Large scale analysis of communication cues in negotiation

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DOCTORAL THESIS

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To Judit, my family and friends

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Abstract

What makes some people better negotiators than others? In this thesis, I use facial expression recognition software, natural language processing, and recent statistical tools (e.g. LASSO regularization technique) to explore how people can improve their verbal (e.g., asking questions) and non-verbal behavior (emotional expression and conversation style) to build stronger relationships and get better deals at the negotiation table. Additionally, I investigate the prevalence of negotiation conversations in our lives. The first paper explores conversation dynamics in negotiation. Specifically, I investigate how distinct conversation dynamics measures impact negotiation outcomes. I derive 16 measures across seven dimensions of conversation dynamics: speaking time, turn length, pauses, speech rate, interruptions, backchannels, and response time. Network analysis showed interconnections between these measures, revealing differences in negotiators' "talk vs. listen" tendencies. Regression and LASSO analyses demonstrated that specific measures predict objective and relational outcomes. Speaking more, faster, and with fewer pauses led to better deals while refraining from interrupting and displaying dynamic turn lengths enhanced likability. These findings underline the significance of conversation dynamics in negotiation success. In the second paper, I test the popular, but hardly tested, idea that asking open-ended questions leads to higher gains in negotiation. Across two studies, I found that negotiators do not ask many questions. In fact, open-ended questions occurred in less than 9% of all speech turns. Yet, negotiators who asked more open-ended questions obtained higher individual gains, while closed-ended questions and non-question statements had no significant effect on negotiation outcome. These findings support the idea that negotiators mistakenly spend too much time trying to persuade rather than learn. The third paper analyzes negotiation videos using emotion recognition software to assess how emotions of negotiators affect outcomes. I measured the tendency to

synchronize and adapt emotions with counterparts. Adapting to positive emotions of the counterpart was related to higher individual gains. Finally, the last paper of the thesis investigates the prevalence of negotiation in people's lives. Using an app-based experience-sampling method, the study revealed that 25% of daily interactions involve negotiation, temporarily decreasing happiness. However, frequent negotiators reported higher long-term happiness. Overall, this thesis shows that negotiation is part of our daily life and the way we communicate affects negotiation outcomes.

Abstract (Spanish)

¿Qué hace que algunas personas sean mejores negociadores que otras? En esta tesis, utilizo software de reconocimiento de expresiones faciales, procesamiento de lenguaje natural y herramientas estadísticas recientes (por ejemplo, la técnica de regularización LASSO) para explorar cómo las personas pueden mejorar su comportamiento verbal (por ejemplo, hacer preguntas) y no verbal (expresión emocional y estilo de conversación) para construir relaciones más sólidas y obtener mejores acuerdos en la mesa de negociación. Además, investigo la prevalencia de conversaciones de negociación en nuestras vidas. El primer artículo explora la dinámica de conversación en la negociación. Específicamente, investigo cómo distintas medidas de dinámica de conversación afectan a los resultados de la negociación. Derivo 16 medidas en siete dimensiones de dinámica de conversación: tiempo de habla, longitud de turno, pausas, velocidad de habla, interrupciones, retroalimentación y tiempo de respuesta. El análisis de redes mostró interconexiones entre estas medidas, revelando diferencias en las tendencias de "hablar vs. escuchar" de los negociadores. Los análisis de regresión y LASSO demostraron que medidas específicas predicen resultados objetivos y relacionales. Hablar más, más rápido y con menos pausas llevó a mejores acuerdos, mientras que abstenerse de interrumpir y mostrar longitudes de turno dinámicas aumentó la simpatía. Estos hallazgos subrayan la importancia de la dinámica de la conversación en el éxito de la negociación. En el segundo artículo, pruebo la idea popular pero poco estudiada que hacer preguntas abiertas conduce a mayores ganancias en la negociación. En dos estudios, encontré que los negociadores no hacen muchas preguntas. De hecho, las preguntas abiertas representaron menos del 9% de todos los turnos de habla. Sin embargo, los negociadores que hicieron más preguntas abiertas obtuvieron mayores ganancias individuales, mientras que las preguntas cerradas y las afirmaciones que no eran preguntas no tuvieron un efecto significativo en el resultado de la negociación. Estos hallazgos respaldan la

idea que los negociadores gastan demasiado tiempo tratando de persuadir en lugar de aprender. El tercer artículo analiza videos de negociación utilizando software de reconocimiento de emociones para evaluar cómo las emociones de los negociadores afectan a los resultados. Medí la tendencia a sincronizar y adaptar las emociones con los interlocutores. Adaptarse a las emociones positivas del interlocutor se relacionó con mayores ganancias individuales. Finalmente, el último artículo de la tesis investiga la prevalencia de la negociación en la vida de las personas. Utilizando un método de muestreo de experiencias basado en una aplicación, el estudio reveló que el 25% de las interacciones diarias involucran negociación, disminuyendo temporalmente la felicidad. Sin embargo, los negociadores frecuentes reportaron una mayor felicidad a largo plazo. En general, esta tesis muestra que la negociación es parte de nuestra vida diaria y la forma en que nos comunicamos afecta a los resultados de la negociación.

Abstract (Catalan)

Què fa que algunes persones siguin millors negociadors que altres? En aquesta tesi, faig servir programari de reconeixement d'expressió facial, processament de llenguatge natural i eines estadístiques recents (com la tècnica de regularització LASSO) per explorar com les persones poden millorar el seu comportament verbal (per exemple, fent preguntes) i no verbal (expressió emocional i estil de conversa) per construir relacions més sòlides i obtenir millors acords a la taula de negociació. A més, investigo la prevalença de les converses de negociació a les nostres vides. El primer article explora la dinàmica de la conversa en la negociació. Específicament, investigo com diferents mesures de la dinàmica de la conversa afecten els resultats de la negociació. Derivo 16 mesures en set dimensions de la dinàmica de la conversa: temps de parla, longitud del torn, pauses, ritme de la parla, interrupcions, canals de retroacció i temps de resposta. L'anàlisi de xarxa va mostrar interconnexions entre aquestes mesures, revelant diferències en les tendències de "parlar vs. escoltar" dels negociadors. Les anàlisis de regressió i LASSO van demostrar que mesures específiques prediuen resultats objectius i relacionals. Parlar més, més ràpid i amb menys pauses va portar a acords millors, mentre que abstenir-se d'interrompre i mostrar longituds de torn dinàmiques va millorar la simpatia. Aquests resultats destaquen la importància de la dinàmica de la conversa en l'èxit de la negociació. En el segon article, poso a prova la idea popular, però poc estudiada, que fer preguntes obertes porta a guanys més alts en la negociació. En dos estudis, vaig trobar que els negociadors no fan gaires preguntes. De fet, les preguntes obertes es van produir en menys del 9% de tots els torns de parla. No obstant això, els negociadors que van fer més preguntes obertes van obtenir guanys individuals més alts, mentre que les preguntes tancades i les afirmacions que no eren preguntes no van tenir un efecte significatiu en el resultat de la negociació. Aquests resultats donen suport a la idea que els negociadors malauradament

dediquen massa temps intentant persuadir en lloc d'aprendre. El tercer article analitza vídeos de negociació utilitzant programari de reconeixement d'emocions per avaluar com les emocions dels negociadors afecten els resultats. Vaig mesurar la tendència a sincronitzar i adaptar les emocions amb els interlocutors. L'adaptació a les emocions positives de l'interlocutor estava relacionada amb guanys individuals més alts. Finalment, l'últim article de la tesi investiga la prevalença de la negociació a la vida de les persones., Utilitzant un mètode de mostreig d'experiències basat en una aplicació, l'estudi va revelar que el 25% de les interaccions diàries involucren negociació, disminuint temporalment la felicitat. No obstant això, els negociadors freqüents van informar d'una major felicitat a llarg termini. En general, aquesta tesi mostra que la negociació és part de la nostra vida diària i la forma com comuniquem afecta els resultats de la negociació.

1. Introduction

1.1 Overview

Persuasive communication tactics have been used since ancient times. In Homer's epic, Odysseus uses passionate words in an attempt to evoke sympathy from Nausicaa, humbly imploring, “Here I am at your mercy, princess are you a goddess or a mortal?” Similarly, in Shakespeare's masterpiece, "Romeo and Juliet," Juliet's persuasive finesse shines as she urges Romeo to defy his family's wishes, asserting that the family name means nothing with a poetic metaphor: “What's in a name? That which we call a rose. By any other name would smell as sweet.” In more contemporary times, Greta Thunberg challenged world leaders at the 2019 UN Climate Action Summit with a firm face and direct tone, confronting them with a piercing inquiry: “How dare you pretend that this can be solved with just *business as usual*?”

