothesis 1, strong support for hypothesis 2, and clarity as to the different sources for hypothesis 3.

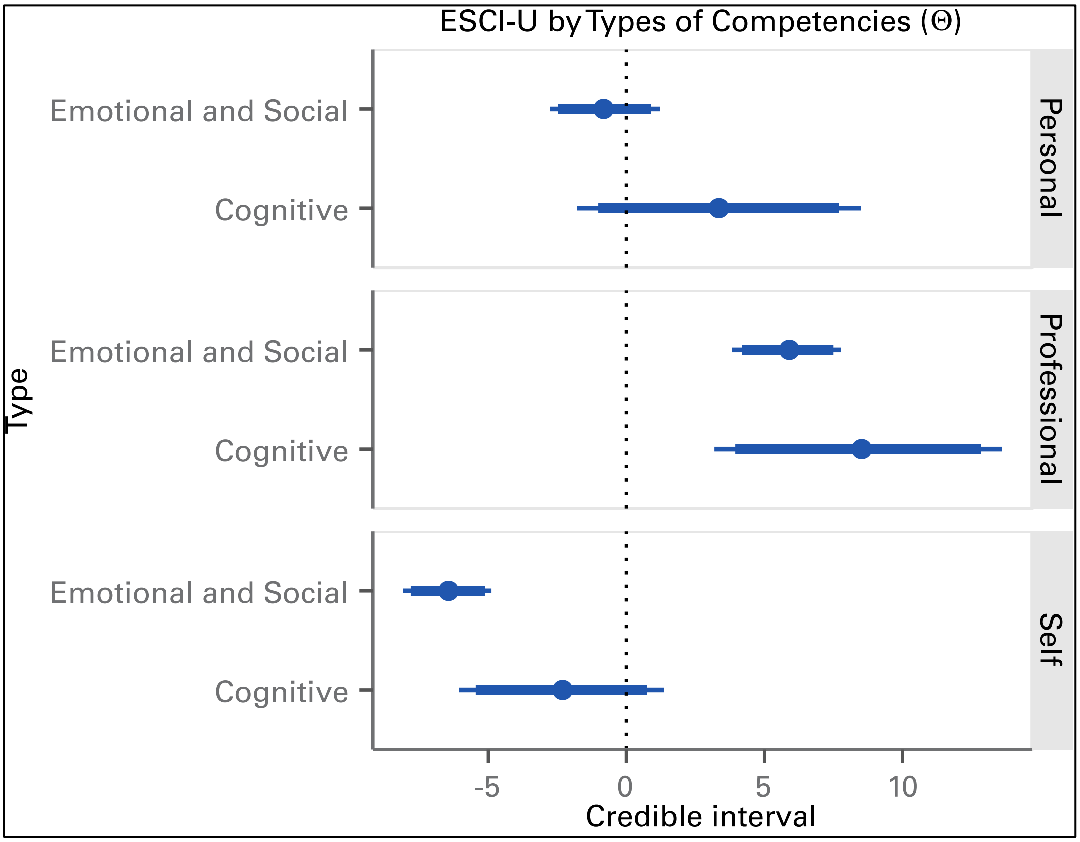

Figure 3.2 | Caterpillar plot of the posterior distribution of the effects of types of competencies on GMAT scores, by rater. Credible intervals (median, 90 - thick line - and 95% - thin line) of the distribution of the parameters that account for the association between the type of competency and the GMAT score. Hence, for the first element (Emotional-Personal), one unit increase in emotional competencies is expected to decrease the GMAT by around one point. However, since the credible interval overlaps zero, there may be weak evidence of an actual decrease.

Figure 3.2 also shows that others' ratings of behavior agree more with each other than they do with self-perceptions. This is a well-established result (Atwater and Yammarino, 1992; Carless et al., 1998) that brings further support to our claim that clustering self-report with others' ratings or 360° based approaches confuses the relationships of EI to different constructs. Another way to examine these results is by using probability statements, which is one of the advantages of using Bayesian inference. In this sense, the probability that cognitive competencies are more strongly associated with GMAT scores than the EI competencies ranges between 81.5 percent for professional raters, 92.7 for personal raters and 97.8 for self-evaluations. Therefore, the data offers strong evidence for hypotheses 3.

To provide deeper insight into the consistency of the distributions, Figure 3.3 shows the caterpillar plot of all the 52 $\theta_{c,r}$ parameters, one per each of the 14 ESCI-U competencies, and the three rater groups. As can be seen, the parameters' distributions are quite consistent within the EI and cognitive types of competencies results shown in Figure 3.2. The figure can be read as follows, taking as an example the first element of Figure 3.3: an increase of 1 unit in the competency score of pattern recognition by professional raters is expected to generate an on average increase of about 7.5 in the GMAT score. Yet, regardless of which rater perceptions are considered, cognitive competencies always show higher association with GMAT scores than EI competencies.

3.7.2 The moderator effect of gender

Regarding the moderator effects of gender, females showed substantially lower associations between EI and *g* than males, as shown in Figure 3.4. In fact, it is negative for observations from each of the self and professional observers and non-significant for personal observers for females. Meanwhile, there is a positive relationship between EI and *g* for males as viewed from professional observers. Although varying in intensity, for all sources for both EI and cognitive competencies, males show a stronger relationship to *g* than females. Regarding cognitive competencies, the relationship to *g* is stronger for males than females from all sources. This provides further support for hypotheses 3 and clarifies why hypothesis 4 is important.

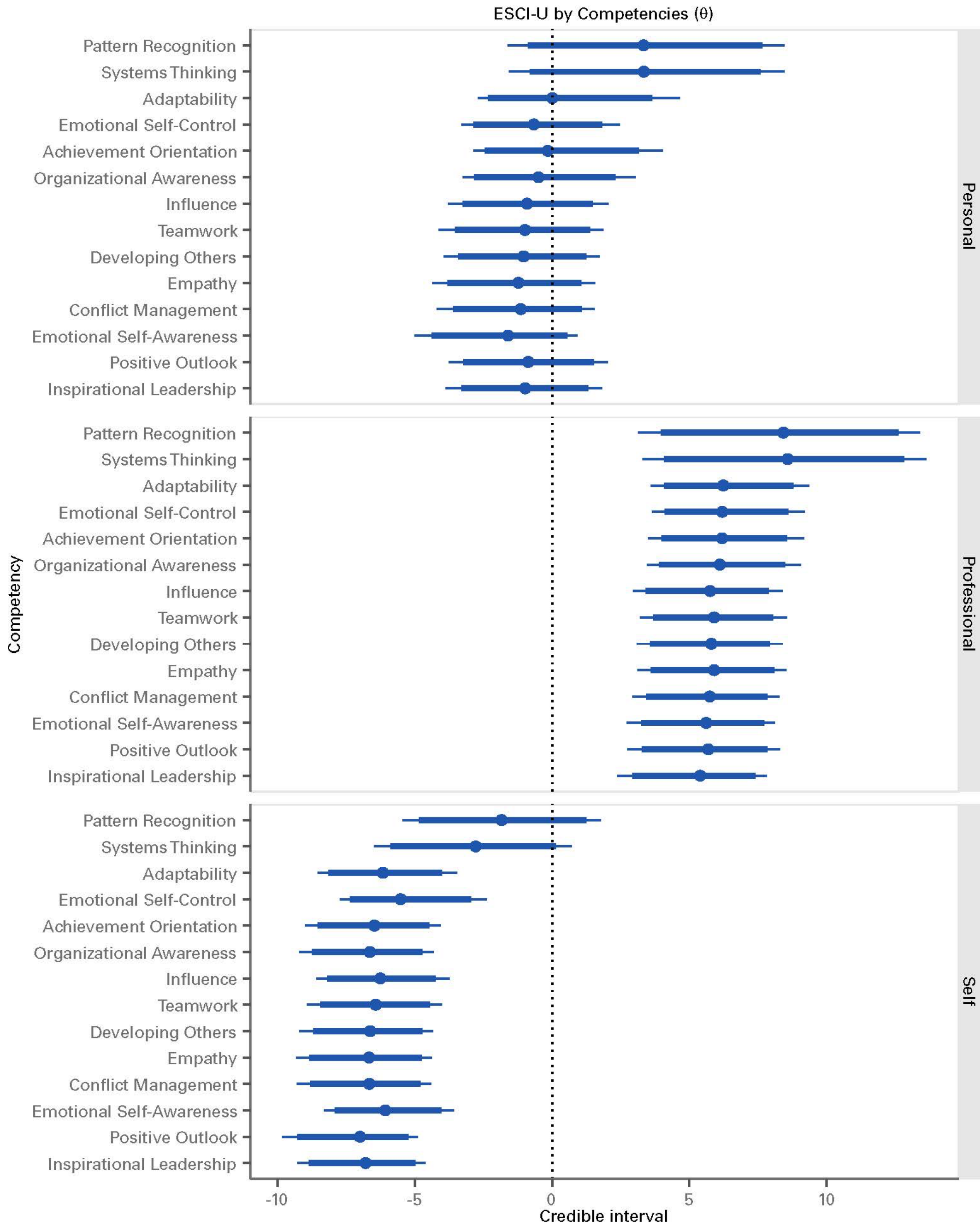

Figure 3.3 | Catterpillar plot of the posterior distribution of the effects of each competency on GMAT scores. Credible intervals (median, 90 – thick line – and 95% – thin line) of the distribution of the θ parameters that account for the association between each competency and the GMAT scores.

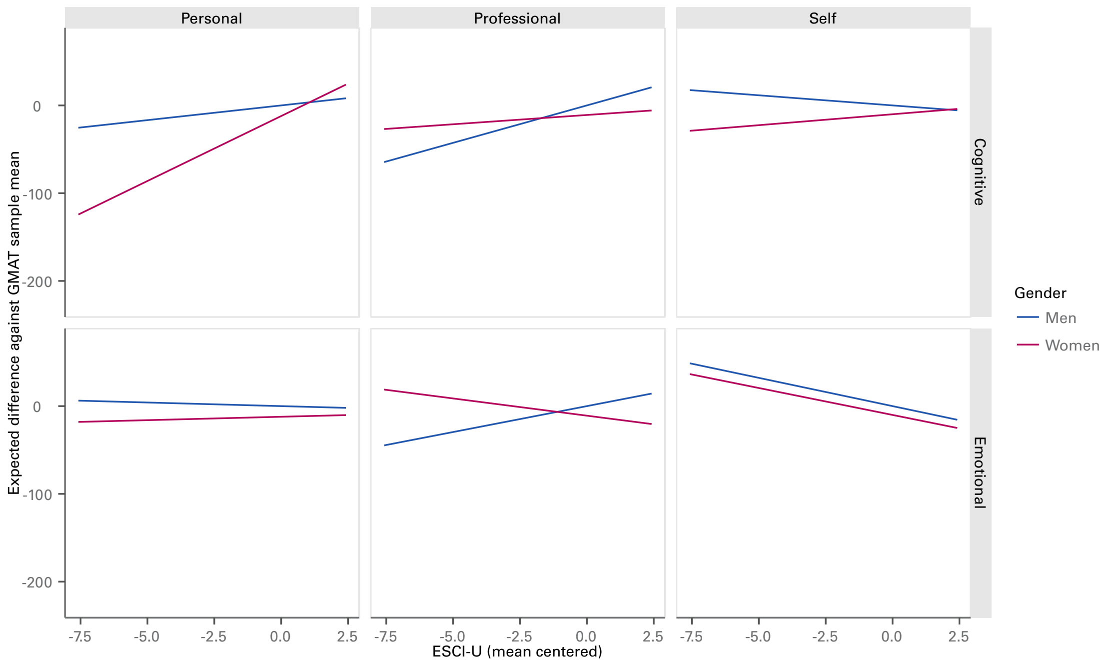

Figure 3.4 | Expected moderating effect of gender on the relationship between ESCI-U score on congnitive and emotional competencies and GMAT, by type of rater. The lines represent the expected effect of ESCI-U scores (as departures from the sample mean in the horizontal axis) and GMAT scores (as departures from the sample mean in the vertical axis). Flat lines represent situations in which the association between ESCI-U and GMAT is not clear. Increasing lines can be read as follows: a unit increase in the ESCI-U score for a male/female in an emotional/cognitive competency as measured by a specific rater is expected to increase the GMAT score by a certain amount given by the vertical axis.

3.8 Discussion

The study examined the relationship between behavioral EI and *g*. We found that cognitive competencies are more strongly related to *g* than EI competencies. EI, as seen by others, is slightly related to *g*, in particular for observations from professional raters for males, but there is no relationship from observations of personal raters, and a slightly negative relationship of EI and *g* from self-assessment. When we examined the gender moderating effects, there appears to be a relationship between EI and *g* for males with observations from professional raters. With females, there is no relationship between EI and *g* with observations from personal raters, and a slight negative relationship with observations from professional raters and self-assessment.

In alignment with both Fernández-Berrocal and Extremera (2006) and Boyatzis (2009) frameworks of the research on EI, these results offer further support to distinguish between approaches to EI that are based on self-perception and those that are behavioral. This would add to the literature by supplementing the other approaches and levels of EI with the behavioral approach and helps us develop a more holistic model of the EI. Even with this approach, for males with assessment from professional colleagues, there is a relationship between EI and *g*. It is not as strong as the relationship with cognitive competencies and *g*. But it is there. These findings support the idea reported in other studies that to be effective in management, leadership or professions, we probably need some distribution of EI, cognitive competencies and *g* (Boyatzis, 2006; O'Boyle et al., 2011).

Self-assessment showed a slight negative relationship between EI and *g*. This raises the question as to whether self-perception approaches to EI will be as good in predicting job performance (Taylor and Hood, 2010). But a recent meta-analysis of self-assessment methods did show consistent predictive effects of EI (Joseph et al., 2014). Perhaps for those jobs and professions that involve more analytic activities and tasks which require a higher level of *g* – e.g., a bench scientist, engineering programmer, creative artist or mathematician, self-perceived EI may be relatively less accurate in performance prediction than a behavioral approach.