Whether you are trying to persuade world leaders, seal the deal with potential customers, raise money from investors, or face conflicts at home, professional and personal success requires the ability to negotiate effectively. Yet, a surprisingly large amount of negotiation books and advice still rely on practitioners’ experience and anecdotal evidence. If you open a negotiation handbook, listen a negotiation podcast or watch a talk of a senior negotiator, you’ll likely be instructed to refrain from monologues, ask more questions and display strategically facial expressions (e.g., Calhoun, 2004; Fisher, Ury & Patton, 2011; Malhotra & Bazerman, 2007; Voss & Raz, 2016). Experts suggest that negotiators should spend less time arguing and defending their positions at the bargaining table and more time listening (Jeong, Minson & Gino, 2020; Pinkley, Griffith, & Northcraft, 1995) or that a warm communication style may lead to obtain a “good guy discount” (Calhoun, 2004; Jeong et al., 2019). Most of these tactics are integral to many negotiations training programs, ranging from mediation (Moore, 2003) and sales (Singh, Manrai, & Manrai, 2015) to hostage negotiation (Van Hasselt et al., 2006). However, few studies have quantified negotiators’ communications tactics in real dialogues, nor demonstrated the impact of communications tactics on negotiated

outcomes (e.g. Jeong et al., 2019). In this thesis, I use a large conversation dataset, a turn-level focus, combination of classic behavioral experiments and novel machine-learning tools to test four widely accepted — but hardly tested — tactics in negotiation. Using a unique large dataset of negotiation recordings, I aim to uncover the verbal and non-verbal behaviors that may lead to more successful negotiation. In Ch2, I explore the macro-structure of negotiation to uncover how conversation dynamics (e.g., speech time distribution, interruptions) predict negotiation outcomes. In Ch3 and Ch4, I investigate the micro verbal- and non-verbal behaviors (e.g., word choice, facial display of emotion) that can make or break a deal. Specifically, in Ch3, I test the power of asking questions during negotiations. And in Ch4, I investigate the role of facial emotion expression. Finally, in Ch5 I explore how relevant may be these tactics in people's life by investigating the widely advocated but barely tested idea that individuals negotiate every day.

1.2 Communication Cues

Individuals communicate in different ways. Words play a central role to communicate information (Krauss, 1987). However, it's not just language that conveys information; gestures, sound and conversation dynamics also provide valuable information. For instance, a shaky head typically signifies disagreement (Briñol & Petty, 2003; Eibl-Eibesfeldt, 1972), while a high-pitched, loud voice often indicates fear (Sauter & Eimer, 2010), or short response time may communicate engagement (Templeton et al., 2022). Because of the specific conflictual context, the findings of casual conversations cannot be generalized to negotiation conversations. For example, in casual "get-to-know-you" conversations slow response times between strangers can be awkward (Templeton et al., 2023), while prolonged silences in negotiations can help reflection that fosters joint gains (Curhan et al., 2022). As this difference highlight, findings from other conversational contexts may not generalize to negotiations and vice-versa. Thus, it is important to study communication cues in negotiation context.

1.3 Communication in Negotiation

The way individuals communicate during high-stakes negotiations has direct implications for objective outcomes, such as the final monetary deal or the post-negotiation relationship. Words choice impact ability to claim value (e.g. Galinsky & Mussweiler, 2001). To date research has shown that a warm style of communication may hurt negotiators in a distributive setting (Jeong et al., 2019). On the contrary, displaying positive emotions may be beneficial to reach integrative outcomes (Anderson & Thompson, 2004). On non-verbal cues, negotiation has several studies that show that expressing anger (Van Kleef & Côté, 2007), having open and expansive body language (Carney et al., 2010; Hall et al., 2005), and maintaining eye contact (Drolet & Morris, 2000) can result in better negotiation outcomes. A handful of studies examine paraverbal components of communication, like prosody and intonation. Speaking with a lower pitch increases perceptions of status and authority (Buller & Burgoon, 1986; Ko, Sadler, & Galinsky, 2015; Ohala, 1982), improving negotiation outcomes (Klofstad et al., 2012). For conversation dynamics, there are a couple of articles from Curhan and colleagues (2007, 2022) that shows the central role of conversation dynamic metrics such as response time and speaking time in making or breaking a deal.

In sum, past research showed that verbal and nonverbal communication cues matter in negotiation. However, these previous negotiation studies suffer from several important limitations. First, different nonverbal behaviors were analyzed interchangeably. For example, Kopelman and colleagues (2006) manipulated communication style and facial expressions simultaneously. Besides, negotiation is rarely a monologue. As in most human interactions, negotiators constantly adapt their verbal and non-verbal behavior to each other in a series of recursive loops. Should you mimic the talking speed of your counterpart? Should you interrupt a lengthy tirade? Should you smile back when they smile at you? Beyond the basic verbal – nonverbal distinction, emerging research in the field of conversational dynamics suggests that

key elements of the negotiation dance at the level of speech turns may have an impact on its outcome. For example, Curhan and Pentland (2007) found that conversational dynamics explain 30% of the variance of individual gains. In another study, Curhan et al. (2022) found that longer pauses before starting a turn supports joint gains. However, this early research only focused on five conversational features and the former article on 5 first minutes of negotiation, potentially missing out on the role of different additional conversational markers and negotiation phases. Finally, negotiation is characterized by many widespread ideas barely tested. For example, one of the main ideas is that negotiation is part of our daily life (e.g. Fisher et al., 1981). In this thesis, I address some of these shortcomings.

1.4 Overview of the Thesis

In this thesis, I test negotiation behavioral advices that still rely on practitioners' experience and anecdotal evidence. Specifically, I advance in the study of negotiation literature by investigating macro-structure and micro-behavior in negotiation conversations. In chapter 2 of the thesis, I *zoom out* on a large set of conversational dynamics and how they relate with negotiation outcomes. In chapter 3, I *zoom in* on a particular verbal tactic, namely asking questions, shading light on the propensity of negotiators of asking questions and the impact on final deals. On chapter 4, I focus on another micro behavior: non-verbal cues. Specifically, I look at the emotional facial display dynamics in negotiation. Finally, in chapter 5, I test the idea that we negotiate every day. The conclusions and implications may extend beyond negotiation conversation. This thesis contributes to the emerging literature on psychology of conversation, natural process language and conflict resolution. The thesis focuses on large-scale analysis of communication cues in negotiations to identify patterns and trends that may inform negotiation practice. The study will use natural language processing (NLP), emotion recognition software (R-CNN) and new statistical techniques (e.g. LASSO) to analyze large

volumes of negotiation videos/transcripts and identify patterns and trends in verbal and non-verbal communication cues.

Negotiation is a critical part of human interaction, and understanding the role of macro-structure and micro behavior in negotiation is essential to effective negotiation. The findings of this thesis have significant implications for negotiation practice. The study will provide insights into the role of verbal and non-verbal communication cues in negotiation and identify patterns and trends that may inform negotiation practice. The thesis also provides insights into the role of information and emotion. The findings of this study will be of interest to practitioners in the fields of business, law, and international diplomacy who are involved in negotiation as well as all individuals at large.

1.5 Theoretical background

In the following paragraphs, I briefly review the general overarching research lines of my thesis. Specific extended literature reviews can be found in each chapter of the thesis.

1.5.1 Negotiation Theory

Negotiation is the process by which two or more parties communicate to reach an agreement that satisfies their interests (Pruitt & Carnevale, 1993). Negotiation conversations differ from casual conversations in several key ways. First and foremost, negotiation involves a specific objective, which is to reach an agreement between two or more parties. This means that negotiation is a goal-oriented process that requires careful planning, preparation, and execution. Secondly, negotiation involves a certain level of conflict. While other forms of communication may be focused on sharing information or building relationships, in negotiation parties have competing interests or different views on a particular issue. Another key difference is that negotiation often requires a certain level of give-and-take. Parties may need to make concessions or compromises in order to reach a mutually beneficial agreement. This means that

negotiation often involves a high degree of flexibility and adaptability. Finally, negotiation often requires a specific set of skills, such as active listening, effective communication, and the ability to persuade and influence others (Chapman, Miles, & Maurer, 2017; Thompson, 1990). These skills are essential for successfully navigating the negotiation process and reaching a positive outcome.

Distributive and Integrative negotiations

Negotiation can be broadly categorized into two distinct types: distributive and integrative. These two approaches embody divergent strategies and tactics employed by parties to reach mutually acceptable agreements (Thompson, Wang, Gunia, 2010). Distributive negotiation, often referred to as "competitive" or "zero-sum" negotiation, is characterized by a fixed resource pool, where any gain for one party is inherently balanced by an equivalent loss for the other (Galinsky & Mussweiler, 2001). The primary objective in this approach is to claim as much value as possible from the limited resources available, creating a win-lose scenario. On the other hand, integrative negotiation adopts a different perspective. In this type, negotiators recognize the potential for expanding the resource pool by identifying shared interests and areas of compatibility (Malhotra & Bazerman, 2007). The focus shifts from mere distributive gains to jointly creating value and achieving mutual benefits. Negotiators can find solutions that address the needs and concerns of all involved and make everyone better off. In this thesis, I focus on integrative (Ch.2,3,4) and distributive (Ch.4) negotiations.

Objective and subjective outcomes

Negotiation yields outcomes that can be broadly classified into two categories: objective and subjective outcomes. Objective outcomes are quantifiable results (e.g. money, time or resources) that emerge from the negotiation process, such as specific terms in a contract,

financial agreements, or measurable changes in resource allocation. These concrete achievements provide clear benchmarks for evaluating the success or failure of a negotiation.

Subjective outcomes pertain to the less tangible and more perceptual aspects of negotiation. These outcomes are influenced by individual perceptions, emotions, and psychological factors experienced by the parties involved. Examples of subjective outcomes include the level of satisfaction or dissatisfaction felt by negotiators, the perception of fairness in the process, and the degree of trust established between the parties. Unlike objective outcomes, subjective outcomes are challenging to quantify and may vary significantly depending on each party's unique perspective and cultural background.

While objective outcomes provide a clear measure of the concrete gains achieved through negotiation, subjective outcomes hold significant importance as well. The satisfaction and perceived fairness of the negotiation process can profoundly impact the parties' future interactions and relationships (Hart & Schweitzer, 2022). If a negotiation process is perceived as equitable and respectful, it is more likely to foster trust and cooperation between the parties in subsequent dealings. Conversely, a perceived lack of fairness or a negative emotional experience may lead to strained relationships and hinder future collaboration.

Recognizing and understanding the interplay between objective and subjective outcomes is vital for effective negotiation strategies. Skilled negotiators not only strive for favorable objective outcomes but also work to address the subjective concerns and emotional aspects of the negotiation.

Negotiation Processes

The process of negotiation involves different communication cues that convey information and influence the outcomes of the negotiation. Verbal communication cues refer

to the use of words, preverbal cues include tone and pith, conversation dynamics cues include the way people talk or pause, while non-verbal cues include body language, facial expressions, and gestures. Understanding these cues and how they influence negotiation outcomes is critical to effective negotiation.

Extensive research shows that largely studied psychological construct like power (e.g. Kim, Pinkley, Fragale, 2005), status (e.g. Brett & Thompson, 2016), personality (e.g. Brett & Thompson, 2016) or motivation (e.g. De Dreu, Beersma, Steinel, & Van Kleef, 2007) play a crucial role in determining the outcome of negotiation. However, less research investigated the most fundamental expression of negotiation: the communication. In fact, negotiation is expressed via a conversation where parties coordinate to reach an agreement. Negotiation take the form of a conversation. Growing interest for the communication in negotiation expressed in studying strategic emotion communication. For example, early research shows that anger may increase the ability of the expressers to claim value (Van Kleef et al., 2004a). On the contrary, fear limits the ability to claim value as it is perceived as a sign of weakness from the counterpart (Adler, Rosen, & Silverstein, 1998). Sadness may increase the ability of the expressers to claim value under certain conditions (Sinaceur et al., 2015). Disappointment has been proved to be a double-edged sword emotion in negotiation. A negotiator that expresses disappointment may elicit either a call for help or perception of an opportunity of exploitation in the receiver (Lelieveld, Van Dijk, Van Beest, & Van Kleef, 2013).

A more recent research stream is to investigate the conversational dynamics. Curhan and colleagues (2007, 2022) open up the field to study the influence of how individual talks with the outcome of negotiations. For example, Curhan and Pentland (2007) found that conversational dynamics explain 30% of the variance of individual gains. In another study, Curhan et al. (2021) found that longer pauses before starting a turn supports joint gains.

Finally, recent research on verbal cues show the importance of what we say. To date research has shown that a warm style of communication may hurt negotiators in a distributive setting (Jeong et al., 2019). Anchoring studies show that the precision of an offer (e.g. $1485) (Mason, Lee, Wiley, & Ames, 2013), decreasing concessions of counteroffers (e.g., $1,500–1,210–1,180–1,170) (Tey, Schaerer, Madan, & Swaab, 2021) and range offers (e.g., $600-700) (Ames & Mason, 2015) lead to lead to a distributive advantage.

Past research in negotiation has shifted attention into communication cues. However, there is limited research on which verbal, nonverbal and conversational dynamics cues are relevant to make or break the deal.

1.5.2 Conversation studies

Negotiation is a conversation between two or more people. Therefore, reviewing the research on conversation is crucial. People communication has been extensively studies in social psychology. The modern psychological study of conversation derives from studies in information systems. One of the first contribution was that communication is performed to convey a *meaning* (Shannon, 1948). Conversations are organized in tum-taking (Sacks, Schegloff, & Jefferson 1974). Two or more individuals alternate moments of talking (and sometime they may talk simultaneously – *overlapping*). First psycholinguistic studies show how people change linguistic code to signal status or power (Blom & Gumperz, 1972; Scotton & Ury, 1977). These studies investigate unique features of communication and the consequences on interpersonal relationships. For example, Street and colleagues (1983) results indicated that listeners found a speaker with moderate to relative faster rates (actual and perceived) more competent and socially attractive than a speaker with slower rates. Neale (1975) show that people match vocal intensity of interlocutor and the degree to which a subject will match another subject's vocal level was predicted by the social desirability of the individual. Finally, Aronsson and colleagues (1987) shows that legal professionals routinely

change their language considerably as they move from the monological phases of the trials to the rather informal dialogical phases (hearings), in which they directly interact with defendants.

In Krauss (1987) seminal paper he introduces the central role of the listener in a conversation. He claims that a message has no meaning without the interpretation of a listener. This create a second dimension of analysis where the communication is not unidimensional but at least bidimensional. This led to the introduction of new paradigm where researchers were interested in the interplay of speakers.

Conversation is multi-individual process. Krauss (1987, p. 82) argued that

> Communication is conceptualized as a process by which messages encoded at a source (called the sender) are transmitted along a channel to a destination (called the receiver) where they are decoded. A conversation, in terms of this model, can be regarded as a situation in which two or more people alternate as sender and receiver. The purpose or function of communication is to convey something called information from sender to receiver, and in human communication information is conveyed primarily by symbols that have meaning. (Krauss 1987, p. 82)

Building on the interplay between speakers, it was theorized the Context of Accommodation (CAT) (Giles, Coupland & Coupland, 1991). CAT claims that individuals either converge or diverge in communication style. This is associated with speakers' goals for social approval, communication efficiency, and identity (Giles, Coupland & Coupland, 1991). This theory explains "*why*" individuals change linguistic style. Taken together, all these studies show the importance of communication on interpersonal relationships and behavior. In chapters 1 and 2, I investigate the role of conversations in negotiations. In chapter 4, I measure the prevalence of negotiation conversation in people daily life.

1.5.3 Emotion Studies

Research demonstrates that emotions are often an integral part of the negotiation processes (see Van Kleef & Côté, 2018 for review). Throughout a negotiation, people may, for example, experience hope that things will go as planned, anxiety when expressing what they want, anger when their request is rejected, and happiness when they finally reach an agreement. In negotiation, emotions represent a source of information (Van Kleef, De Dreu, & Manstead, 2004a). Laboratory studies on dyads show that inducing or confronting a negotiator with emotions such as anger, joy, or fear can have a critical impact on the outcome of negotiation (e.g. Hideg & Van Kleef, 2017; Keltner & Buswell, 1997; Morris & Keltner, 2000; Van Kleef, De Dreu, & Manstead, 2004b). More recently, scholars studied how emotional transition (e.g., from happiness to anger) throughout a negotiation may be beneficial to obtain concessions (see e.g., Filipowicz et al., 2011; Sinaceur et al., 2013).

Taken together, these previous studies show that the emotions of one negotiator can impact negotiation outcomes. Surprisingly, little research has been dedicated to the role of facial emotion expression in negotiation. However, people's judgement has been shown to be highly affected by non-verbal cues (e.g. Ambady & Rosenthal, 1992; Ballew & Todorov, 2007; Tsay, 2013). Besides recent research shows that emotional synchrony strengthens social connection (Cheong et al., 2020). In addition, people tend to reciprocate counterpart's behavior in negotiation (Butt et al., 2005). Based on this research, in chapter 3, I investigate how facial emotional synchrony - that is the number of times two negotiators display a similar emotion at the same moment - and facial emotional adaptation - that is the extent to which negotiators adapt their emotion expression to their counterpart - relates to individual and joint negotiation outcomes.

1.6 Structure of the thesis

This thesis revolves around the role of conversational cues in negotiation. This thesis is structured in the form of a monograph composed of four complete and interrelated manuscripts. Each manuscript focuses on a particular dimension related to negotiation conversations. The thesis is divided into four chapters.

The first manuscript focuses on analyzing conversational dynamics in negotiation. This involves analyzing the sound and silences during a negotiation to identify how different measure interact with each other and predict negotiation outcome. The study explores a new approach where conversational dynamic measures are not considered in vacuum, but it takes a holistic perspective. Specifically, the study looks at the use of 16 variables, categorized in 7 dimensions, using a dataset of 38,564 conversation turns from 239 negotiations. Results show that conversational dynamics matter and affect differently for subjective and objective outcomes.

The second manuscript focuses on analyzing verbal communication cues in negotiation. Specifically, I examine the popular idea that negotiators do not ask enough questions, and instead mistakenly devote too much time arguing and defending their positions. This involve analyzing propensity to ask questions and the effect on the ability to obtain gains. The dataset is analyzed using NLP and ML techniques to identify patterns. The study explores the use of verbal communication cues to convey information and influence the outcome of the negotiation. Specifically, the study will look at the role of open- and closed-ended questions in establishing gains. Further, I claim and test two parallel mediations from information and rapport.