The gender moderating effects noted may be interpreted as a result of the different expectations and attributions from others to males and females. Whether emerging from stereotyping or social comparison processes, they force what appears to be a more generous attribution of the link between EI and *g* to males than females. One dilemma is that some studies may confound such processes by using a measure of *g* that appears gender biased. For example, the Ravens Progressive Matrices, although considered one of the best measures of *g*, is a visual comparison task (i.e., choosing a figure that fits into a sequence more than others). Since males appear to handle such spatial reasoning more quickly, as a result of prior gender based training and socialization, may give males a different distribution on the results than females. It is recommended that these "male normative" intelligence tests (Furnham, 2001), are paired with the Mill Hill Vocabulary or some such similar test that balances a measure of *g* with specific skills in which females do better than males (Boyatzis et al., 2012).

Overall, the different results from different raters are a reminder that the reality of what you see depends on the direction in which you look, and the color of the lenses you wear.

3.8.1 Implications

The results suggest that research on EI should examine at more than one level within studies, the ability, trait, self-perception or behavioral levels. It may help in understanding the relevance of EI to life and work outcomes, as well as other constructs in psychology. They also suggest that research on EI should include measures of *g* to show the unique variance contributed by each concept and show the relative power of each. When collecting behavioral EI data, these results suggest that analyses should examine the sources of the observations as a possible moderator or mediator on the dependent variables. For example in this research, it is likely that the professional environment provides more opportunities for the raters to assess *g*-related competencies than the personal environment. It is also crucial to analyze data for gender effects that may not be apparent in more direct, statistical analysis.

Professionals using 360° assessments to coach or develop EI should be prepared to identify systemic differences across gender and rater types. Otherwise, individuals may leave their coaching session thinking they have an actual "problem" with certain raters, when in reality it is a systematic bias shared across the population.

3.8.2 Limitations

One of the limitations of this study emerges because the data came from a single school with diverse nationalities. As such, it threatens external validity. The study should be replicated in other schools to insure that a specific school's selection and admissions criteria have not biased results.

By focusing on MBA students, we also threatened construct validity. Social desirability is one of the most common validity threats associated with the use of questionnaires in this postgraduate population. Raters provided by the individual rated might create a halo effect, an overall positive feeling leading to inflate their perception of how often desirable behaviors are present. Specially, self-assessment is often misguided for this overall positive feeling about oneself, or because being competent is desirable, thus increased positive self-assessment tends to occur. Future research should address this issue as well.

3.9 Conclusions

Emotional intelligence exists at multiple levels. The behavioral level of EI shows a different relationship to *g* than other levels or approaches to EI. Different people around us, at home and at work, will see different facets of our behavior, depending on the kind of relationship and rapport they have established. Some raters are best equipped to assess certain competencies than others because they witness frequently the activities that elicit those behaviors. While our study reveals that raters from a professional sphere are more apt to evaluate cognitive competencies, future research would benefit from looking further into discovering which rater type among professionals (boss, colleagues or subordinates) is best suited to assess which ESCI-U competency. The same can be said of the pervasive impact that gender stereotypes and social comparison processes have on observations of others and their interpretations of it. Regarding EI, to be of most help in discovering insights that will be useful to improving our lives, we should be more comprehensive about the variety in approaches to EI and more sensitive to their differences at the same time.

References of Chapter 3

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Chapter 4 | When EI competencies catalyze the relationship between intelligence and learning performance: A task-dependent interaction model

ABSTRACT

The fundamental principle of emotional intelligence (EI) lies on the integration of emotion into cognitive processes that facilitate mental activities such as thought, memory and decision-making. Yet, prior research on EI has mainly focused on testing additive models that assume EI and cognitive abilities make independent contributions to performance; little attention has been devoted to investigating their potential interaction effects. We develop and test a task-dependent interaction model that reconciles the divergent findings in previous interaction studies. We posit that whenever tasks require the social cognitive domain and involve interpersonal interactions, EI and general cognitive ability (or *g*) are mutually reinforcing, such that the association between EI and *g* becomes stronger as *g* increases. Otherwise, in non-social tasks, a negative interaction between EI and *g* is expected. Using a behavioral approach to EI, also known as EI competencies, we collect observations of actual EI behavior as is seen by others who work and live with the person. Based on a sample of 849 MBA students including 23 nationalities, we test a hierarchical model that is contingent on the types of task (social vs. non-social) and rater (professional, personal and self). Our results reveal that aside a positive main effect on the classroom performance of professional executives, behavioral EI moderates the relationship of *g* and academic performance. Whereas we find evidence that in non-social tasks, behavioral EI has a stronger effect on MBA performance among candidates with low *g*, our data was short to support the hypothesis whereby, in social tasks, EI boosts the effect of cognitive abilities on performance. Moreover, while females had an advantage in social tasks, man had relatively higher performances in non-social tasks. Professional raters had a relatively small measurement error as compared to the other rater types, and thus produced the highest estimates in our model.

Keywords: emotional intelligence, emotional intelligence competencies, general cognitive ability, opposing cognitive domains, social tasks, non-social tasks, individual performance

4.1 Introduction

Educational psychologists, along with parents, teachers and society at large, are concerned with how best to enhance learning performance. Herein defined as one's ability to apprehend knowledge, skills, attitudes or behaviors that are required and/or reflected by the objectives of certain learning experiences (LePine, LePine & Jackson, 2004), we study learning performance in this paper, as assessed within a population comprising managers and professional executives enrolled in an international MBA programs at a leading business school. To this end, higher education institutions such as ours attempt to select those students that are most likely to succeed in their programs, based on a set of pre-defined criteria (Romanelli et al., 2006). Among these, general cognitive ability, or *g*, has been the most studied and well-established predictor of both academic and job performance (Nisbett et al., 2012). However, the last 20 years have witnessed the rise of emotional intelligence (EI), fuelled by claims that it is superior to IQ in predicting performance (Goleman, 1995, 1998). While some researchers have shown that emotional intelligence, as conceptualized by a set of abilities ranging from perception to regulation of emotions in the self and in others (Mayer & Salovey, 1997), has an incremental impact on job performance – even beyond *g* and personality traits (Boyatzis et al., 2012), an increasing number of studies and meta-analyses attest to an overall accumulation of conflicting results, particularly in academic settings (Van Rooy & Viswesvaran, 2004; Zeidner, Matthews & Roberts, 2004; O'Boyle et al., 2011; Brackett, Rivers & Salovey, 2011).

It is our contention that the lack of consistency across findings in the field may be due, in part, to the prominence of additive linear models in the study of EI's contribution to performance. In the attempt to show EI's incremental validity, researchers have built the case for EI by arguing it can explain variance in performance that is not yet accounted by extant constructs, such as cognitive intelligence (Goleman, 1998; Mayer, Salovey & Caruso, 2000). This argument presumes that emotional and cognitive intelligences make independent contributions to performance, an assumption that overlooks the integration of emotional and cognitive processes (Damasio, 1994) that is core to the concept of EI, particularly since it "combines the ideas that emotion makes thinking more intelligent and that one thinks intelligently about emotions." (Mayer & Salovey, 1997, p. 5). While it is clear that individuals who score high (low) in both EI and *g* achieve top (bottom) performances, less is known about predicting performance when EI is high (low) and *g* is low (high). To tap into this gap, the present study examines the interaction effects of EI and *g* on individual performance.

To be sure, the scant research addressing EI's interaction effects on performance is gathering mixed findings. Three studies in academic institutions find evidence of a negative interaction between *g* and EI on performance (Agnoli et al., 2012; Côté & Miners, 2006; Petrides et al., 2004). Thus, such studies propose a compensatory model, whereby individuals characterized by low levels of cognitive intelligence use emotional intelligence skills to cope and compensate for their performance. Notwithstanding, research conducted in business organizations draws opposite results. Notably, Ferris et al. (2001) proposes social skill positively moderates the relationship between general mental ability and job performance. Here the authors argue that for those individuals characterized by low levels of cognitive intelligence, incapable of offering effective solutions to a task, social skill is of little help to their performance. Similarly, Verbeke et al. (2008) and Kidwell et al. (2011) confirmed the positive interaction by which EI enhances cognitive ability in boosting sales performance.

Reconciling such puzzling findings, we contend that whether EI and cognitive ability interact in the way of complementing or substituting one another for raising performance, ultimately depends on the type of task requirements. Specifically, we adopt Jack et al. (2012)'s categorization of tasks regarding two broad and opposing cognitive domains, namely social vs. physical reasoning. We hypothesize that in tasks requiring social reasoning, i.e., thinking about social cognitions and the mental states of other persons, EI and *g* may function as strategic complements, mutually reinforcing their effects on performance. By contrast, in non-social or physical reasoning tasks, i.e., that require thinking about mechanical properties of inanimate or abstract objects, we may observe that EI is most beneficial as a coping device for individuals lacking the intellectual ability needed to effectively perform the task.

To study a task-dependent interaction model of EI and *g* on performance, the present research involved the collaboration of 864 business professionals as they enrolled in an international Master of Business Administration (MBA) program. Unlike most academic programs, the MBA is well known for its business-laden environment and diversity across subjects. With courses spanning from social reasoning (e.g., International Marketing or Leadership) to physical reasoning (e.g., Finance or Statistics), the MBA is a particularly suitable setting to test our hypotheses.

The purpose of this study is to articulate a coherent framework that advances early research on the moderating role of EI in affecting performance (Van Rooy and Viswesvaran, 2004; Fiori, 2015), while internalizing task-dependence in the analysis. Additionally, we are first, to our knowledge, to examine the interaction effects of a behavioral approach to emotional intelligence.

4.2 Emotional Intelligence

Capturing the philosophical spirit of modern day's emotional intelligence, Aristotle first noted that "those who possess the rare skill to be angry with the right person, to the right degree, at the right time, for the right purpose, and the right way are at an advantage in any domain in life" (Langley, 2000: 177). Yet, the Stoics of Ancient Greece insisted that emotion and emotion-laden aspects of life were inferior to reason, a view that, to the exception of the European romanticists of the eighteen-century, prevailed throughout millennia. Only recently, in the mid-twentieth century, the first mentions of "emotional intelligence" begin to appear; the first in Van Ghent's (1953) literary account of Jane Austen's *Pride and Prejudice*, noting how the lead character displayed this quality. A few decades later, we witness the emergence of emotional intelligence as a new scientific concept in Salovey & Mayer's (1990) seminal article that launched EI into psychology research.

To be sure, during the previous decade of the 80s, groundbreaking research in two areas of psychology had been vital for EI to arise. First, a cognitive revolution had been underway: narrow cognitive conceptions of analytical intelligence were expanding towards the idea of multiple intelligences, spanning across social, practical, and personal intelligences (Gardner, 1983; Sternberg, 1985). In parallel, research on emotion was showing unequivocal evidence of the integration of emotion within cognitive processes, facilitating such facets of mental functioning as memory, attention, and decision-making processes (Damasio, 1994; Forgas & Moylan, 1987; Mayer & Bremer, 1985). These discoveries, although countering millenary wisdom that emotion was an "acute disturbance of the individual as a whole" (Young, 1943: 263), were lighting up a lively inquiry among psychologists and neuroscientists alike, about the possibility of an overlap between emotion and intelligence. This way, an articulate conception of emotional intelligence came to form as a true intellectual ability, meeting traditional standards for an intelligence (Mayer, Caruso & Salovey, 1999) and being defined as a set of interrelated skills, including "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotions and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth." (Mayer & Salovey, 1997: 10).

Although Salovey and Mayer's articles (1990a, 1990b, 1997) initially stirred the scientific community with the idea of a new form of intelligence pertaining to emotions, Goleman's (1995, 1998) best sellers galvanized public interest with claims that EI was superior to traditional intelligence in predicting workplace performance. With the rise of EI's cachet came the widespread use of the concept by organizational consultants, coaches, educators and researchers alike. Soon, the diversity of people interested in the topic matched the variety of EI assessments available. To such an extent that, today, EI researchers embrace alternative approaches to its measurement, assessing EI through different facets other than formal intelligence.

Despite EI's field being deep in controversy with several definitions and assessments over its first 25 years of research, emotional intelligence, as a concept that comprises a set of inter-related abilities pertaining to the perception and regulation of emotions in the self and in others (Mayer & Salovey, 1990), provides a common content domain to existing EI measures (Joseph et al., 2014). What distinguishes existing EI models is the choice of measurement theory, a decision that is tied to the reflective facet of EI one wishes to observe. Notably, EI may be observed as a standard mental ability, a self-perceived quality within the personality realm, or ultimately, as it manifests into real life behavior. This way, three distinct but complementary EI approaches exist in the literature (cf. Fernández-Berrocal & Extremera, 2006; Boyatzis et al., 2015): 1) Ability EI, following Salovey & Mayer's work, assumes EI can be measured similarly to traditional forms of intelligence, with a performance-based questionnaire (e.g., MSCEIT; Mayer, Salovey & Caruso, 2000) in which item responses are judged wrong or right by a panel of Emotion experts. Studies using MSCEIT have shown consistent prediction of *g*, even when controlling for personality (Webb et al., 2013). Regarding performance, although some studies shown relationships with school (Brackett et al., 2004), and job outcomes (Mayer et al., 2008), three meta-analyses find that relative to other EI approaches, Ability EI is not as good predicting job performance (Van Rooy & Vaswervaran, 2004; O'Boyle et al, 2011; Joseph & Newman, 2010). 2) Self-report EI is based on self-perceptions of EI reflecting facets within the personality realm (Bar-On, 1997; 2000), attitudes and behavioral tendencies (Petrides & Furnham, 2000; 2001). This approach uses self-report questionnaires, which although show acceptable validity (e.g., Trait EI Questionnaire (TEIQue); Petrides & Furnham, 2001), oftentimes need correction for social-desirability bias (Paulhus and Reid, 1991). While Self-report EI is not as strongly related to *g* nor job outcomes, it does show a significant relationship to personality (Joseph and Newman, 2010; O'Boyle et al., 2011); and 3) Behavioral EI assesses a person's emotional intelligence as it manifests through behavior in real-life situations. It's most representative model is probably emotional and social competencies (e.g., ESCI; Boyatzis, 2009; Goleman & Boyatzis, 2007). What is distinctive about this approach is that it does not rely on the self as a source of information. Instead, behavioral EI collects observations from others, the people who live or work with the person being assessed (also known as multi-source or 360º assessment), regarding what and how frequently they see the person behave in ways that are emotionally or socially competent (Boyatzis, 2009; Boyatzis et al., 2015). Behavioral EI as measured with ESCI (Boyatzis & Goleman, 2007) is only mildly related to *g*, but shows evidence of a strong relationship to workplace performance (Boyatzis et al., 2012; Downey, Lee & Stough, 2011).