The third manuscript uses a large dataset of moments of facial expressions of emotions during negotiations. I captured moment-to-moment facial displays of emotion using residual

convolutional neural network (R-CNN), a subtype of artificial neural networks particularly suited to classifying images based on subtle differences. Negotiators were recorded "in gallery view", with both faces visible at all times (N= 2,596,624 emotion data points at half-second intervals). I then computed for each negotiator (1) the propensity to display five discrete emotions (i.e., joy, anxiety, frustration, contempt, and surprise), and (2) the tendency to synchronize their facial display of emotion with their counterparts (as a series of within-dyad regression coefficients predicting Person A's emotions form Person's B lagged emotions). Finally, I relate these measures to individual and joint gains. The study also looks at the moderating role of time.

The last manuscript is an experience sampling study where I measure how often people have a negotiation conversation. In addition, I relate the frequency of negotiating with the short- and long-term happiness. I find that individuals negotiate 25% of the time they have a conversation. In addition, negotiation conversation negatively affects short term happiness, but positively affect long term ones.

The four manuscripts complement each other by studying the effects of conversation behaviors on negotiation outcomes. Furthermore, each manuscript explores different communication tactics that negotiators may use to obtain better deals. Overall, these manuscripts contribute to a better understanding on the role and impact of communication cues in negotiation.

1.7 Methodology of the thesis

The overarching research approach of this thesis relies on observational and experimental data. These methods are widely used in Organizational Behavior, Social Psychology and Behavioral Science. This thesis consists of three studies through which data on negotiation behavior are collected in a controlled environment and economically

incentivized to better understand how individual communication influences negotiation outcomes and personal well-being.

The first study consists of a large dataset of dyadic negotiation simulations recordings (video and audio). Data have been collected as part of a larger project titled "Emotions & Negotiation." Findings from data that overlap have been reported in three manuscripts of the thesis (Ch. 2, 3, 4). At the beginning of the PhD, I planned to video record face-to-face negotiations at ESADE Decision Lab. However, due to COVID-19 outbreak I needed to move the negotiation simulations online. At the end, the totality of our sample comes either from video calls (via *Zoom*) or online chat negotiations. This was not only a creative form to collect data, but also respond to new form of communicating in business setting. Interactions via video calls (e.g. Zoom) and business communication platforms (e.g. Microsoft Teams) are part of daily activities in organizations (e.g. Yang et al., 2022). Hence, results and implications of our findings are highly externally valid and applicable in organizations. In total over three years, I collected more than 300 dyadic negotiation simulations video recordings. We transcribed and video analyze more than 166 hours of negotiation zoom recordings. We extracted verbal and non-verbal communication cues. I investigated relationship between conversational variables and negotiation outcomes using network analysis, multi-level linear models (R package: lme4 v.1.1.27.1) and LASSO regularization technique (Jacobucci, Brandmaier, & Kievit, 2019; Helwig, 2017; Tibshirani, 1996). Limits of this data is the virtual mediated conversation. For example, the response time may be higher compared to face-to-face (Boland et al., 2022). I acknowledge that the technical component of this medium leads to some impediments than face-to-face conversation avoid (e.g. audio lag).

The second study is an online pre-registered experiment where I manipulated the question asking behavior of one role (Ch. 3). I was interested to test whether asking open-ended questions lead to obtain better deals. I recruited 577 participants on Prolific Academic to

negotiate in dyads via live text-based chat using SMARTRIQS (Molnar, 2019). After exclusion criteria, the sample of participant was of 400. Immediately after being paired with a peer, participants received role instructions for a lease negotiation they would complete over text-based online chat. In each dyad, we randomly assigned the participant to the role of tenant to an open-ended question condition or to a control condition. In the open-ended question condition, we asked participants to "write down a minimum of three open-ended questions to ask the landlord," as part of their negotiation preparation. In the control condition, we asked participants to "write down a minimum of three things to say to the landlord." Landlords were naïve. We compared negotiation outcomes of the treated and controlled groups.

The last study is an experience-sampling design to measure how often individuals negotiate in their everyday lives (Ch. 5). I used this method to overcome traditional constraints, such as social desirability and recall biases, which have plagued previous research on negotiation (Galinsky & Mussweiler, 2001; Kwon & Weingart, 2004), and examine the complex interplay between negotiation frequency and well-being. A total of 350 participants were recruited via the Prolific online platform. Participants reported their behavior and feelings via the MindSampler app (iPhone or Android).

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2. Conversation Dynamics in Negotiations

Abstract

How much should you talk, pause, or interrupt your counterpart in negotiations? The present research zooms out on the macrostructure of negotiation conversations to examine how systematic differences in conversation dynamics—the structural and temporal patterns that arise from the presence or absence of speech between interlocutors—relate to objective and relational outcomes at the bargaining table. We examined 38,564 speech turns from 239 online negotiation recordings and derived, for each negotiator (N = 380), 16 measures pertaining to seven dimensions of conversation dynamics: speaking time, turn length, pauses, speech rate, interruptions, backchannels, and response time. Network analyses reveal that many of these measures are interconnected, with clusters of variables suggesting broad differences in negotiators' propensity to "talk vs. listen" and to mimic their counterparts. Regression and LASSO analyses further show that several measures uniquely predict objective and relational outcomes in videoconference negotiations. At the objective level, negotiators who speak more, faster, and with fewer pauses tend to get better deals. At the relational level, negotiators who refrain from interrupting and display more dynamic turn length (i.e., low similarity over successive turns) are better liked. Taken together, the results suggest that conversation dynamics could make or break deals.

2.1 Introduction

Imagine you are trying to persuade your boss to give you a raise or convince your colleagues of the best way to allocate company resources. How might the amount of time you talk, pause, backchannel, and interrupt in these conversations impact your success? Hundreds of studies have *zoomed in* on the content of negotiations to show that what we say affects what we get. Here, we go beyond the content of what was said and instead *zoom out* on the macrostructure of negotiation conversations to investigate how the simple patterns of speech and silence can predict important negotiation outcomes.

Negotiation is an integral part of our social lives. People engage in various forms of bargaining, compromise, and influence attempts with their coworkers, kids, friends, and strangers alike on a daily basis (Di Stasi, Schweinsberg, & Quoidbach, 2023). Negotiation conversations—social interactions aimed at reaching an agreement that enhances the status quo (Carnevale & Pruitt 1992)—possess unique characteristics that distinguish them from other types of conversations. These distinctions include their goal-oriented nature (Galinsky & Mussweiler, 2001), the presence of divergent interests (Pruitt, 1998), and the necessity for strategic communication to achieve desired outcomes (e.g., Bowles & Babcock, 2013; Lee & Ames, 2017; Schaerer, Schweinsberg, Thornley, & Swaab, 2020; Trotschel et al., 2015). Consequently, the factors that predict successful negotiations may sometimes deviate from those that predict success in other types of conversations. For example, people who smile more frequently in casual "get-to-know-you" conversations are better liked (Reece et al., 2023), whereas people who smile more frequently in negotiations get worse deals (Kopelman, Rosette, & Thompson, 2006). Similarly, adopting a warm and polite tone may boost feelings of connection (Holtgraves et al., 1989), but may also result in less favorable pricing (Jeong et al., 2019). And while slow response times between strangers can be awkward (Templeton et al.,

2023), prolonged gaps in negotiations can provide space for reflection that fosters value creation (Curhan et al., 2022). As these differences highlight, findings from other conversational contexts may not generalize to negotiations and vice versa.

What makes a negotiation successful? Most research investigates the *verbal* components of communication. Making first offers (e.g., Galinsky & Mussweiler, 2001), using precise prices ($1,487 instead of $1,500; e.g., Mason et al. 2013), talking about one's constraints (vs. their flaws; Lee & Ames, 2017), mentioning strong alternatives (Schaerer et al., 2020), and framing issues in terms of losses vs. gains (e.g., De Dreu, Carnevale, Emans, & Van De Vliert, 1994) have all been shown to improve negotiation success. A smaller body of work focuses on *nonverbal* components of communication, such as body movements and facial expressions. Expressing anger (Van Kleef & Côté, 2007), having open and expansive body language (Carney et al., 2010; Hall et al., 2005), and maintaining eye contact (Drolet & Morris, 2000) can result in better negotiation outcomes, typically by conveying assertiveness and dominance. Finally, a handful of studies examine *paraverbal* components of communication, like prosody and intonation. Speaking with a lower pitch increases perceptions of status and authority (Buller & Burgoon, 1986; Ko, Sadler, & Galinsky, 2015; Ohala, 1982), improving negotiation outcomes (Klofstad et al., 2012). Having more variability in vocal pitch and volume can make people seem more persuasive and engaging, also leading to more successful outcomes (Burgoon et al., 1990).

While these verbal, nonverbal, and paraverbal components of communication are certainly important, recent scholarship suggests that a deeper understanding of negotiation could be gained by examining *conversation dynamics* (Boothby, Cooney, & Schweitzer, 2023). The term "conversation dynamics" has found varied usage across academic contexts, typically spanning behaviors such as turn length, silence, and interruptions, but also sometimes

conversation topics and gaze behaviors. In an effort to enhance clarity and precision, we adopt an approach inspired by the seminal work of Heldner and Edlund (2010) and Curhan and Pentland (2007). We propose that conversation dynamics be defined as the structural and temporal patterns that originate solely from the presence or absence of speech between speakers. This operational definition distinguishes conversation dynamics from verbal components, which focus on the content of the speech. Similarly, it differentiates them from nonverbal components that revolve around body language, such as facial expressions and gestures, during periods of speaking and listening. Furthermore, it separates conversation dynamics from paraverbal components that relate to the speaker's voice characteristics, such as pitch and volume. The conversation dynamics of when people are speaking (or not) may provide important insights into how a negotiation's structure, flow, and balance influence its outcomes, irrespective of its content and context.

2.2 Conversation Dynamics

Human conversations tend to be organized by remarkably well-coordinated speech turns (ten Bosch, Oostdijk & Ruiter, 2004) where people minimize the gaps between turns (Stivers, 2009) and adapt their turn lengths to each other over time (Giles, Coupland, & Coupland, 1991). Recently, interest in conversation dynamics has grown among psychologists, fueled by the availability of audio and video recordings, and advancements in analytical tools and natural language processing (Koenecke et al., 2020). This has allowed the exploration of individual differences in conversation dynamics, revealing how simple turn-taking patterns contribute to effective communication (Curhan et al., 2022; Chowdhury et al., 2016; Masumura et al., 2019; Reece et al., 2023; Templeton et al., 2022).

Building on classic and emerging work in the field, we propose that conversation dynamics can be described by seven core dimensions, all derived from the basic succession of speech and silence between people (Figure 1). Moments of speech can be used to measure a negotiator's overall *speaking time* as well as the length of individual *speech turns* (e.g., short utterances vs. long monologues). The timing of speech can be used to measure a negotiator's propensity to speak over their counterpart either to briefly signal attention, understanding, and agreement (i.e., *backchannels;* e.g., "yeah," "uh-huh," "hmm") or to seize the floor (i.e., *interruptions*). Moments of silence can be used to measure the time it takes negotiators to respond to something the counterpart said (i.e., *response time*) and their propensity to use *pauses* within their own turn. Finally, comparing the ratio of speech and silence within a negotiator's speech turn makes it possible to compute *speech rate*.

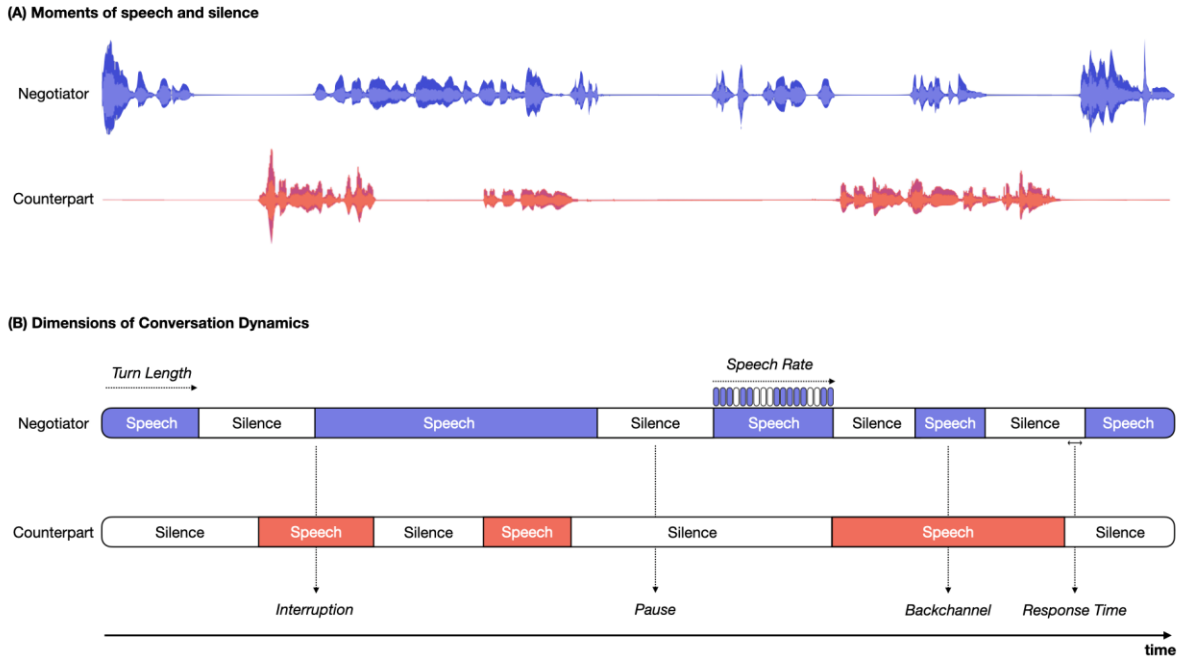

Figure 1. Moments of speech and silence. (A) Moments of speech and silence. *Waveforms represent voice amplitude for the Negotiator (in Blue) and the Counterpart (in Red).* (B) Dimensions of conversation dynamics. *Each colored segment represents moments of speech. White segments represent moments of silence. The horizontal axis represents time. The seven core dimensions of conversation dynamics are annotated on the schematic.*

People do not speak, interrupt, or pause in a vacuum, but rather in response to another person. Communication Accommodation Theory (Giles, Coupland & Coupland, 1991; Giles, Taylor & Bourhis, 1973) describes how people regularly adjust their communication styles in reaction to others. Specifically, people may converge or diverge their speech patterns, accents, gestures, and other behaviors to accommodate or resist the communication styles of their interaction partners. Indeed, work by Myers-Scotton and Bolonyai (2001) shows that individuals often make convergent or divergent linguistic choices intentionally, as rational tactics to influence others. Outside of the negotiation realm, a large body of work shows that when people use more similar gestures (Nowicki et al., 2013), postures (Chartrand & Bargh, 1999; Hatfield et al., 1992), language (Gonzales, Hancock & Pennebaker, 2010), and vocal intensity (Natale, 1975) they tend to report better interactions. Inside the negotiation realm, the balance of rapport-building and assertiveness is critical to negotiation success (Hart & Schweitzer, 2022). By converging on core dimensions of conversation dynamics, negotiators may be able to create a sense of similarity and shared understanding, potentially increasing relational outcomes. By diverging on these core dimensions, negotiators may assert more status or dominance, potentially impacting objective outcomes.

Drawing from the Communication Accommodation Theory and related work on rhythmic synchrony (e.g. Bernieri, 1988; Nowicki et al., 2013), behavioral matching (e.g. Abney et al., 2014; Chartrand & Bargh, 1999) and codeswitching (e.g. Scotton & Ury, 1977), we emphasize the importance of quantifying how individual dyad members influence each other along each core dimension of conversation dynamics, in addition to quantifying behavior for each dyad member individually. Combining individual-level measures with dyad-level measures is needed to gain a fuller understanding of how these conversation dynamics impact negotiation outcomes.

2.3 Seven dimensions of conversation dynamics and negotiation outcomes

People are generally interested in maximizing two types of outcomes when they negotiate: objective outcomes (e.g., more money, faster production, better terms) and relational outcomes (e.g., building trust with the other side, strengthening one's reputation; Carnevale & Pruitt, 1992; Gunia et al., 2011; Pruitt, 1998). Though these two dimensions of success are not orthogonal, they typically imply different negotiation tactics (Hart & Schweitzer, 2022). Maximizing objective outcomes entails balancing value-creation (e.g., asking questions to uncover interests, joint creative problem-solving) and value-claiming behaviors (e.g., firm offers and counter-offers, strategically using silence). Maximizing relational outcomes largely depends on building trust, establishing rapport, and demonstrating empathy (Magee et al., 2007; Ten Velden et al., 2009). In this section, we review the existing and relevant literature for each core dimension of conversation dynamics and reason through how each dimension may relate to objective and relational negotiation outcomes.

2.3.1 Speaking Time

Some negotiators like to talk a lot, by telling stories, sharing information, or simply entertaining their counterpart. Others prefer to talk a little, by opting to be concise and to the point. Greater speaking time (i.e., a person's proportion of voiced utterance relative to the entire conversation) often correlates with dominance (Cheng et al., 2013; Mast, 2002), a trait that predicts better outcomes in negotiation (e.g., Belkin et al., 2013; Curhan & Pentland, 2007; Sinaceur & Tiedens, 2006; Van Kleef, De Dreu & Manstead, 2010). Providing partial evidence for this idea, Curhan and Pentland (2007) found that speaking time during the first five minutes of negotiation positively relates to individual gains in an employment simulation, but only for participants playing the high-status role (i.e., manager vs. employee). Outside of the negotiation

domain, higher speaking time relates to greater team member effectiveness ratings (O'Bryan et al., 2022) and favorable hiring decisions (Frauendorfer et al., 2014).

However, speaking too much may hurt a negotiator's ability to create a strong relationship. For example, research on work teams shows that an imbalance of speaking time among members predicts less group satisfaction (Lai & Murray, 2018). Likewise, research on how businesses can recover after failing to meet customers' expectations suggests that speaking less and instead giving people more time to complain (vs. apologizing right away) enhances service satisfaction (Min, Jung, & Ryu, 2021).

Together, this research suggests that more speaking time may be associated with higher objective outcomes (i.e., how much value negotiators gain) but lower relational outcomes (i.e., how much their counterpart likes them).