Other classifications of EI literature exist, but are based on a division of the field that sets apart EI research on Salovey & Mayer's (1997) Ability EI - corresponding to streams 1 and 2 in Ashkanasy & Daus (2005) – from all other EI approaches, notably self-report and behavioral EI, which are clustered together and labeled as "mixed EI" (Mayer et al., 1999; Ashkanasy & Daus, 2005). Referring to the obscure nature of this label, Joseph et al. (2014: 2) names it as "black box" and notices how prior theoretical work on mixed EI is scant. To be sure, not one theoretical article exists on mixed EI. This is probably due to the fact that mixed EI was not created as a construct by any of the research it represents; rather it is an uninformative label originated by Mayer et al. (1999), to designate other researchers' work on the field, particularly that which provides original contributions and falters to stay inside the narrow borders of Ability EI (Mayer & Salovey, 1997). Instead, the classification offered above provides a balanced organization of EI research, based on the three existing methodological themes through which research on EI is flourishing. This way, we subscribe Fernández-Fernández-Berrocal & Extremera's (2006, p. 8) comprehensive view of the EI field, wherein "[all] these approaches try to discover the emotional components that underlie *emotionally intelligent* people and the mechanisms and processes that set off the use of these abilities in our everyday life".

4.3 Behavioral EI

In this paper we choose to follow a behavioral approach to EI, as it allows capturing emotional intelligence at a facet that is closer to action and consequential to real-life and work performance, i.e., actual behavior in situated contexts. Considering the etymological roots of emotion come from the Latin word *emovere*, a combination of *ex* (out) + *movere* (to move) is a good reminder that emotion is strongly associated with external movement that provides signals to others. Darwin's, (1872)'s treatise on emotional expression performed a comparative study of humans and animals and gathered unequivocal evidence on the breadth of emotional communication that is captured through body movements and facial expressions. Similarly, emotional intelligence can be seized in both verbal and non-verbal behavior that is visible and consequential to others, offering a sound basis to establish a behavioral approach to EI.

Particularly, we use the Emotional and Social Competencies Inventory (ESCI; Boyatzis et al., 2015; Boyatzis & Goleman, 2007; Boyatzis, 2009; Boyatzis, Goleman & Rhee, 2000), a behavioral EI measures that shows evidence of construct and discriminant validity (Byrne, Dominick, Smither & Reilly, 2007; Cherniss, 2010; Cherniss & Boyatzis, 2013). The ESCI model is empirically supported by 40 years of research identifying competencies that predict work success (Boyatzis, 1982; McClelland, 1973; Spencer & Spencer, 1993). Competencies are defined as learned capabilities that lead to effective or superior performance, wherein each competency is reflected by a set of behaviors sharing a common underlying intent (Boyatzis, 2009). Competencies have been derived inductively from qualitative studies of human performance using behavioral event interviews with managers in many positions and across several countries (Boyatzis, 2009). Because the identification of competencies and their refinement emerges from performance based criterion sampling, they are expected to be closely related to work and life outcomes.

As mentioned above, behavioral EI concerns the same content domain as other EI approaches, i.e., the concept of emotional intelligence as defined in Mayer & Salovey (1990). Specifically, the ESCI model parallels the definition of EI, in that it addresses: 1) the same core abilities of perception (or awareness) and regulation (or management) of emotion; 2) the same targets, that is, whether abilities are directed at self or others. The distinction between approaches is in the facet of the construct they observe. In a critical review of the field, Zeidner et al. (2004: 377) clarifies that what differentiates the approach of ability EI from its behavioral counterpart is akin to the distinction between fluid and crystallized ability. As the authors explain: "EI (as a fluid ability) does not guarantee that individuals will actually manifest competent behaviors at the workplace. (…) Whereas [ability] EI may determine a person's potential for learning practical job-related emotional and social skills, the level of emotional competencies (as a crystallised ability) manifested by that person shows how much of that potential she or he has actually realised". Indeed, some individuals may be good at mindfully thinking and coming up with solutions to hypothetical emotional-laden problems, but lack the training or experience for actually performing the behaviors they prescribe (Fiori, 2009).

Overall, the ESCI model comprises 12 EI competencies that are structured into four clusters, resulting from the Cartesian product of 2 EI abilities (awareness and management of emotion) by 2 targets (self and others): 1) *Emotional self-awareness* represents one competency by the same name; 2) *Emotional self-management* includes the competencies of Emotional self-control, Adaptability, Achievement orientation and Positive outlook; 3) *Social awareness* involves Empathy and Organizational awareness competencies; and 4) *Relationship Management* includes the competencies of Coach and mentor, Inspirational leadership, Influence, Conflict management and Teamwork. When the ESCI model is used for the purposes of development and/or outcome assessment, two cognitive competencies, which have traction in predicting effective leadership, management and executive performance, are added. They are: Systems thinking and Pattern recognition (Boyatzis, 2009).

In its most distinctive feature, the ESCI model measures behavioral EI as is seen and assessed by others. For this matter, it uses a 360º assessment instrument (Boyatzis & Goleman, 2007; Boyatzis & Sala, 2004; Sala, 2002), which enables multiple raters from different life spheres – notably, professional (i.e., bosses, peers and subordinates), personal (i.e., relatives, spouses and friends), and other raters – to provide behavioral observation scores to the person being assessed. The instrument assesses how frequently observers have seen 5 specific behavioral indicators for each competency, using an 11-point frequency scale from 0 (never) to 10 (always), which has been shown to have superior reliability (Batista-Foguet et al., 2009). This way, competencies as a behavioral approach to EI as observed and scored by others who live and work with the person (as opposed to self-assessment) shows a consisting prediction to job and life outcomes (Boyatzis, 1982, 2006; Boyatzis et al., 2012; McClelland, 1998; Dulewicz et al., 2003; Law et al., 2004; Sy et al., 2006; Ryan et al., 2009, 2012; Boyatzis et al., 2011, 2012; Aliaga Araujo & Taylor, 2012; Gutierrez et al., 2012; Sharma, 2012; Spencer & Spencer (1993); Amdurer et al., 2014; Victoroff & Boyatzis, 2013; Mahon et al., 2014).

4.4 EI, cognitive ability and learning performance

Throughout the past century, general cognitive ability, also known as general intelligence, general mental ability or simply *g*, has taken the leading role in enlightening our understanding of human performance. As a global ability concerning the "the general efficacy of intellectual processes" (Ackerman et al., 2005, p. 32), *g* is thought of as the underlying common factor to all types of cognitive processing (e.g., verbal, mathematical, spatial, logical, musical, emotional). As a latent construct, *g* is therefore not observed directly; it must be inferred from the positive correlations among different abilities (Spearman, 1904; Jensen, 1998). Based on the large body of evidence showing *g* has a strong relationship to school and workplace performance across tasks and settings (Gottfredson, 1997; Jensen, 1998; Ree & Carretta, 1998, 2002; Salgado, Anderson, Moscoso, Bertua, & de Fruyt, 2003; Salgado et al., 2003; Schmidt & Hunter, 1998), researchers have referred to *g* is the best single predictor of performance (Gottfredson, 1986; Schulte et al., 2004).

But, although *g* strongly correlates between .30 and .50 with several performance measures, it actually only explains about 25% of their variance (Goldstein et al., 2002; Hunter & Hunter, 1984). Research on novel psychology constructs echoes this finding to argue there remains a large amount of variance in performance (i.e., 75%) that can only be explained by other factors (e.g., Gardner, 1993; Song et al., 2010). Notably, the case for EI was built over claims that it explains the variance in human performance that is not accounted for by cognitive intelligence or *g* (Mayer & Salovey, 1997; Goleman, 1998; Mayer, Salovey & Caruso, 2000). This argument has led to an emphasis on identifying the main linear effect of emotional intelligence on performance. In consequence, today, the majority of empirical research on EI is based on additive model specifications, which assume that emotional and cognitive intelligences make independent contributions to human performance. It is our contention, however, that this assumption of independence is in contradiction with the very concept of emotional intelligence, which lies at the intersection of emotion and cognition and "combines the ideas that emotion makes thinking more intelligent and that one thinks intelligently about emotions" (Mayer & Salovey, 1997: 5). Notably, at the core of EI lies an important neuroscience discovery: the integration of emotion within cognitive processes across a variety of mental functions such as memory, attention, and decision-making (Damasio, 1994; Forgas & Moylan, 1987; Mayer & Bremer, 1985). Therefore, additive independent models may indeed be too "simplistic and incomplete" to represent the contribution of EI to performance (Côté & Miners, 2006, p. 2).

The fundamental problem with relying on additive independent models when explanatory variables are interdependent concerns the presence of multicollinearity, which by inflating coefficient standard errors contributes to the instability of model estimates. This may help explaining why empirical research on the relationship between EI and performance has long produced mixed results (Zeidner, Matthews & Roberts, 2004; Côte & Miners, 2006; Rode et al., 2007; Van Rooy & Viswesvaran, 2004). Particularly regarding learning performance, studies report conflicting findings (Brackett, Rivers & Salovey, 2011): whereas some research shows that EI explains achievement in high school (Márquez, Martín & Brackett, 2006) and undergraduate programs (Lam & Kirby, 2002), other studies suggest there is no relation or a non-significant one between emotional intelligence and academic performance (Petrides et al., 2004). In fact, it is often the case that studies will initially show positive effects of EI on academic performance until they eventually become non-significant after controlling for related variables, such as cognitive intelligence and personality traits (Barchard, 2003; Bastian, Burns & Nettelbeck, 2005; Brackett & Mayer, 2003).[11] Such large variation across studies is

[11] However, regarding job performance, recent findings are relatively more consistent than academic performance, as confirmed by two meta-analyses wherein existing approaches to EI were found to positively associate with workplace performance (Joseph & Newman,

leading EI research to adopt multiplicative models, whereby the interaction effect of EI and *g* on performance is explored (e.g., Côté & Miners, 2006; Petrides et al., 2004; Kidwell et al., 2011). In this line, we are first, to our knowledge, to study the interaction effect of behavioral EI on the relationship between *g* and academic performance.

Besides the dominance of additive linear models, two other issues may also be hindering previous findings on EI. First, prior research often uses a domain-general assessment of EI (e.g., Mayer et al., 2003), which may convey the idea that high EI individuals have all the right ingredients to succeed and in so doing "invite the attribution of a halo effect" (Boyatzis, 2008, p. 8). Instead, EI's contribution to performance may best be captured through specific abilities, whereby each may enhance problem-solving in some contexts (e.g., street sales) but not in others (e.g. formal presentations). This may explain why research based on unidimensional assessments of EI has shown mixed findings across different tasks (e.g., Austin, 2004; Day & Carroll, 2004; see Zeidner et al., 2004). Therefore, a general assessment of EI may feasibly address broad domains, but do poorly when studying performance in specific contexts (Bearden et al., 2001). Contributing to solve this issue, this study uses 12 specific measures of behavioral EI, i.e., different competencies that may enhance performance differently depending on which task and context they are being studied.

Second, research on EI has devoted little attention to examine how EI may differently relate to performance in different *types* of tasks. Notably, EI may be specially relevant in tasks that require interpersonal interaction, an idea that finds supports in studies showing how EI affects group processes (Jordan & Troth, 2004;

2010; O'Boyle et al. 2011). In particular, emotional and social competencies have been shown to positively affect management (Ramo, Saris & Boyatzis, 2009; Boyatzis et al., 2012) and entrepreneurship performance (Ahmetoglu, Leutner & Chamorro-Premuzic, 2011; Camuffo, Gerli & Gubitta, 2012).

Druskat & Wolff, 2001) and particularly the quality of social interactions (Lopes et al., 2004).

To address these issues, we offer three main contributions to the EI-performance literature: First, we study the moderating role of EI on the relationship between *g* and performance. Second, we use a multidimensional behavioral measure of EI that features 12 specific competencies. Third, we internalize task-dependence in the analysis, by considering two types of tasks (social and non-social) within the same sample. Thus, in the following section, we propose a task-dependent interaction model of EI, *g* and performance.

4.5 A task-dependent interaction model of EI, *g* and learning performance

We propose that the interaction between EI and *g* on learning performance depends on the type of task. Herein we adopt LePine et al.'s (2004) definition of learning performance as the *"degree to which individuals acquire the knowledge, skills, attitudes or behaviors reflected in the objectives of a particular learning experience."* (LePine et al., 2004, p. 883). We use a taxonomy of tasks that is based on two opposing cognitive domains: The *social* cognitive domain, relates to tasks that require social information processing, i.e., reasoning about the minds of others, and the *non-social* (or physical) cognitive domain pertains to tasks that require reasoning about the causal or mechanical properties of inanimate objects (Jack et al., 2012). According to Jack et al. (2012) and prior neuroscience research (Shulman et al., 1997; Nagel, 1974; Hill, 1997; Levine, 1999; Jack & Shallice, 2001; Robbins & Jack, 2006), these cognitive domains have been found to consistently associate with two antagonistic neural networks, namely the task-positive network (TPN) and the default mode network (DMN; see Jack et al., 2012;

Boyatzis et al., 2014). Specifically, non-social tasks are found to activate the TPN (and deactivate the DMN), a cortical network that is thought to be most relevant for problem solving, focusing of attention, making decisions and action control, whereas social tasks tend to activate the DMN (and deactivate the TPN), which plays a leading role in emotional self-awareness, social cognition and ethical decision making (for a review see Boyatzis et al., 2014).

To study these two types of tasks within the same sample of individuals, we chose to conduct this study within the academic setting of an MBA, where we could assess the course performance of professionals and executive managers according to social and non-social tasks.

4.5.1 Social tasks

When individuals engage in social tasks, wherein interpersonal interactions are a requirement, how does the interactive nature of the relationship between EI and *g* on performance takes form? We suggest that among individuals with low levels of EI – those who may be less apt at getting along or influencing others - *g* may contribute relatively little to performance. Similarly, among professionals characterized with lower levels of cognitive ability, who are short of knowledgeable contributions for the task at hand, EI may be of little consequence to performance. Indeed, even if these professionals were highly competent in their mastery of EI skills, as much as they could empathize with or influence others, their inability to identify and create effective solutions would undermine their overall performance. In fact, in a study of the interaction of social skill and *g* on job performance and salary, Ferris et al. (2001, p. 1076) notes how “the focus on interpersonal interaction that is characteristic of workers high in social skill without the prerequisite intellect needed to perform tasks and derive innovative solutions to problems may even be viewed negatively by decision makers, resulting in lower evaluations and salary increases.” Interestingly, the authors find evidence of this phenomenon, by which increases in social skills when combined with low *g*, actually lead to lower salary levels.