2.3.2 Turn Length

Turn length can vary widely between and within speakers (Sacks, Schegloff, & Jefferson, 1974). Two people with the same overall speaking time can have vastly different turn-taking strategies (e.g., speaking with a few lengthy turns vs. many short ones). Prior work shows that extraverts often speak with longer turns compared to introverts (Batrinca, Mana, Lepri, Pianesi, & Sebe, 2011). People also tend to use longer turns when talking with strangers than with friends and family, and when discussing topics that are important to them (Yuan, Liberman, & Cieri, 2006).

To our knowledge, no research has directly examined the consequences of turn length on negotiation success. On the one hand, using long turns might help negotiators frame the conversation, more effectively fostering individual gains (Loschelder, Stuppi, & Trötschel, 2014; Schaerer et al., 2020). On the other hand, excessively long speech turns may hinder the smoothness and balance of information exchanges necessary to reach a successful agreement

(e.g., Loschelder et al., 2016; Trötschel et al., 2011). The link between turn length and relational success is similarly unclear. Dong and colleagues (2012) showed that short turns in group conversations are associated with higher cooperation in a social dilemma task. Similarly, analyses of call-center conversations suggest that customers are more satisfied when agents take shorter turns (Chowdhury et al., 2016). However, research on divorcing couples demonstrates that short turns are also typical of conflict escalation (Donohue, 1991). Due to these mixed findings, the existing literature doesn't provide clear predictions about the direction of the relationship between turn length and objective and relational negotiation outcomes.

2.3.3 Pauses

Speech turns are not formed by continuous, uninterrupted utterances. People pause within their turn to emphasize a certain point, reflect on how to carry on, or simply take a deep breath. Such pauses are frequent across languages and typically last longer than 180 milliseconds (Heldner & Edlund, 2010). Pauses differ from response times (discussed below) in that pauses occur *within* a speaker's turn whereas response times are measured *between* turns. During pauses, speakers are often planning what to say next (Kircher et al., 2004). It is an open question how these pauses are perceived in the context of a negotiation. They may be taken as signs that someone is hesitant and unsure, or could be taken as evidence that someone is thoughtful and reflective.

Research suggests that people who speak with few pauses are often perceived as being more extraverted (Mallory & Miller, 1958), confident (Jiang & Pell, 2017), and competent (Mohammadi & Vinciarelli, 2015) compared to people who pause more often while speaking. Given that extraversion, confidence, and competence are all positively related to negotiators' ability to claim value (e.g., Sharma, Bottom, & Elfenbein, 2013; Sinaceur et al., 2011; Thompson, 1990) it is possible that fewer pauses within turns relates to greater objective gains.

Moreover, studies suggest that convergence of pauses within turns is common over the course of a conversation (Edlund, Hirschberg, & Heldner, 2009) and can signal social connection (Street & Buller, 1988). This research suggests that pause convergence between negotiation partners may be associated with higher relational outcomes.

2.3.4 Speech Rate

Speech rate – how fast people talk – can vary for many reasons. The pronunciation of utterances themselves varies greatly among people (Miller, Aibel, & Green, 1984). For example, older people tend to have a slower speech rate, and men tend to have a slightly faster speech rate than women (Yuan et al., 2006).

Faster speech rates increase perceptions of extraversion (Nass & Lee, 2001), persuasiveness (Smith & Shaffer, 1991), confidence (Guyer et al., 2019; Miller, Maruyama, Beaber, & Valone, 1976), competence (Ray, 1986), enthusiasm, and overall "energy" (MacLachlan, 1982). Many of these perceptions may positively influence negotiation outcomes. For example, research suggests that negotiators who display confidence (Adair & Semnani-Azad, 2011; Guyer et al., 2019) and high energy levels MacLachlan (1982) are more likely to achieve their desired outcomes. People also have a tendency to spontaneously converge their speech rates over the course of a conversation (Cohen Priva, Edelist, & Gleason, 2017) and more convergence predicts greater cooperation (Manson et al., 2013). Moreover, a lab study on the effect of speech rate similarity on compliance showed that listeners were more likely to volunteer their time for a research project when the requester's speech rate was similar to theirs (Buller, LePoire, Aune, & Eloy, 1992). Therefore, we expect both faster speech rate and speech rate convergence to be associated with higher objective gains. However, it is unclear how speech rate might impact relational outcomes, as faster speech rates are associated with

high arousal states for both positive and negative emotions, like happiness and anger (Juslin & Laukka, 2003).

2.3.5 Interruptions

Most dyadic conversations are not perfectly coordinated ballets where speakers patiently wait for the end of their interlocutor's turn to start theirs. Instead, they may be better described as jazz sessions where speech turns frequently overlap (Heldner & Edlund, 2010). Overlapping speech can sometimes be a good sign. It indicates that people are excited to jump into the conversation and are so in sync that they can almost finish each other's sentences (Tannen, 1981). Here, we focus on a specific case of overlapping speech: interruptions. Interruptions occur when someone takes over another person's turn before they have had the opportunity to finish making their point (Hilton, 2018, p.6). Interruptions can disrupt the flow of the negotiation, making it harder to establish rapport. In regular conversations, interrupters are often perceived as higher in status but less liked (Farley, 2008; Goldberg, 1990). Furthermore, interruptions are associated with dominance (Hall et al., 2005), which in turn predicts better outcomes in negotiation (e.g., Belkin et al., 2013; Curhan & Pentland, 2007). Interruptions are also more likely to occur in distributive vs integrative negotiations (Olekalns, Brett, & Weingart, 2003). Taken together, this literature suggests that negotiators who interrupt frequently may exhibit higher objective gains but poorer relational outcomes.

2.3.6 Backchannels

People often produce short utterances used as "continuers" (e.g., *mhm, yes, ok*; ten Bosch, Oostdijk & Ruiter, 2004) to signal attention while another person is speaking. These are called backchannels. Unlike interruptions, backchannels are short and typically last less than one second (Dong et al., 2012). Backchannels are effective ways to demonstrate high-quality listening (Bavelas, Coates, & Johnson, 2000; Kluger & Itzchakov, 2022) which can increase perceptions of partner responsiveness (Itzchakov, Reis, & Weinstein, 2022). In a meta-

analysis, Hall and colleagues (2005) showed that the frequency of backchannels was unrelated to perceptions of dominance. Thus, existing literature provides no basis to associate a negotiator's propensity to use backchannels with objective outcomes. However, because backchannels may signal involvement with the counterpart's message (Weger et al., 2014), one could expect a positive association with relational outcomes.

2.3.7 Response Time

Response time is the duration between the end of a speaker's turn and the first voiced utterance from their partner's reply. The modal response time in conversation is about 200 milliseconds (Heldner & Edlund, 2010; Stivers et al., 2009). Collaborative discussions are characterized by longer response times, whereas competitive conversations and arguments are characterized by shorter response times (Trimboli & Walker, 1984). Speakers engaged in cognitively complex discussions tend to exhibit longer response time, whereas the opposite happens when people feel anxious (Cappella, 1979). Short response times are related to increased social connection (Templeton et al., 2022) and can facilitate coordination, improving rapport in creative problem-solving discussions (Yokozuka et al., 2021).

Research by Curhan and colleagues (2022) finds that negotiators with long response times (3-17 seconds) achieve higher joint gains (i.e., the sum of their individual objective outcomes). These authors suggest that longer response times may facilitate a more deliberative mindset, helping negotiators uncover solutions that make both parties better off. In contrast with this view, research in linguistics shows that in many cultures, longer response times are more likely to be perceived as problematic by listeners (e.g., a sign of disagreement or unwillingness to comply; Roberts et al., 2006; 2011). Moreover, the more confident people are in their answers, the faster they respond (Kimble & Seidel, 1991; Hall et al., 2005), a factor that might help a negotiator claim more value.

Overall, past research does not suggest precise predictions on the relationship between response time and objective negotiation outcomes. Whereas longer response times may facilitate joint problem-solving (which helps increase the size of the pie), shorter response times may signal assertiveness (which helps claim a bigger slice of the pie). However, research suggests that negotiators who respond faster may build stronger social connections and enjoy higher relational outcomes.

2.4 The present research

We set out to explore how the seven core dimensions of conversation dynamics relate to objective and relational outcomes in negotiation. Our work builds upon previous research in five important ways.

First, only four of these dimensions (speaking time, turn length, response time, and backchannels) have been studied in a negotiation context (Curhan & Petland, 2007; Curhan et al., 2022). As mentioned previously, negotiations differ from other types of conversations, making it difficult to extrapolate findings from one domain to another. Here, we consider all seven conversation dynamics within a negotiation context.

Second, when previous research *does* examine conversation dynamics in negotiation, they do so in isolation, measuring only a single variable at a time. However, it is reasonable to expect these measures to impact each other. For example, the more people speak, the more opportunities they have to engage in backchanneling or interruptions (see MacLaren et al., 2020). Likewise, speech rate has been found to relate to speech turns' length in a non-linear way (Yuan et al., 2006). Here, we examine how different dimensions of conversation dynamics relate to *each other* and further investigate which ones *uniquely* predict negotiation outcomes.