A second mechanism that accounts for the interactive dynamics between EI and *g* concerns how their contributions to performance are mutually reinforcing. In a way, EI and *g* can be said to function as *strategic complements*, by which investing in EI skills can particularly boost the performance among those who have also developed their intellectual abilities. Yet, it is our contention that such positive interaction of EI and *g* on performance is tied to the type of task; only if the task involves actual social cognition and interpersonal interaction may we observe the mutual reinforcement between EI and *g*. This is because the facets of EI that may be most helpful to an otherwise "competent jerk" (see Casciaro & Lobo, 2005 for a scientific definition) are those related with the ability to empathize, influence or lead others, competencies that may only be required in tasks that require interpersonal interaction. Indeed, we notice how among previous interaction studies on EI, those that found a positive interaction were conducted in settings where tasks required interpersonal exchanges to be performed, such as in sales jobs (e.g., Kidwell et al., 2011; Verbeke et al., 2008). Therefore, we propose the following:

Hypothesis 1: In social tasks, EI positively moderates the relationship between g and performance.

4.5.2 Non-social tasks

When engaging in non-social tasks, including those requiring logical reasoning, such as mathematical thinking and causal/mechanical inferences, EI skills may add little to the performance of those individuals, who have strong cognitive abilities to meet the intellectual demands of the task. This is because in tasks that are primarily cognitive-intensive, those individuals characterized with a high *g* are able to achieve top performances, regardless of their level of EI abilities. Indeed, when task performance is high, the room for further improvement is so small, that EI abilities may only play a minimal role. Therefore, we suggest that in non-social tasks, wherein little or no interpersonal interaction is required, there is a negative interaction between EI and *g* on performance, such that the higher the level of one's cognitive abilities, the smaller the effect of EI skills on performance.

This is aligned with previous studies conducted with children and high-school students that show how EI, as assessed with a self-report measure of emotional intelligence, is most helpful for those students with low levels of cognitive ability (Petrides et al., 2004; Agnoli et al., 2012). As the authors argue, students with weaker cognitive abilities are able to reap more benefits from their EI skills as these are used for overcoming feelings of fear and anxiety, which tend to arise when facing cognitively challenging tasks. Similarly, in a university setting, a compensatory model was used to describe how individuals might resort to EI abilities for balancing out their shortcomings in cognitive intelligence such that they manage to keep focused and finish the task (Côté & Miners, 2006).

Our contention to these findings, though, involves recognizing that they may only hold when tasks are of a non-social nature and require no interaction with others. Only in these tasks can individuals with strong cognitive abilities achieve high performances by themselves, regardless of their level of EI. In fact, to succeed in non-social tasks, and according to Casciaro & Lobo (2005), a "competent jerk" is all one ever needs to be. No empathy or ability to influence others is required to achieve high performances in non-social tasks. This may help explaining how the negative interaction between EI and *g* has only been found in academic settings, wherein interpersonal interaction, while recommended, is not required to deliver a course assignment. Moreover, as aforementioned, as soon as tasks introduce elements from the social domain, and require interpersonal interaction, EI abilities - particularly those pertaining to social awareness and relationship management (e.g. to be able to get along with and influence clients to adopt a particular solution to a problem) -, may be most consequential to those individuals who also meet the cognitive requirements for the task at hand. From the preceding discussion we suggest the following hypothesis:

Hypothesis 2: In non-social tasks, EI negatively moderates the relationship between g and performance.

4.5.3 The moderator effect of rater type

As we have discussed in other work (Boyatzis et al, 2015) research on social cognition shows that individuals give more weight to their own thoughts and feelings than to their behavior when forming self-perceptions, but this effect goes in the opposite direction when forming perceptions of others (Vazire, 2010). Disparate types of raters may provide distinct information on the person being assessed (Borman, 1997). Individuals may behave differently depending on the situation (e.g. at home vs. work) (Lawler, 1967). Friends and family may observe a person using different behavior as a function of the setting (i.e., having a family meal at home versus having lunch with colleagues at the work canteen). Yet, in general, empirical studies tend to dismiss family or friends as raters (Bracken et. al., 2001). In order to be comprehensive in assessments, in this study we collected data from a wide range of a person's relations – those from work and from their personal life.

Several studies exhibit the existence of differences among bosses', peers' and subordinates' views as well as consultants, customers or clients. Atkins and Wood (2002) claims certain types of raters are best positioned to observe and evaluate specific types of competencies depending on the personal and working relationships they had with the person being evaluated. For instance, subordinates were found to be the best evaluators of competencies such as coaching and developing people, when compared to bosses or peers (Luthans et. al., 1988). Also, each rater source may have idiosyncratic tendencies leading to different observations and measurement errors, such as leniency bias, central tendency, and range restriction (Saal, Downey, & Lahey, 1980). These may, in turn, be moderated by cultural assumptions (Ng, Hynie & MacDonald, 2012).

Whereas personal raters show leniency bias, and self-evaluations for development purposes tend to reveal an underestimation of own abilities, professional raters have been shown to be most accurate in their assessment of competencies (Boyatzis et al., 2015). Therefore, if personal and self-raters have relatively higher measurement error than professional raters in their assessment of EI competencies, we should expect an attenuation bias in the estimated effects of EI on performance, when EI is assessed by the formed types of raters. Therefore we propose the following hypothesis:

Hypothesis 3: Among professional, personal and self-assessment of EI competencies, professional sources will show the strongest relationships between EI and performance.

Figure 4.1 below shows the overall path diagram of the task-dependent interaction model of EI competencies and cognitive ability for enhancing learning performance, including both structural and measurement relationships.

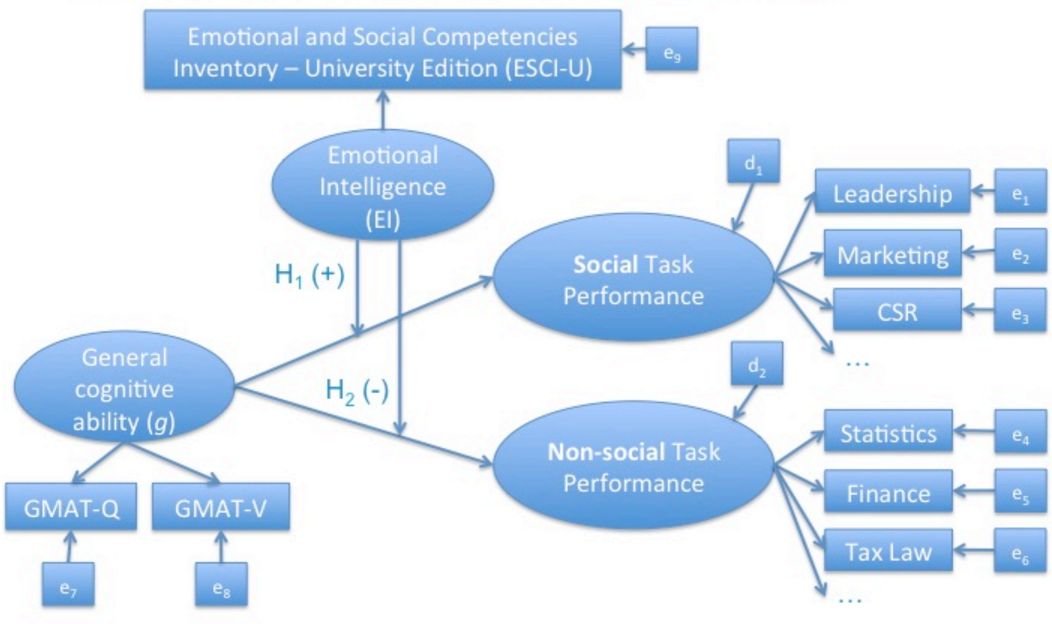

Figure 4.1 | Path diagram of the task-dependent interaction model of EI and cognitive ability for enhancing learning performance in social versus non-social tasks.

4.6 Data and methods

4.6.1 Participants

Data were collected on 864 part-time and full-time MBA candidates, from a top European business school, between 2006 and 2013. There were 30% females, and the average age of candidates was 29 years (SD=2.8). As part of the MBA, the candidates took a compulsory course called Leadership Assessment and Development, which is based on the Intentional Change Theory (Boyatzis, 2008). In this course, the candidates were asked to complete a self and multisource assessment of EI competencies. All data were collected under the informed consent and ethical guidelines of ESADE Business School.

Figure 4.2 below offers a visual summary of the descriptive statistics of the individuals, regarding the key variables in our model.

4.6.2 Measures

Emotional Intelligence Competencies

We used the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis and Goleman, 2007), a 70-item survey instrument which measures 14 competencies of two types: cognitive and emotional. In this paper, however we focused on the 12 emotional competencies: emotional self-awareness, emotional self control, adaptability, achievement orientation, positive outlook, empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. Because the behavioral manifestations of these competencies are frequently observed in a variety of different situations they have been operationalized with as many as five indicators per competency. Psychometric properties of the test based on samples of 62,000 completions of the ESCI and 21,000 of the ESCI-U both reveals each scale shows model fit and satisfies criteria for discriminant and convergent validity (Boyatzis et al., 2014). A wide variety of validation studies on the test were reviewed earlier in this paper as well as in Wolff (2006) and Byrne et al. (2007).

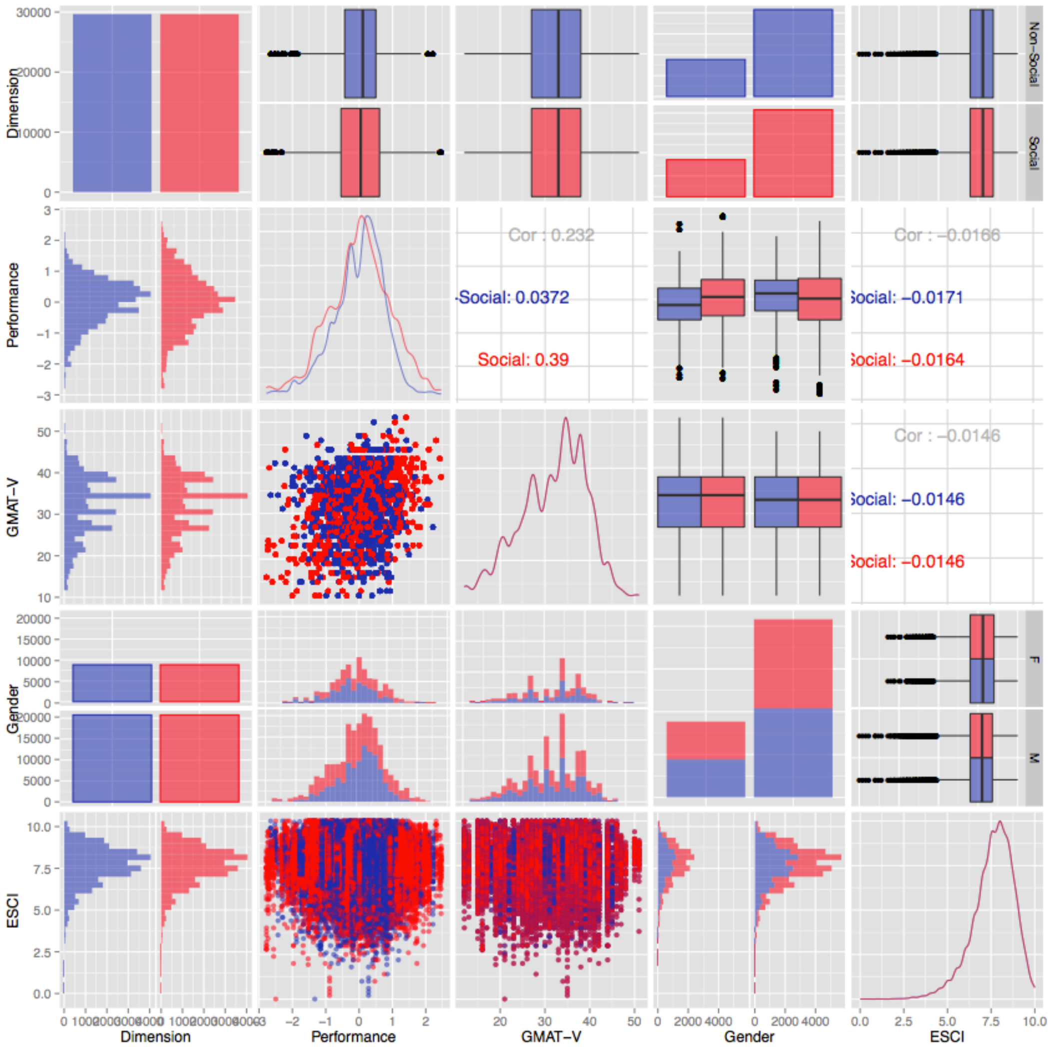

Figure 4.2 | Visual summary of the key variables in the model, including the independent variables, ESCI and GMAT-V, the dependent variable, learning performance, and the moderating variables of type of task (social and non-social) and gender.

Competencies can be considered to be the behavioral approach to emotional, social, and cognitive intelligence (Boyatzis, 2009). As such, the MBA candidate is asked to solicit others from their work and personal life to complete the test about their behavior. The students had an average of 4.2 others complete the test for each of the 864 subjects in this analysis (standard deviation equals to 1.6). It is believed that multi-source assessment, such as 360˚, provides protection against social desirability because of the distinct sources of responses.

Since we suspected that the ESCI factorial structure provided by the personal and the professional raters could be different as a function of their different perspectives of the MBA students' behavior, we have modeled the data separately[12].

For purposes of exploring our research question, we distinguished three types of sources, or assessments in this study. We used a classification provided by each respondent at the time of completing the test. The responses were grouped as either: self, personal, or professional. One is the assessment provided by the student about himself or herself. Another source was personal, such as a spouse/partner, friends, or family members. Professional sources were bosses, peers, subordinates or clients from work or classmates in the MBA program. There were a few cases in which personal or professional assessments were missing; these cases were dropped resulting in a final sample of 624 individuals with personal and 611 with professional assessments available. All had self-assessment.

MBA participants and their raters were asked to indicate the frequency of the behavior on each item on an eleven point-scale ranging from (0) 'the behavior is never shown' to (10) 'the behavior is consistently shown.' This response set provides higher quality data on this predominantly European MBA population than

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[12] Because we did not assume that Personal and Professional raters have the same perception and aggregate them under the usual "other" category of raters, we have tested their measurement or factorial equivalence (Meredith, 1993).

the usual 5-point scale (Batista-Foguet et al., 2009). The final ESCI-U scores have been mean-centered to ease the interpretation of the parameters in the model. To compute the 360◦ assessments on the 70 items that constitute the ESCI-U survey, we first obtained for each item, its average score across all professional and personal raters separately, and then averaged across the five items per each competency.

General cognitive ability (g)

We used the Graduate Management Admission Test (GMAT) as a measure of *g*. For this study we chose to collect our GMAT data from the GMAC, the entity that owns and administers the GMAT, and not through the Admissions Office at the University. We collected the students' GMAT scores from the first time they took the test. Using GMAT first time scores as compared to the scores with which students were admitted in the MBA program (usually obtained after repeatedly taking the test), enabled a wider range of variation in GMAT with higher dispersion and lower means. We, thus, attempted to minimize the issue of range restriction in GMAT (Oh et al., 2008) and the resulting attenuation bias in the model coefficients. In our sample, the GMAT mean is 602.6, which is a little higher than the overall GMAT for all test takers of 545. The sample's standard deviation of the GMAT is 78.8, almost two thirds of the reported GMAT deviation (at 121). Therefore, our sample contains individuals with slightly higher GMAT and less "heterogeneous" scores than the population of GMAT applicants.

Learning performance

We assessed learning performance using two performance scores accounting for the MBA candidates' grading performance in social and non-social domain courses, obtained from the university registrar after the end of each term. These scores were computed, based on a factor analysis of 21,350 grades, with a mean of about 25 grades per individual. To obtain the learning performance measures per cognitive domain (social vs. non-social), we specified a factor analysis model that allowed us to identify which course topics referred to the social domain and which belonged to the non-social. The basic descriptive statistics showed how the grades were negatively skewed. Each individual grade was however a standardized score of the position of the individual in the group/year for a course. Standardizing by group/year is an efficient way of eliminating Professor effects, or the differences in ratings regarding the idiosyncrasies of certain topics. So what learning performance is really measuring is how well students perform as *compared to other students* (or, in other words, considering the group), but not raw grade performance. Each course was classified in one of the 16 topics, and the courses in each of the topics were averaged by student. Therefore, a student having three courses in one topic is averaged on the three courses, while not having any course on a topic is a missing value. This generates a matrix of *IxT* (individuals x topics) equal to 864 x 16, where missing values are 22 percent. The measurement model is, hence, a factor analysis performed to the matrix of grades and topics, retrieving two different factors.

4.6.3 Procedures

The data analysis process is divided into two different models: the measurement model and the explanatory model.

The explanatory model is a non-nested hierarchical robust linear model between performance and the covariates (gender, cognitive intelligence, emotional and social intelligence and the interaction between the last two). The hierarchical structure is necessary in order to account for the different ways in which the data is naturally structured: first because there are two measures of performance per individual and some of the effects may or may not be shared across the two cognitive domains; and second because emotional and social competencies are measured in a two-level clusters and rated by three different groups. Equation (1) describes the explanatory model of the linear association between performance (y, for two different cognitive domains d) and the covariates (X), when ESCI competencies (c) are measured by different groups of raters (r) and organized in clusters (cl) and higher-level clusters (CL), for each of the individuals (i).

$$
\begin{array}{rcll}
Performance_{id} & \sim & \tau\left(\mu_{id},\sigma_{id},\upsilon\right) & \\
\mu_{id} & = & \alpha_{d,c,r} & +\ \left(Female_i, GMAT_i, ESCI_i, GMAT * ESCI_{i,c,r}\right)\theta_{d,c,r} \\
\theta_{d,c,r} & \sim & N\left(\Theta_{d,cl,r},\sigma_{\theta d,r}\right) & \\
\Theta_{d,cl,r} & \sim & N\left(\mu_{\theta d,CL,r},\sigma_{\theta d,r}\right) & \\
\mu_{\theta d,CL,r} & \sim & N\left(0,100\right) & \\
\sigma_i & = & \exp\left(Intercept, Female_i, GMAT_i, ESCI_{i,c,r}\right)\lambda & \\
\lambda & \sim & N\left(0,10\right) & \\
\upsilon & \sim & U(0,1) &
\end{array}
\qquad (1)
$$

The equation can be read as follows: performance for any individual in any of the two cognitive domains is a linear combination of an intercept (α), an effect for gender, for general intelligence, for EI competencies and for the interaction between cognitive intelligence and EI competencies.

In addition to the linear effect, the model is a robust model specification accounting for the fact that performance can be better or worse predicted depending on gender, cognitive intelligence and emotional and social intelligence (the λ effects). Taking into account controls for heteroskedasticity improves the inference process by generating unbiased and more efficient estimates of the parameters.

Inference is performed using Bayesian procedures, namely the Gibbs sampler and MCMC methods. There are three reasons to prefer Bayesian inference for addressing our research: first, the sample is in itself an entire population; second, it is not a random sample; and third, inference of a factor analysis model with missing data is not possible using frequentist models. These issues pose problems in many statistical analyses because traditional frequentist methods are based upon the assumption that the data are created by a repeatable stochastic mechanism. While mainstream statistics treat the observable data as random and the unknown parameters of the population are assumed fixed and unchanging, in the Bayesian view, it is the observed variables that are seen as fixed whereas the unknown parameters are assumed to vary randomly according to a probability distribution. Therefore, in Bayesian models, the parameters of the population are no longer treated as fixed and unchanging as a frequentist approach would assume[13].

In sum, the main advantages of the Bayesian approach are twofold: (1) it enables highly flexible model specifications (as the one needed to account for the hierarchical structure of our data); and (2) is more appropriate for settings where the data is not a random sample, but the entire population. In addition, it offers a clear and intuitive way to present results. For example, it appears more intuitive by generating *probability* statements about the findings (for more readings on the advantages of Bayesian inference, check the introductory chapters of Gill, 2002; Gelman et al., 2003; Jackman, 2009).

4.7 Results

4.7.1 Measuring learning performance

Figure 4.3 shows the weights of the topics in the factor analysis model. First, the topics scoring higher in the first dimension are non-social, therefore the first dimension accounts for performance in non-social courses, whereas the second dimension accounts for performance in social courses. Second, topics that weight higher in the non-social dimension tend to weight less in the social dimension.

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[13] Instead of a frequentist approach, in this approach a parameter is assigned a prior distribution (based on previous research in the field), which is then updated with the actual data by means of a specified likelihood function, so as to produce a posterior distribution of the parameter (Wagner and Gill, 2005). In fact, in our approach we are not entitled to use a *p*-value (as in frequentist statistics) as the probability of obtaining the observed sample results under the null hypothesis. As mentioned the data is not a sample of a larger population but it is a population.

Third, there are several topics that have from very low to no weight in the non-social dimension but high weights in the social one. All in all, the measurement models raises a clear non-social performance based on a selected group of courses (Statistics, Tax Law, Finance, Economics, Business Law) and a social performance that is a more complex combination of virtually all the courses.

4.7.2 Explanatory model

Figure 4.4 shows the coefficient estimates obtained through robust regression, of the direct effects of gender, GMAT-V, ESCI, and the interaction effect between ESCI and GMAT-V on learning performance in social (red line) and non-social (blue line) cognitive domains. Reading the panels corresponding to the professional raters, which are on average the most reliable raters, there are 4 main findings: (1) females tend to score slightly higher than males on those courses that engage the social cognitive domain, whereas males score higher than females on non-social courses (average difference in scores between male and female is about 0.2 points on non-social courses); (2) GMAT-V, the verbal component of GMAT has a higher effect on the learning performance of social courses than non-social, an intuitive result seen that social courses are verbally more intense than the non-social ones; (3) the direct effect of emotional and social competencies is positive and higher on the learning performance of non-social courses, particularly in social intelligence competencies, than in the social courses; and (4) the interaction effect of ESCI and GMAT-V on the learning performance of social and non-social is slightly negative, however in social courses the effect is higher, especially if we refer to social intelligence competencies, i.e., empathy, organizational awareness, conflict management, coach and mentor, influence, inspirational leadership and teamwork. The latter finding informs the central research question in this paper. It supports hypothesis 2 of a negative interaction between EI competencies and cognitive ability on the learning performance of non-social courses, however it shows little support to our first hypothesis of a positive interaction, despite the effect being higher in social courses than in non-social. These findings, and particularly the lack of evidence in our sample to support what is a central hypothesis in this paper, H1, will be fully debated in the discussion section of this paper.

Figure 4.5 provides a visual summary of the interaction effects between each EI competency and GMAT-V on the learning performance of social and non-social courses. In other words, the figure shows the estimated effect of different GMAT and ESCI values on performance scores. Expected performance is shown in red for social courses and in blue for non-social courses. Solid lines represent individuals with the minimum observed GMAT verbal scores, whereas dashed lines represent individuals with highest GMAT verbal observed. The horizontal axis accounts for the range of the potentially observed ESCI values (between 5 and 10).

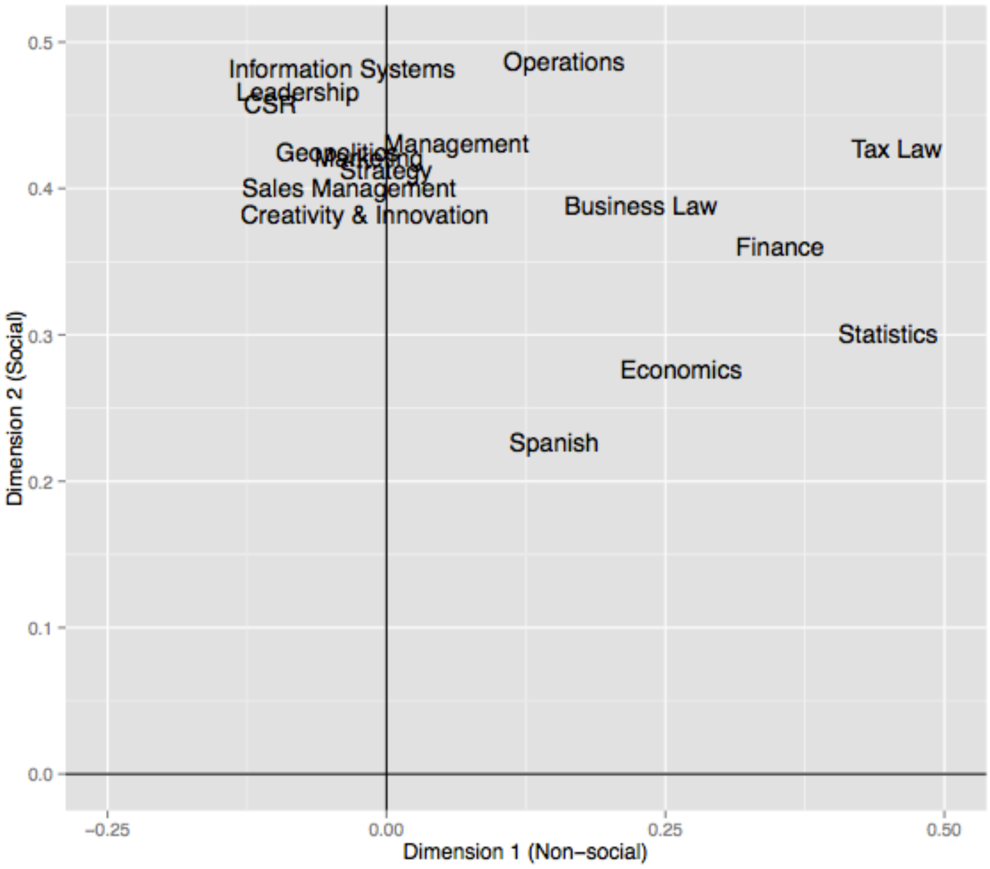

Figure 4.3 | Scatterplot of the topic weights on two cognitive dimensions: social and non-social, obtained by a factor analysis model on the individual scores in each topic.

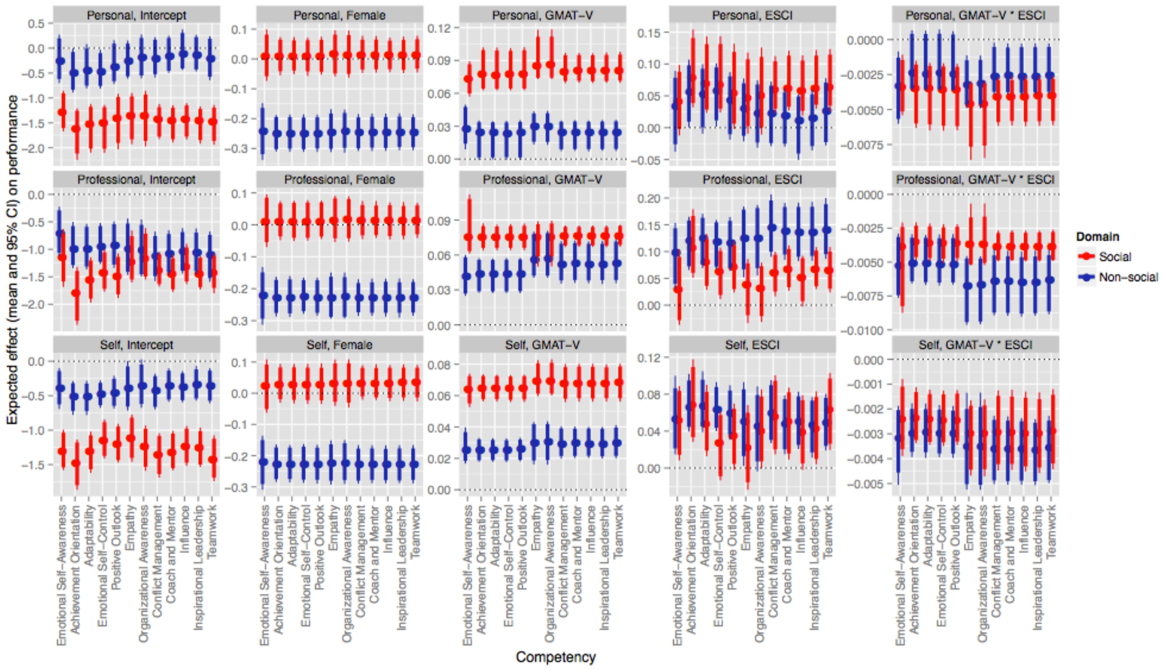

Figure 4.4 | Coefficient estimates of the direct effects of ESCI, GMAT-V and gender and the interaction effect of ESCI*GMAT-V on learning performance.