Third, most research has focused on central tendency measures of conversation metrics (e.g., average turn length). But, crucial communicative information is likely to lie beyond averages. For example, analyses of conversations during emergency response calls find that *variability* in turn-taking relates to a caller's degree of medical risk (Young, Rochon, & Mihailidis, 2016). As previously discussed, decades of research on Communication Adaptation Theory suggest that a negotiator's *adaptability* to their counterpart may be another important factor in predicting negotiation outcomes (see also Muir et al., 2020). Individuals may also vary in how unpredictable their behaviors are (Ybarra et al., 2010). Thus, the *predictability* of a negotiator's behavior over time may also be related to negotiation outcomes. Here, we characterize each conversation metric in terms of variability, adaptability, and predictability, in addition to their average values across the negotiation.

Fourth, previous studies focus on objective outcomes (e.g., Curhan & Pentland, 2007), measured either in terms of individual or joint gains. However, in negotiation, it is common and advantageous to have a long-standing relationship with a particular counterpart (Schweinsberg, Thau, & Pillutla, 2022). Most negotiators not only aim to leave the negotiation table with their pockets full but also with improved relationships (Tuncel, Mislin, Kesebir & Pinkley, 2016). Here, we consider both objective and relational negotiation outcomes.

Finally, in this project, we analyze negotiations that took place over the video conferencing platform, Zoom. Virtual negotiations have become more common since the COVID-19 pandemic as people increasingly prefer to work from home (Standaert, Muylle, & Basu, 2022). Recent work by O'Bryan et al. (2022) highlights the relevance of conversation dynamics measures such as speaking time and turn-taking to predict team member effectiveness in virtual project-based teams. Our research capitalizes on this growing trend and sheds light on the nuances of conversation dynamics in the context of virtual negotiations.

Virtual conversations differ from face-to-face conversations in several meaningful ways, such as the exclusive reliance on voice and facial expressions, and the potential for increased lags in communication (Boland et al., 2022; Purdy, Nye & Balakrishnan, 2000). Given the prevalence of virtual communication in today's world, understanding how conversation dynamics may shape online deals is essential for effective negotiation practice.

In this work, we examined 38,564 speech turns from 239 online negotiations and derived the most comprehensive set of conversation dynamics measures to date (see Table 1) for each negotiator. We first investigated how these measures related to each other. We then investigated how these measures relate to objective and relational outcomes.

2.5 Method

2.5.1 Transparency and Openness

We describe our sampling plan and all measures in the study. All data, analysis code, and research materials are available at

https://osf.io/as8nu/?view_only=b6dd2e6b5b514bab9d1ea0db3ad167b1 and in the Supplementary Materials. Data were analyzed using R, version 4.1.0 (R Core Team, 2021). We obtained institutional review board (IRB) approval from ESADE Business School (IRB - 004/2020) as part of a larger project titled “Emotions & Negotiation.” This is the first publication from this dataset. This study’s design and its analysis were not preregistered.

2.5.2 Participants

We recorded 239 negotiation simulations from 380 MBAs (118 women and 262 men) across three European business schools. Students negotiated the Pacific Sentinel (N = 185) and the McConsult (N = 54) cases. About 75% of participants engaged in one negotiation (N = 282), and 25% of participants (N = 98) engaged in two negotiations (see Supplementary Materials, Note 1). Participants never negotiated with the same person more than once.

Individual outcomes in these simulations were tied to students' final grades to incentivize performance.

2.5.3 Overview of the procedure

Participants were instructed to negotiate using the video conferencing system "Zoom" set on gallery view (i.e., with both negotiators always visible on screen). The negotiation simulations had no time limit (*M* = 32 min; *S.D.* = 17 min; Range = 7 to 87 min). Participants were asked to stop the recording immediately after the negotiation to prevent non-negotiation-related conversations from being included in the analyses (e.g., post-deal debriefing, practical discussion about uploading the recording). Next, participants jointly completed an online "contract" where they entered the specific terms of their deal. We used this information to compute the *objective outcome* for each negotiator. Finally, participants privately reported their feelings about the negotiation process and their counterparts. We used this information to compute the *relational outcome* for each negotiator.

2.5.4 Data pre-processing

Data was collected using two audio processing methods. The first audio processing method recorded a *single audio file* per negotiation. A total of 121 negotiations from 242 MBA students collected in 2020-2021 were recorded using this method. For these recordings, we first performed automated voice activity detection from the Trint transcription platform (https://trint.com), which uses a mix of automated speech recognition (ASR) and natural language processing (NLP) algorithms to match human utterances to written words that are hyperlinked, time-stamped at the centisecond-level, and displayed in an online text editor. Trained research assistants then manually reviewed each recording to check and correct the transcripts, time stamps, and speaker identifiers. They also annotated moments of interruption (see Supplementary Materials, Note 1 & 2).

The second audio processing method recorded *separate audio files* for each speaker. A total of 118 negotiations from 138 MBA students collected in 2021 were recorded using this method. For these recordings, automated voice activity detection was performed separately for each file using Trint. Following Heldner and Edlund (2010)'s guidelines, we then reconstructed the turn-by-turn structure of dyadic conversations by juxtaposing the communicative states' time series (i.e., a binary variable indicating whether a person is speaking (=1) or not speaking (=0) every 10 milliseconds). This processing method allowed us to build conversation records in a fully automated way with the same level of precision as the manually edited transcripts (e.g., no speaker identification error, no missing overlapping speech segment). In fact, except for estimating the number of interruption events, the two methods yielded remarkably similar conversation dynamics measures (Median *r* across metrics > .91; see Supplementary Materials, Note 3).

2.5.5 Measures of Conversation Dynamics

The formal definition of the seven dimensions of conversation dynamics and their associated measures (median, variability, autocorrelation, and cross-speaker correlation) are presented in Table 1. We drew these operationalizations from previous research on conversation dynamics, phonetics, and linguistics (e.g., Curhan et al., 2022; Dong, Lepri, Kim, Pianesi, & Pentland, 2012; Heldner & Edlund, 2010; Reece et al., 2023; Stivers et al., 2009; Yngve, 1970).

Speaking time is the sum of the turn length for each speaker divided by the sum of the turn length for both speakers. It represents the proportion of time that each speaker spoke, relative to the total amount of speaking time. Because speaking time does not include moments of silences between speakers' turns and/or turn overlaps, these proportions do not always sum to 1 (Curhan & Petland, 2007).

Turn length is the duration of a speaker's uninterrupted speech during a conversation. It refers to the time a speaker holds the conversational floor before yielding it to their counterpart, and it is typically measured in seconds. In line with previous work, turn length measures excluded backchannel turns (see Dong, Lepri, Kim, Pianesi, & Pentland, 2012).

Pauses are periods of silence within a negotiator's speech turn that last at least 180 milliseconds (Heldner & Edlund, 2010). This threshold helps to differentiate pauses from stop closures, which are brief airflow blockages essential for producing specific consonant sounds. Heldner and Megyesi (2003) discovered that 99.2% of stop closures lasted less than 180 ms.

Speech rate is the number of words per minute (wpm). Although alternative methods for measuring speech rate exist, such as syllables or phones per second (see Tilsen & Tiede, 2022 for review), we selected the wpm metric for its simplicity and practicality. The widespread use of wpm in psychological research promotes consistency and comparability across studies (e.g., Guyer, Fabrigar, & Vaughan-Johnston, 2019).

Interruptions are defined as instances in a conversation where the right to make a point within a speech turn is not satisfied (Goldberg, 1990; Murray, 1985). Identifying interruptions can be challenging, as overlapping speech may also represent cooperative engagement (Dong et al., 2012; Hilton, 2018; Lai & Murray, 2018) or coordination problems such as simultaneous turn startups (Clark, 1994; Gervits & Scheutz, 2018) rather than an attempt to take control of the conversation. To address this complexity, we manually coded 120 negotiations (11599 turns) and employed a random forest machine learning approach to predict interruptions (Mayer, 2019). This method allowed us to use all our other turn level measures as predictors (i.e., turn length, turn speech rate, response time, and backchannels) to differentiate interruptions from other types of overlapping speech. We chose this approach over a more traditional cutoff method based solely on the duration of overlapping speech (see, e.g.,

Okamoto, Rashotte, & Smith-Lovin, 2002; Seré, 2023; Zimmerman & West 1975) because it can detect interruptions that do not meet predefined thresholds that are subject to "researchers' degrees of freedom.". Analyses using different rule-based approaches as well as only the subset of manually coded interruptions yield similar results (see Supplementary Materials, Note 5), suggesting that our results are robust to this choice.

Backchannels are operationalized as instances of overlapping speech where a speaker produces an utterance lasting less than 1 second (Dong, Lepri, Kim, Pianesi, & Pentland, 2012). We manually coded a subset of negotiations for backchannels to validate this threshold for our particular dataset. Providing support for the 1-second cutoff used in previous research, we found that over 95% of our human-coded backchannels involved overlapping speech lasting less than 1 second (see Supplementary Materials, Note 6).

*Response tim*e is defined as the amount of time it takes for one speaker to respond after the other has finished speaking. In line with Curhan and colleagues (2022), when computing response time measurements, we set negative response times (which occur when speakers overlap in their speech turns) to a value of 0.