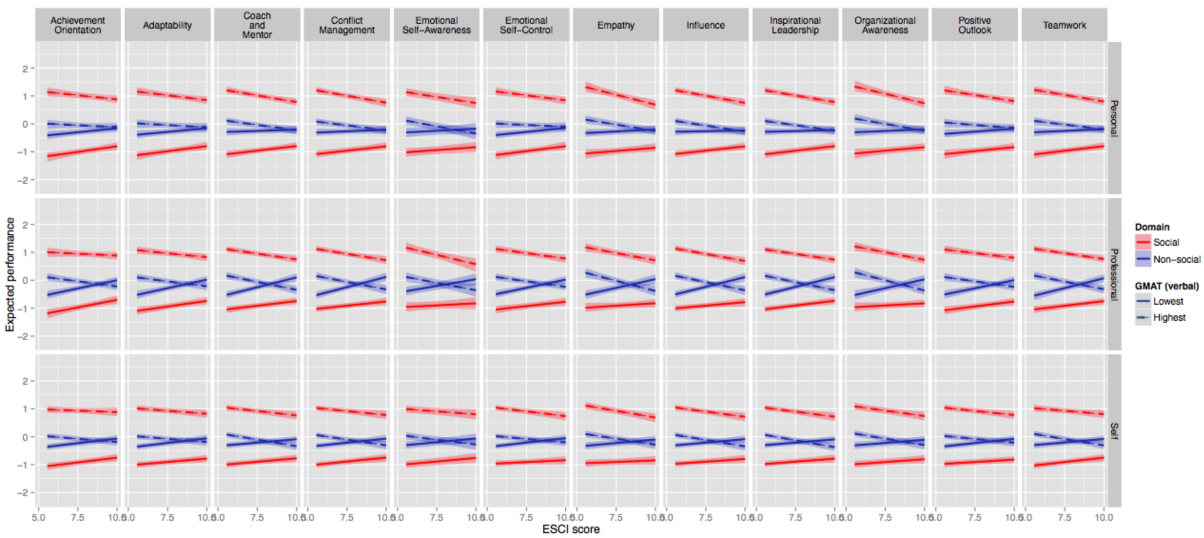

Figure 4.5 | Interaction effect between ESCI and GMAT-V on the learning performance of social and non-social tasks.

Effects accounting for unequal variances of performance using λ are quite different by domain. For social topics women have less variability in their performance, as well as individuals with higher GMAT. However, ESCI is not associated with higher or lower variability of performance on the social domain. For non-social domain topics, the picture is quite the opposite. Females have more variability in their performance, GMAT does not play any role in the variability and individuals with higher ESCI are more volatile in their performance (more difficult to predict).

4.8 Discussion

Earlier research has proposed that emotional intelligence and cognitive abilities contribute to performance in independent and incremental ways (Goleman, 1998; Mayer, Salovey & Caruso, 2000). The present study shows, however, that the contribution of EI to the classroom performance of 864 professional business executives and managers is dependent on their level of cognitive abilities. As predicted in hypothesis 2, we find evidence that in non-social tasks, those that primarily involve analytical thinking and logical reasoning about abstract concepts (e.g. course assignments in Statistics or Finance subjects), the lower cognitive ability the stronger the effect of EI competencies on performance. In agreement with Côté & Miners (2006), Agnoli et al. (2012) and Petrides et al. (2004), we find that those individuals who face bigger cognitive challenges have in compensation the opportunity to reap more benefits from deploying EI competencies. Facing a cognitive challenge, i.e. when a tasks' intellectual demands outweighs one's cognitive abilities, can be emotionally taxing, as sentiments of fear and frustration emerge, sabotaging one's focus, and approach motivation. In these situations, being trained to effectively use EI competencies such as emotional self-control, achievement orientation or positive outlook may help individuals keep their eye on the prize and their head in the game, with the confidence that, regardless of the cognitive difficulties they face, they can choose not to give up, but give in to keep a clear and focused mind until the task is finished. This way, EI competencies have in these cognitive struggles an opportunity to make a significant difference in performance. Otherwise, when individuals' cognitive resources outweigh task demands, the absence of a cognitive challenge or emotional threat, enables them to reach high performances in non-social tasks, regardless of their emotional competence.

On the contrary, when tasks engage the social cognitive domain, involving reasoning about people's minds and requiring interpersonal interactions to be accomplished, having high cognitive resources alone may not be enough to succeed. Hypothesis 1 proposed that in social tasks, EI competencies should be more consequential to performance when coupled with stronger rather than weaker cognitive abilities, i.e., a positive interaction, wherein EI and *g* mutually reinforce each other's contributions to performance. However, although our data showed a relatively higher interaction between EI and *g* on the performance of courses within the social domain as compared to the non-social, this increase was not sufficient to support hypothesis 1. We suspect this was due to a few limitations related to this study and the academic context in general. First, there was a limitation we detected after conducting an ex-post focus group with 15 MBA students (3 teams) to understand the nature of their teamwork. In a revealing discussion, the MBA candidates admitted how, regardless of the many team projects they had, particularly in social domain courses, such as Human Resources or Marketing, they had learned, early on into the MBA program, to work individually in all team projects. Specifically, they discovered the most efficient system to produce such large number of group projects across all MBA courses, was to assign different group projects to individual team members. For example, the team member with a HR management position, would be in charge of the Human Resources group project, whereas the one who held a sales job would take care of the Marketing team assignment, and so forth. In the end, all team members would review each other's "team" projects, but they would never meet to discuss different perspectives or exchange feedback. Therefore, even if the courses within the social domain had a higher percentage of teamwork, and should normally require more discussion and interaction within teams, the fact that students forge an individual work system to get through all team projects without interpersonal interaction, may have blurred the distinction between social and non-social tasks within our performance measures.

Second, although an MBA is an educational program known for being specifically designed to mimic the tasks of real business environments, the performance of those tasks is assessed in a remarkably different way in an academic setting than in the real workplace. Projects and assignments are graded in a bounded 1-10 scale, which limits the ability to distinguish good from outstanding performances, particularly if there is a tendency in private business schools such as ours, to observe a positive skew in grading (notably most passing grades fall between 8 and 10). Consequently, if students having just enough cognitive resources to meet the tasks demands, already score top grades on their projects, it leaves little room in the grading scale to discriminate the substantial quality improvements that might accrue to those individuals that, on top of good cognitive abilities have solid EI competencies to facilitate the discussion of distinct perspectives and experiences within their teams, which fosters the production of superior innovative projects (cite Druskat & Wolf, 2001). Otherwise, the use of an unbounded grading scale to assess performance, such as the market value of products and services that rules real business exchanges and is the base of performance measures at the workplace, allows capturing the full extent of the contribution of EI competencies to performance. This may help explaining why all studies on the interaction between EI (or social skill) and *g* on performance that are conducted in actual business environments show EI positively moderates the effect of cognitive abilities on performance (Ferris et al., 2001; Verbeke et al., 2008; Blair et al., 2011), whereas those studies conducted in academic settings do not (Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012).

Furthermore, by controlling results for gender, we are able to confirm a well-known finding by which females tend to have an advantage in social tasks, whereas males are at an advantage in performing non-social tasks. This phenomenon has been referred to as the gender equality paradox (), which is thoroughly studied in the Nordic countries, particularly Norway, where gender equality policies are relatively stronger than in the rest of Europe. In addition, this finding provides further validation that our confirmatory factor analysis across the various MBA courses was appropriately done, regarding the content distinction between social and non-social domains.

4.8.1 Limitations

A first limitation in this study concerns the range restriction in the GMAT, our measure of general cognitive ability. This is due to an MBA admission criterion that requires candidates to score above a certain threshold in their GMAT (usually above 600 points). Our attempt to correct for range restriction, by using the students' GMAT scores collected from the first time they took the test, as opposed to the scores with which they were admitted in the MBA (scores that may have been obtained after attempting the test several times), was effective insofar as it increased the variation in GMATs, but was limited to solve the selection bias within our sample.

In addition, by focusing on MBA candidates, even if our sample included business professionals with diverse nationalities and career backgrounds, we may have threatened the external validity of our findings. Moreover, the fact that the data came from a single school where, as we observed ex-post, there was a considerable absence of interpersonal interaction or actual teamwork among MBA teams, (regardless of the school's emphasis in group projects, particularly in social topics), may have threatened the construct validity of our measure of task performance in social domains.

Furthermore, our performance measures were based on grades given by professors in various MBA disciplines. Teachers' assessments of performance may be biased by the quality of relationships they establish with students, a phenomenon known as leader-member exchange (Graen & Uhl-Bien, 1995), which we were unable to control for. An alternative measure of performance we considered using to complement professors' grades is the peer-evaluations students do within their teams. However in our school, professors are not allowed to disclose their students' peer-evaluations, therefore we were unable to collect peer-evaluations in our sample.

4.8.2 Implications for future EI research and practice

To our knowledge, only 7 studies, including the present one, have examined the interaction between EI and cognitive ability on academic and job performance; all have found statistically significant interactions (Verbeke et al., 2008; Blair et al., 2011; Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012; Fiori, 2015). We thus hereby join their shared call for further research in EI that moves beyond incremental effects and pays attention to the interaction of EI with interdependent intelligences or abilities that have been thoroughly studied for their impacts on performance, particularly cognitive ability. This involves recognizing the false myth in our scholarship by which EI, or any other construct for that matter, may only be valuable for organizational research and practice, if it makes an incremental linear contribution to performance (Landy, 2005; Zeidner et al., 2004). Emotional intelligence, as a predictor of human performance, can be particularly more important and consequential in ways other than their incremental linear effects (Murphy, 1996; Hough, 2003). Exploring the indirect paths, such as the multiplicative effects of interaction, enables researchers to discover EI is valuable for ultimate performance, in part because it determines other variables' capacity to influence performance more effectively.

The most helpful contribution this paper offers to future research lies in the theoretical framework we develop for studying the interaction of EI and *g* on performance: the task-dependent interaction model of EI. By internalizing distinct types of tasks within the same sample, this model provides a potential way to reconcile the divergent findings among previous interaction studies conducted in job roles that require interpersonal interaction, and those conducted in academic settings where such interaction is oftentimes absent. In agreement with Rode et al. (2007) EI may be distinctively helpful whenever tasks require a high degree of interpersonal interaction, an observation that has been thoroughly explored in preliminary research studying the impact EI has on group processes (Jordan & Troth, 2004; Druskat & Wolff, 2001; Druskat & Wolff, 2008) and the quality of social interactions (Lopes et al., 2004). Therefore we invite researchers to explore task-dependent models, such as the one found here, for considering both multiplicative and additive effects of EI on human performance.

Nonetheless, insofar as schools are challenged to effectively engage students in interpersonal interactions, even in their group assignments, we may be at odds to observe the catalyzing power of EI on the relationship between cognitive abilities and academic achievement. This suggests that the replication of this study in organizations, where most work is developed in teams and interpersonal interactions abound, would provide a better chance to gather evidence in support of hypothesis 1 in our model, and show that EI boosts the relationship between *g* and performance. One challenge in such replication would concern the identification of jobs roles where employee's performance can be feasibly assessed in social and non-social tasks separately (e.g. a product manager has non-social tasks related to the technical product development as well as social tasks such as discussing product customization with potential clients).

Furthermore, our results along with previous work (Boyatzis et al., 2015; Furnham et al., 2014) show the importance of considering 360º multi-source assessments of EI. Different people, at work and at home, have unique vantage points from which to observe distinct facets of our behavior, particularly depending on the specific relationship and rapport they have established with us. Similarly to Boyatzis et al. (2015), our study shows that professional raters in general provide a more balanced assessment of EI competencies, with relatively smaller measurement error, as compared to self and personal raters, providing the smaller attenuation bias of our model estimates (i.e., had the higher coefficients). This suggests future research should benefit from introducing multi-source assessments in their EI measures. Specifically, it is interesting to dig deeper into the distinctive perspectives across the raters within each type (e.g., collaborators, bosses, peers; friends; relatives; spouse), and look into identifying which particular competencies each rater is best apt to observe and assess.

Finally, we join researchers working on different EI approaches (e.g., Fernández-Berrocal et al., 2006; Boyatzis et al., 2015; Petrides & Furnham, 2000) in a shared call for research that promotes a comprehensive vision for EI, one that acknowledges the unassailable contribution each existing measure, be they ability, self-report or behavioral EI, makes to the advancement of our understanding of what an emotional intelligent person thinks like, feels like and acts like.

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Appendix of Chapter 4

Table 4.1 | Correlation matrix between learning performance in social and non-social domains, cognitive abilities (as measured by GMAT) and EI competencies as scored by professional raters (*n*=864)

	Constructs	Social	Non-social	GMAT-V	GMAT-Q	GMAT-T	AO	A	CM	CFM	ESA	ESC	E	I	IL	OA	PO
[Social]	Performance Social																
[Non-social]	Performance Non-social	0.140															
[GMAT-V]	GMAT-V	0.380	0.032														
[GMAT-Q]	GMAT-Q	0.094	0.360	0.150													
[GMAT-T]	GMAT-T	0.320	0.240	0.790	0.730												
[AO]	Achievement Orientation	0.100	0.039	0.015	0.032	0.032											
[A]	Adaptability	0.039	0.053	0.038	0.037	0.049	0.780										
[CM]	Coach and Mentor	0.006	0.007	0.025	0.000	0.018	0.660	0.680									
[CFM]	Conflict Management	-0.024	0.072	-0.002	0.049	0.030	0.700	0.730	0.760								
[ESA]	Emotional Self-Awareness	-0.074	-0.018	-0.003	0.051	0.030	0.560	0.620	0.700	0.690							
[ESC]	Emotional Self-Control	-0.006	0.034	0.074	0.021	0.062	0.490	0.600	0.570	0.660	0.460						
[E]	Empathy	-0.026	-0.005	0.027	0.000	0.021	0.590	0.690	0.780	0.750	0.690	0.700					
[I]	Influence	-0.046	-0.002	0.023	0.034	0.039	0.670	0.750	0.710	0.770	0.670	0.550	0.710				
[IL]	Inspirational Leadership	0.009	0.004	0.020	-0.014	0.007	0.700	0.720	0.790	0.760	0.620	0.530	0.660	0.770			
[OA]	Organizational Awareness	-0.036	-0.007	0.033	0.002	0.026	0.600	0.760	0.680	0.700	0.630	0.620	0.750	0.760	0.680		
[PO]	Positive Outlook	-0.010	-0.008	-0.014	-0.038	-0.034	0.660	0.650	0.630	0.680	0.550	0.560	0.660	0.610	0.700	0.620	
[T]	Teamwork	-0.002	0.034	-0.006	-0.008	-0.007	0.630	0.700	0.820	0.760	0.620	0.660	0.810	0.700	0.730	0.750	0.650

Table 4.2 | Correlation matrix between learning performance in social and non-social domains, cognitive abilities (as measured by GMAT) and EI competencies as scored by personal raters (*n*=864)

	Constructs	Social	Non-social	GMAT-V	GMAT-Q	GMAT-T	AO	A	CM	CFM	ESA	ESC	E	I	IL	OA	PO
[Social]	Performance Social																
[Non-social]	Performance Non-social	0.140															
[GMAT-V]	GMAT-V	0.410	0.042														
[GMAT-Q]	GMAT-Q	0.092	0.360	0.160													
[GMAT-T]	GMAT-T	0.340	0.250	0.790	0.730												
[AO]	Achievement Orientation	0.052	0.030	-0.003	0.005	-0.001											
[A]	Adaptability	0.035	0.004	0.061	0.015	0.048	0.690										
[CM]	Coach and Mentor	-0.003	-0.074	0.007	-0.094	-0.053	0.570	0.600									
[CFM]	Conflict Management	-0.037	-0.032	-0.029	-0.021	-0.037	0.580	0.700	0.680								
[ESA]	Emotional Self-Awareness	-0.062	-0.100	-0.037	-0.052	-0.063	0.490	0.560	0.660	0.690							
[ESC]	Emotional Self-Control	0.010	0.066	0.011	0.008	0.009	0.470	0.600	0.480	0.620	0.450						
[E]	Empathy	-0.076	-0.058	-0.022	-0.068	-0.060	0.470	0.610	0.720	0.680	0.670	0.620					
[I]	Influence	-0.029	-0.095	0.008	-0.022	-0.009	0.520	0.680	0.620	0.690	0.590	0.440	0.530				
[IL]	Inspirational Leadership	-0.007	-0.083	0.008	-0.048	-0.027	0.650	0.700	0.710	0.710	0.610	0.490	0.570	0.760			
[OA]	Organizational Awareness	-0.037	-0.079	0.016	-0.055	-0.026	0.550	0.720	0.580	0.640	0.530	0.520	0.650	0.650	0.660		
[PO]	Positive Outlook	-0.072	-0.045	-0.057	-0.017	-0.051	0.540	0.560	0.490	0.540	0.450	0.510	0.470	0.450	0.610	0.510	
[T]	Teamwork	-0.012	-0.022	-0.037	-0.082	-0.078	0.550	0.650	0.720	0.660	0.520	0.600	0.690	0.530	0.640	0.670	0.560

Table 4.3 | Correlation matrix between learning performance in social and non-social domains, cognitive abilities (as measured by GMAT) and EI competencies as scored by self-evaluations (*n*=864)

	Constructs	Social	Non-social	GMAT-V	GMAT-Q	GMAT-T	AO	A	CM	CFM	ESA	ESC	E	I	IL	OA	PO
[Social]	Performance Social																
[Non-social]	Performance Non-social	0.130															
[GMAT-V]	GMAT-V	0.380	0.037														
[GMAT-Q]	GMAT-Q	0.085	0.360	0.150													
[GMAT-T]	GMAT-T	0.310	0.250	0.790	0.730												
[AO]	Achievement Orientation	0.036	0.020	-0.075	-0.061	-0.090											
[A]	Adaptability	-0.003	0.027	-0.022	-0.051	-0.048	0.550										
[CM]	Coach and Mentor	-0.033	-0.087	-0.073	-0.097	-0.120	0.350	0.330									
[CFM]	Conflict Management	-0.001	0.032	-0.035	-0.110	-0.093	0.490	0.470	0.460								
[ESA]	Emotional Self-Awareness	-0.008	-0.054	-0.019	-0.057	-0.051	0.340	0.340	0.400	0.440							
[ESC]	Emotional Self-Control	-0.065	0.031	0.011	-0.001	0.008	0.340	0.400	0.180	0.360	0.180						
[E]	Empathy	-0.096	-0.026	-0.075	-0.078	-0.099	0.320	0.460	0.450	0.480	0.470	0.390					
[I]	Influence	-0.037	-0.029	-0.008	-0.058	-0.043	0.390	0.490	0.420	0.520	0.360	0.250	0.390				
[IL]	Inspirational Leadership	-0.050	-0.076	-0.067	-0.110	-0.120	0.470	0.490	0.560	0.500	0.340	0.260	0.370	0.600			
[OA]	Organizational Awareness	-0.045	-0.079	-0.052	-0.110	-0.100	0.340	0.470	0.390	0.400	0.390	0.320	0.430	0.540	0.470		
[PO]	Positive Outlook	-0.089	-0.038	-0.150	-0.082	-0.160	0.450	0.420	0.300	0.380	0.220	0.300	0.330	0.280	0.480	0.300	
[T]	Teamwork	0.017	-0.048	-0.047	-0.110	-0.100	0.400	0.480	0.570	0.530	0.310	0.330	0.500	0.400	0.520	0.420	0.370

Chapter 5 | General Discussion, Limitations, Implications and Future Research

5.1 General discussion

5.1.1 Research questions revisited

The main purpose of this doctoral thesis is to inform and contribute to future research in emotional intelligence and its role in enhancing learning performance. As such, this concluding chapter revisits the central research questions that have guided the three studies comprised in this thesis, to offer an overall discussion of the findings and, while taking into account the research quality of each study, provide pointers to orient future research on emotional intelligence. Thus, in this thesis we have addressed the following three main research questions, with the first question split into two interrelated questions:

1_A. Is the multi-rater assessment of behavioral EI valid and reliable?

1_B. Are there some raters who are more apt to assess specific EI behaviors than others?

2. What is the relationship between behavioral EI and general intelligence?

3. How does behavioral EI moderate general intelligence for enhancing learning performance in social versus non-social tasks?

Collectively, these questions aim to expand our understanding of behavioral EI and its relationship with general intelligence, as well as how they interact together to enhance learning performance in specific types of tasks, particularly social and non-social tasks.

The first main question comprising two interrelated questions *"Is the multi-rater assessment of behavioral EI valid and reliable?"* and *"Are there some raters who are more apt to assess specific EI behaviors than others?"* are answered in the first empirical article (Chapter 2) and concern the conceptual and epistemic aspects of the operationalization of behavioral EI.

To respond to the second main question *"What is the relationship between behavioral EI and general intelligence?"*, we conducted an empirical study (Article 2, Chapter 3), wherein we formulate and empirically test four hypotheses, in particular that EI competencies are only slightly associated with general intelligence and that this association is moderated by the subject's gender and the type of rater – professional, personal or self – that is assessing the competencies. Based on a sample of 641 business professionals enrolled in an MBA program at a leading European business school, our findings indicate that behavioral EI, as observed and assessed by others, is slightly related to general intelligence. This finding is in contrast to the high correlations that have been found between cognitive intelligence and other EI approaches, especially ability EI. In fact, the high levels of association between measures of EI and *g* have been the basis of severe criticism to the construct's lack of divergent validity (Landy, 2005). This way, behavioral EI takes distance from other approaches in the way that it only captures EI if it is manifested through behavior that is visible to others. Because the behavioral manifestations of emotional intelligence have more to do with one's experience of dealing with emotional-laden situations rather than with fluid intelligence per se, we may observe that individuals have varying levels of EI competencies regardless of the level of cognitive intelligence they have developed thus far.

The fact that behavioral EI is only slightly related to general intelligence implies that we may observe a balanced distribution of these two individual abilities across the population. This offers the ideal conditions to inquire about the relatively unclear and less studied prediction of learning performance when EI is high (or low) and cognitive ability is low (or high). To inform this inquiry we must investigate the nature of the interactive relationship between emotional intelligence and general intelligence on learning performance. To this end, the third article (Chapter 4) in this thesis poses the question of "*How does behavioral EI moderate general intelligence in enhancing learning performance in social versus non-social* *tasks?"*. While previous research has proposed that emotional intelligence and cognitive abilities contribute to performance in independent and incremental ways (Goleman, 1998; Mayer, Salovey & Caruso, 2000), we show that the contribution of behavioral EI to the learning performance of 864 professional business executives and managers in an MBA program does depend on their level of cognitive abilities.

Moreover, in support of our second hypothesis in the third article, we find evidence that when individuals are engaged in non-social tasks, i.e. tasks that primarily involve analytical thinking about abstract concepts (e.g., course assignments in Statistics or Finance subjects), the lower is their level of cognitive ability relative to the intellectual demands of the task, the stronger is the effect of EI competencies on their learning performance. Indeed, when students face intellectually demanding tasks that outweigh their cognitive resources, they may experience an emotional upheaval, overwhelmed by negative emotions such as fear and frustration. These emotions can be incapacitating if they sabotage one's ability to focus on and drive away the needed motivation to approach the task. Under such cognitive challenges and emotional strain, our findings show that those students who, according to their professional or personal peers, are seen to have solid EI competencies, especially emotional self-control, achievement orientation or positive outlook, are able to keep their eyes on the prize and their head in the game until the task is finished. It is thus, in the presence of such cognitive struggles that often lead students to give up, that EI competencies find an opportunity to shine and make a considerable difference in performance. Instead, if students have a high level of cognitive abilities such that there is no cognitive challenge, i.e. the individual's cognitive abilities outweigh the task demands, the absence of an emotional struggle makes EI competencies appear less necessary to an individual's learning performance, to the extent that we observe high *g* students have high performances regardless of their level of emotional competencies. Although this finding illustrates the compensatory model devised by Côté & Miners (2006), which has also found support in other studies of academic performance (Agnoli et al., 2012; Petrides et al. 2004), we propose that it is best observed when tasks are non-social or require no personal interaction.

Otherwise, when tasks engage the social cognitive domain, involving reasoning about people's minds and requiring interpersonal interactions, we consider that having high cognitive abilities alone may not be enough to succeed. Our first hypothesis in the third article, which is central to this doctoral thesis, specifies that EI competencies are more consequential to performance when coupled with stronger rather than weaker cognitive abilities. That is, we expect a positive interaction in social tasks, wherein EI and *g* mutually reinforce each other's contributions to performance. This hypothesis bears logic in the way that the presence or absence of EI competencies can effectively "make or break" the manifestation into action of whichever abilities one may have, be they cognitive, visual, musical, or any other. This should be best observed if the task depends on the quality of personal interactions with other collaborators. In a way, the more an individual has developed his or her cognitive abilities, the more he or she has at stake, and thus the greater the impact that EI competencies may have in determining or undermining the successful display, without fear nor hesitation, of cognitive abilities into action. Notwithstanding, although our data show a relatively higher interaction between EI and *g* on the learning performance of courses from the social domain as compared to the non-social, this increase is not sufficient to support our original hypothesis. However, rather than shrug into questioning the logic and sense making of this hypothesis, we surmise this lack of evidence in our sample may be due to a few limitations related to our study and the academic context in general, issues that will be discussed in the following subsection.

5.1.2 Rater type moderator effect

One common aspect to all articles in this thesis is that each set of results is contingent or moderated by the type of rater that is assessing the individuals' behavioral EI, the main independent variable of interest. In the first article, which is devoted to the evaluation of the operationalization of behavioral EI through an inventory of 12 EI competencies, we perform a comparative analysis between the six types of raters that observe and assess the EI competencies – bosses, peers and subordinates within the professional entourage, and friends, relatives and partners within the personal. One of its main findings refers to the identification of a systematic pattern in the ratings whereby self-assessments provide the lowest ratings on all competencies, followed by professional raters and lastly the personal raters who offer the highest ratings in general. Typically, self-assessments observe an upward bias due to social desirability tendencies. Yet, that is not the case in our study. Much on the contrary, because the strictly developmental purposes of the ESCI assessment were clearly explained to every participant, individuals may have chosen to be honest with themselves or towards the individuals they were assessing, so as to offer the best contribution to a real human development agenda. Perhaps most intriguing is the fact when individuals choose to be honest with themselves they tend instead to underestimate their competencies as compared to others' assessment. Whether this is symptomatic of self-esteem issues or leniency bias on the part of others' assessment we cannot really tell with certainty. For instance, personal contacts offered on average the highest ratings, which may denote some form of leniency bias, which is expected to occur in close relationships. Notwithstanding, among all rater types, friends and work peers offered the most similar ratings, which can be understood from the fact that both rater types have a parallel vantage point of observation: both types of relationship share a parallel symmetry "among equals" which may provide for a more transparent relationship with less filters or attempts to influence certain behaviors in one another. Indeed, peers are known for providing more accurate and well-informed appraisals of their coworkers' behavior than supervisors (Druskat & Wolff, 1999; Kane & Lawler, 1978; Lewin & Zwany, 1976; Yammarino & Waldman, 1993).

Overall, amongst all findings in the first article, perhaps the most consequential to the remainder two articles in this thesis refers to the fact that rater types within each context were found to provide similar enough ratings to enable their aggregation into the larger context clusters of professional and personal raters. For this reason, articles two and three refer to these two groups of external raters (i.e., professional and personal), rather than to each of the six existing rater types.

Also, since professional raters were found to report the most conservative ratings among the external observers, with less leniency bias and measurement error, we expected they would sustain a smaller attenuation bias of the relationship between EI competencies and cognitive abilities. Indeed, while professional assessments observed a positive, although slight, relationship between behavioral EI and *g*, there was no relationship from observations of personal raters, and a slightly negative relationship of EI and *g* from self-assessment. Similarly, in the third paper we observe that the effect of EI competencies on learning performance is highest when professionals rate the competencies.

All in all, the different results from distinct raters are a reminder that the reality of what we see depends on the direction in which we look, and the emotion with which we color our lenses.

5.1.3 Gender differences

Another common feature across the three articles is the analysis of gender differences. In the first article we observe how females are generally perceived as more apt than men in competencies such as emotional self-awareness, achievement orientation and adaptability, but less agile in emotional self-control and conflict management. Perhaps the most unexpected yet revealing finding refers to how partners, of all raters, report the most discriminating assessments of women as they give them the lowest evaluations in achievement orientation, emotional self-control, inspirational leadership and cognitive competencies. Nonetheless, supervisors, who are in general the most conservative of all external observers, rate women the highest and ahead of men in achievement orientation, adaptability, conflict management, influence, inspirational leadership and teamwork. These findings appear to make justice to social stereotypes about women being more emotional and thus less able to manage the public manifestation of their emotions, which relates to their socially perceived nurturing role in the family and society. This role also bears fruits in the way women may do better as motivational and mentoring agents, being more adaptable to situations and having high emotionality when it comes to their achievement orientation.

Regarding the relationship between EI competencies and *g*, the second article (Chapter 3) finds that gender has a moderator effect on the results. Among men there appears to be a positive although slight relationship between EI and *g*, whereas women have a negative, albeit slight as well, relationship between their EI competencies and *g*, especially if the competencies are rated by professional raters or self-assessments. Whether emerging from sexist stereotyping or social comparison processes, the gender moderation we identified suggests a more generous attribution of the link between EI and *g* to males than females.

Furthermore, in the third article, we find evidence of gender stereotyping with respect to the types of tasks people tend to do best, such that our results show that females reach higher performances in social courses, whereas males do better in non-social courses. Gottfredson (1981) claims that sex-type boundaries in seeking knowledge about the world and choosing professional careers are set around the age of nine years old. Later in life these stereotypes are expressed as preferences for doing certain tasks or entering certain jobs (Gottfredson, 1981; Spain & Bianchi, 1996). Ultimately, this finding provides reassurance that our confirmatory factor analysis on the diverse MBA courses was appropriately carried out as it correctly distinguished the course contents between social and non-social cognitive domain tasks.

5.2 Limitations

Knowledge claims, propositions or inferences can be deemed valid if they represent to some extent an approximation to the truth (Shadish, Cook & Campbell, 2002). While we may never be certain that any particular inference is true, nor be sure that other inferences or previous theories are determinately falsified we can, however, identify the specific elements in our scientific exploration of reality, that may have limited our access to knowledge. As our field of research lies deep within the reign of social sciences, we are well aware of its susceptibility to certain limitations or threats to validity. While it is unnecessary to re-list all the limitations that have already been identified in each article, we will focus on discussing three of the most important, following the validity typology suggested in Shadish, Cook and Campbell (2002).

First, all three studies presented in this doctoral thesis, were based on data collected at a single school, ESADE, and particularly within the graduate population of MBAs. Although our MBA programs include business professionals with diverse nationalities and educational backgrounds, these two aspects are considered *threats to external validity* as they limit our ability to extrapolate or generalize results to a broader population. Future research could therefore replicate these three studies in other universities and educational programs to guarantee that a specific school's admissions criteria have not biased the results. Considering that European educational policies are investing in the development of emotional and social competencies – it is in fact one of the criteria within the Bologna program for higher education in Europe – it should be revealing to conduct comparative studies between European educational institutions that share similar competency development programs as ESADE's LEAD program.

A second limitation present in studies two and three concerns the restriction of range in the GMAT, our proxy measure of general cognitive ability, which poses a *threat to statistical conclusion validity*. Due to the MBA admission criterion that requires candidates to score above a certain threshold in their GMAT (usually above 600 points), our sample only covered individuals with medium-high to high levels of cognitive abilities. Notwithstanding we devised a way to limit the extent of range restriction by only considering the GMAT scores from the first test ever taken by the MBA candidate, instead of using the scores with which they were effectively admitted in the MBA (i.e., the school's admission office scores, which are all above 600 and may have been obtained after taking the test several times). This way, although we were able to increase the variance in GMAT scores, we could not completely eliminate the selection bias within our sample.

Possibly the most limiting threat to validity is the one we identified in the third article as we conducted ex-post focus groups with 15 MBA students (3 teams). These focus groups were conducted to both understand the qualitative nature of the teamwork involved in MBA courses, as well as to help explain the lack of support our data was showing for the first hypothesis in the article. In a revealing discussion, the MBA candidates admitted how, regardless of the many team projects they had, particularly in social domain courses, such as Human Resources or Marketing, they had learned, early into the MBA program, to work individually in all group projects. Specifically, they identified an efficient system to produce a large number of group projects across the many MBA subjects, whereby they would assign different group projects to individual team members. For example, the team member with a HR management position, would be in charge of the Human Resources group project, whereas the one who held a strategic marketing job would take care of the International Marketing team assignment, and so on. In the end, all team members would review one another's "team" projects, but they would seldom meet to neither discuss specific issues and perspectives nor exchange feedback. Therefore, even if the courses within the social domain had a higher percentage of group work, and should normally require more discussion and interaction within teams, the fact that students forged an individual work system to get through all team projects without actually engaging in any teamwork, the distinction between social and non-social tasks within our performance measures was effectively blurred. Although we identify this to be a *threat to construct validity*, in our measure of social tasks, it also limited the internal validity of the inferences from the third study. In a way, however, this limitation allows us to reflect on alternative explanations as to why our data could not show support to a central hypothesis in this thesis, regarding the positive mutual reinforcement of behavioral EI and cognitive abilities for enhancing learning performance.

Lastly, although an MBA is an educational program known for being specifically designed to mimic the problems and tasks of real businesses, the performance of those tasks is assessed in a remarkably different way in an academic setting than it is in the real workplace. Projects and assignments are graded in a bounded 1-10 scale, which limits the ability to distinguish good from great performances, in what we consider to be a *threat to internal validity* due to a restriction of range in performance. Consequently, if students with just enough cognitive abilities to pass the tasks' requirements are able to score good grades on their projects, that means we are leaving little room in the grading scale to discriminate any substantial quality improvements that might accrue to those individuals that excel well beyond the requirements. Notably, those individuals that on top of good cognitive abilities also make use of solid EI competencies to facilitate team discussions, namely easing the navigation through conflicting perspectives among team members, they are able to raise excellence standards in solutions and product innovations (Druskat & Wolff, 2001), yet their school grade performance is bounded to signal the real value of their contributions. Unless we use unbounded scales to assess performance, such as the market value of products and services that rules real business exchanges and is the base of performance measures at the workplace, we may never capture the full extent of the contribution that EI competencies have on learning performance. This difference in the grading scales between the real world of business and business schools may indeed help explain why all studies on the interaction of EI and *g* on performance when conducted in actual business environments show EI positively moderates the effect of cognitive abilities on performance (Ferris et al., 2001; Verbeke et al., 2008; Kidwell et al., 2011), whereas when conducted in academic settings show a negative interaction instead (Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012).

5.3 Practical implications

5.3.1 Democratizing EI into specific learnable competencies

The first article in this doctoral thesis lends support to extant research efforts directed at establishing behavioral EI as a valid and reliable approach. The behavioral approach to EI expands our knowledge of emotional intelligence by gaining insight about what an emotionally intelligent person acts like. More than valid, the behavioral approach to EI as measured by the ESCI (Boyatzis, 2009; Boyatzis & Sala, 2004; Boyatzis & Goleman, 2007) is valuable to educational institutions and organizations wishing to implement EI development programs for their students and employees, in at least three ways: (1) The ESCI democratizes emotional intelligence by demonstrating that EI can be found in specific daily behaviors and not just as a form of intelligence we may only access when rigorously prompted by tests in a lab; (2) It identifies 12 EI competencies with 5 behavioral indicators which anyone who lives or works with us may observe and assess, thus, alleviating the burden of relying on subjective and oftentimes unreliable self-evaluations of emotional-laden competencies; (3) Because behavioral EI focuses on several particular competencies covering specific EI facets – e.g., exploring some level of emotional self-awareness, or being empathetic with others – it does not invite the attribution of a halo effect, often associated with single construct measures that may deem someone to have or nor a high emotional intelligence. (Boyatzis, 2008); (4) Lastly, by approaching EI at the level of behavior, we are able to translate the intelligence in EI, an abstract notion we may know little about how to develop, into action-packed behaviors we cannot gain awareness through multisource feedback, we have full agency to practice and develop, if we so intend to (cf. Boyatzis, 2001, 2006).

5.3.2 Enabling a selective multi-rater assessment of behavioral EI

A second implication stems from our first article as it paints a clear landscape as to what EI competencies may be better assessed by which raters across the personal and professional spheres. For example, we find evidence that organizational awareness is best assessed by partners and friends. Or that emotional self-control is more frequently observable by work colleagues or peers. These findings support the streamlining of multi-rater assessment protocols, by, for instance, having each rater type evaluate only the few competencies he is most qualified to observe and assess. This could considerably reduce the number of items in the survey each rater type needs to assess, fostering their focus on just a few competencies, thus increasing the quality of the overall assessment.

Professionals using 360° assessments to coach or develop EI should be prepared to identify systemic differences across gender and rater types. Otherwise, individuals may leave their coaching session thinking they have an actual "problem" with certain raters, when in reality it is a systematic bias shared across types of raters.

5.3.3 EI is for everyone, and particularly for "geniuses"

Our third article offers a central theoretical contribution within this doctoral thesis. The conventional view that has been shared by Goleman's best sellers, and researchers throughout in the field, is that EI helps performance in those places where cognitive intelligence cannot. Under this premise, emotional intelligence has, in a way, been sold to those who would rather eat dust than solve a math's problem. That is, EI has gained a certain face validity by which it can do what cognitive intelligence cannot. Instead, our third article counters this credo, as it lends support to the argument that emotional and cognitive intelligences are mutually reinforcing in their effects on learning performance (see Ferris et al., 2001; Verbeke et al., 2008; Kidwell et al., 2011). This implies that those individuals that have developed strong cognitive abilities are able to reap more benefits from investing in EI competencies, as compared to those individuals that are at lower levels of their cognitive intelligence development. This theoretical finding, which may hopefully gather further support from future empirical studies in all of EI's streams, shows that emotional intelligence can, in a way, "make or break" any other abilities we may have developed. For example, if a music genius is suffering from stage fright, s/he can solve that emotional problem by learning EI competencies such as emotional self-awareness. In all likelihood, gaining EI competencies will make the difference between what would otherwise be a humiliating performance and a brilliant spectacle. We believe this is a finding worth debating about in schools and organizations, because it has strong implications in the quality of collaborations students and work colleagues are willing to engage in within their teams. This finding may provide the much needed incentive for top performing students or employees to realize and test for themselves that it is in using emotional intelligence behavior when conversing with others that their most brilliant ideas may come about (Druskat et al., 2001). That is, this type of conversations, that are embedded within an emotionally sensible atmosphere, make up what real teamwork is about, a safe place where learning is both limitless and joyful to everyone, but that tends to be more consequential in terms of performance to those students that are already at an advanced level of their cognitive development. All in all, truly "genius" is to outsmart our egos and collaborate.

5.4 Avenues for future research

We join researchers working on different EI approaches (e.g., Fernández-Berrocal et al., 2006; Boyatzis et al., 2015; Petrides & Furnham, 2000) in a shared call for research that promotes a comprehensive vision for EI, one that acknowledges the unassailable contribution each existing measure, be they ability, self-report or behavioral EI, makes to the advancement of our understanding of what an emotional intelligent person thinks like, feels like and acts like. Indeed, our results suggest that research on EI should examine at more than one level within studies, the ability, trait, self-perception or behavioral levels. It may help in understanding the relevance of EI to life and work outcomes, as well as other constructs in psychology.

When collecting behavioral EI data, analyses should examine the sources of the observations as a possible moderator or mediator on the dependent variables. For example, in our research, it is likely that the professional environment provides more opportunities for the raters to assess *g*-related competencies than the personal environment. It is also crucial to analyze data for gender effects that may not be apparent in more direct, statistical analysis.

To our knowledge, the third article in this thesis is first to study the interactive role of behavioral EI and cognitive ability on enhancing learning performance. Yet, it joins six other studies that have examined the interaction between EI and cognitive ability on academic and job performance; all have found statistically significant interactions (Verbeke et al., 2008; Kidwell et al., 2011; Côté & Miners, 2006; Petrides et al., 2004; Agnoli et al., 2012; Fiori, 2015). We thus hereby join their shared call for further research in EI that moves beyond incremental effects and pays attention to the interaction of EI with interdependent intelligences or abilities that have been thoroughly studied for their impacts on performance, particularly cognitive ability. This involves recognizing the false myth in our scholarship by which EI, or any other construct for that matter, may only be valuable for organizational research and practice, if it makes an incremental linear contribution to performance (Landy, 2005; Zeidner et al., 2004). Emotional intelligence, as a predictor of human performance, can be particularly more important and consequential in ways other than their incremental linear effects (Murphy, 1996; Hough, 2003). Exploring the indirect paths, such as the multiplicative effects of interaction, enables researchers to discover EI is valuable for ultimate performance, in part because it determines other variables' capacity to influence performance more effectively.

The most substantial contribution this thesis offers to future research lies in the theoretical framework we develop in the third article for studying the interaction of EI and *g* on performance: the task-dependent interaction model of EI. By internalizing distinct types of tasks within the same sample, the model provides a potential way to reconcile the divergent findings among previous interaction studies conducted in job roles that require interpersonal interaction, and those conducted in academic settings where such interaction is oftentimes absent. In agreement with Rode et al. (2007) EI may be distinctively helpful whenever tasks require a high degree of interpersonal interaction, an observation that has been thoroughly explored in preliminary research studying the impact EI has on group processes (Jordan & Troth, 2004; Druskat & Wolff, 2001a; Druskat & Wolff, 2001b; Druskat & Wolff, 2008) and the quality of social interactions (Lopes et al., 2004, Lopes et al., 2005). Therefore, we invite researchers to explore task-dependent models, for considering both multiplicative and additive effects of EI on human performance.

Nonetheless, insofar as schools are challenged to effectively engage students in interpersonal interactions, even in their group assignments, we may be at odds to observe the catalyzing power of EI on the relationship between cognitive abilities and academic achievement. This suggests that the replication of our third study in organizations, where most work is developed in teams, would provide a better chance to gather evidence in support of the hypotheses in this model, and show that

EI competencies catalyze the relationship between general intelligence and learning performance.

References of Chapter 5

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