For each core dimension, we elected to focus on the median as a principal measure of central tendency as previous studies demonstrated it is better suited to describe the distribution of speech turn data (e.g., Heldner & Edlund, 2010; Stivers et al., 2009). Results using alternative specifications (e.g. mean) yield similar results (see Supplementary Materials, Note 8). In addition, for conversation measures bounded by zero (e.g., turn length, speech rate, and response time) standard variability measures (e.g. variance or standard deviation) are confounded with the mean (Mestdagh et al., 2018). For this reason, we used the coefficient of variation as a measure of variability.

2.5.6 Negotiation Tasks

We used two different scorable multi-issue negotiation simulations with integrative potential (i.e., opportunities to realize mutual gains through trades across multiple issues). Because these simulations use different success metrics (e.g., money vs. points), we standardized negotiators' objective outcomes across roles and simulations ($M = 0$, $SD = 1$) to make them comparable to each other.

The Pacific Sentinel Negotiation. This two-party simulation features a negotiation between the Executive Editor and the Advertising Manager of a mid-sized newspaper (Valley & Witter, 2004). The two managers need to determine how to spend a one million dollar investment. The Executive Editor is primarily concerned with improving the paper's quality, whereas the Advertising Manager wants to increase advertising revenue. The managers must agree on five issues: two distributive issues (which involve haggling over a fixed amount of value), two integrative issues (which involve making mutually beneficial trade-offs to create value), and one compatible issue (for which both parties have the same preferences). The Executive Editor's potential outcomes range from 90 to 160 quality points. The Advertising Manager's outcomes range from $800,000 to $1,500,000 in revenue. The basic structure of this negotiation simulates typical budgeting negotiations.

The McConsult Negotiation. This two-party simulation was designed for this project and features a negotiation between the recruiter of a top consulting firm and a job candidate who was recently given an offer to join the firm (see Supplementary Materials, Note 4). The recruiter and the candidate must agree on five issues (one distributive and four integrative). The recruiter's potential outcomes range from 0 to 240 points. The candidate's outcomes range from 0 to 260 points. The basic structure of the negotiation simulates typical employment contract negotiations.

Relational Outcomes. Although objective value is indisputably a more concrete indicator of performance in negotiation, subjective value—how people feel about their counterpart—has been shown to matter more than objective value in predicting desire for future relationships (Schweinsberg, Thau, & Pillutla, 2022). Therefore, we measured relational outcomes in the two negotiation simulations by examining how a negotiator's counterpart felt using four items of the Subjective Value Inventory (Curhan, Elfenbein, & Xu, 2006): (1) What kind of "overall" impression did your counterpart make on you? (from 1 - *extremely bad* to 5 - *extremely good*), (2) Did the negotiation make you trust your counterpart? (from 1 - *definitely not* to 5 - *definitely yes*), (3) Did your counterpart consider your wishes, opinions, or needs? (from 1 - *definitely not* to 5 - *definitely yes*), (4) Do you feel your counterpart listened to your concerns? (from 1 - *definitely not* to 5 - *definitely yes*). Our relational outcome score was computed by averaging responses across these four items. The composite average score showed excellent reliability (α = .91).

2.5.7 Analytical Strategy

Examining the interrelationships between measures of conversation dynamics. We first explored how different conversation measures related to one another using a partial correlation network. This network depicts how our set of conversation measures (the "nodes") are connected (through "links"). Following standard practice, we estimated our network using the LASSO (Least Absolute Shrinkage and Selection Operator) regularization technique to maximize the chances of retrieving an accurate structure (Epskamp & Fried, 2018; Foygel & Drton, 2010; Friedman et al., 2008; Meinshausen & Bühlmann, 2006). Relationships that are likely to be spurious are removed from the model resulting in networks that are simpler to interpret. We chose this approach over factor analysis because the different dimensions of conversation dynamics are likely to influence one another causally (e.g., increasing the length

of a person's speech turns should affect their overall speaking time and vice versa) rather than being caused by an unobserved latent entity (see Epskamp & Fried, 2018).

Predicting negotiation outcomes from conversation dynamics. We next investigated which conversation measures uniquely predicted objective and relational negotiation outcomes using multi-level linear models (R package: *lme4* v.1.1.27.1). Because some participants engaged in two negotiations, it is crucial to account for the nested structure of the data to avoid violating the independence assumption and to ensure accurate parameter estimates and standard errors. Multilevel modeling addresses these concerns by estimating both within-group and between-group effects while accounting for dependencies in the data. Our analysis included random intercepts for negotiators, case, role, and dyad. To account for the fact negotiators may adapt to each other's styles, we also analyzed the data controlling for counterparts' conversation measures. Results from these analyses, as well as models that controlled for gender and negotiation length, yielded virtually identical results to the simpler models (see Supplementary Materials, Note 8). For simplicity, we report results from the models without these covariates in the main text.

Our large number of predictors and the high level of interdependence among them can create a risk of collinearity and overfitting (Lai & Murray, 2018). Therefore, we complemented our multi-level linear analyses with a separate set of models based on the LASSO regularization technique to determine the optimal combination of conversation measures in predicting negotiation outcomes. Specifically, we first applied LASSO to perform variable selection by imposing a penalty on regressors, which forces some coefficients to equal 0 (Jacobucci, Brandmaier, & Kievit, 2019; Helwig, 2017; Tibshirani, 1996). This was done through a λ-parameter that weighted the importance of the least-squares fit versus the importance of the LASSO penalty. Here, we selected λ by performing a *k*-fold cross-validation to find the value that minimizes average error. Given that LASSO models' estimates tend to be biased toward 0

(Jacobucci, Brandmaier, & Kievit, 2019) and to facilitate the interpretation and stability of the estimators (Helwig 2017; Tibshirani, 1996), we then regressed the variables retained from the LASSO models in hierarchical regressions (with random intercepts for each negotiator, case, role, and dyads) predicting objective and relational outcomes, respectively.

Table 1. Measures of Conversation Dynamics.

Category	**Definition**	**Measures**	**Mathematical Description**	**Mathematical equation**
Speaking time	Proportion of a negotiator's speaking time relative to the entire negotiation.	Percentage	Ratio between the total amount of time a speaker produces utterances over the total length of the conversation, multiplied by 100.	$pp_{STi} = \frac{\sum_{t=1}^{T_i} TL_i}{NL} * 100$
Turn length	Duration of a negotiator's speech turns.	Median	Midpoint of the distribution of a negotiator's speech turns' length.	if NT_ieven: $Med_{TLi} = \frac{L_{NT_i/2} + (L_{NT_i/2} + 1)}{2}$ if NT_iodd: $Med_{TLi} = L_{(NT_i + 1)/2}$
		Coefficient of Variation	Ratio between the standard deviation of a negotiator's turn length and her average speech turn' length.	$CV_{TLi} = \frac{SD_{TLi}}{M_{TLi}}$
		Adaptability	Spearman correlation between the vector of values for the negotiator's turn length at time *t* and the counterpart's turn length at time *t-1*.	$rc_{xy} = \frac{s_{xy}}{s_x s_y}$
		Predictability	Spearman correlation between the negotiator's turn length at time *t* and her turn length at time *t-1*.	$rc_{xy} = \frac{s_{xy}}{s_x s_y}$
Pauses	Instances of silence within a negotiator's speech turns that last at least 180ms (Heldner & Edlund, 2010), weighted by total speaking time.	Percentage	Total number of pauses divided by the total amount of time a speaker produces utterances, multiplied by 100.	$pp_{Pi} = \frac{\sum_{t=1}^{T_i} TP_i}{\sum_{t=1}^{T_i} TL_i} * 100$

Speech rate	Speed at which a negotiator talks in Words Per Minute (WPM), excluding within turn pauses.	Median	Midpoint of the distribution of speech rates across all speech turns of a negotiator.	if NT_ieven: $Med_{WPMi} = \frac{WPM_{T_i/2} + (WPM_{T_i/2} + 1)}{2}$ if NT_iodd: $Med_{WPMi} = WPM_{(T_i + 1)/2}$
		Coefficient of Variation	Ratio between the standard deviation of a negotiator's speech rate and the average speech rate across her speech turns. .	$CV_{WPMi} = \frac{SD_{WPMi}}{M_{WPMi}}$
		Adaptability	Spearman correlation between the negotiator's speech rate at time *t* and counterpart's speech rate at time *t-1*.	$rc_{xy} = \frac{s_{xy}}{s_x s_y}$
		Predictability	Spearman correlation between the negotiator's speech rate at time *t* and speech rate at time *t-1*.	$rc_{xy} = \frac{s_{xy}}{s_x s_y}$
Interruptions	Instances when a negotiator disrupts the counterpart's turn and takes over the speech turn.	Percentage	Percentage of the counterpart's turn that a negotiator interrupts.	$pp_{Ii} = \frac{\sum_{t=1}^{T_i} I_i}{T_i} * 100$
Backchannels	Instances of sub-one-second utterances during the counterpart's turn.	Percentage	Percentage of the counterpart's turn that negotiator backchannel (utterances <1 sec).	$pp_{Bi} = \frac{\sum_{t=1}^{T_i} n_{(TL \leq 1)_{ti}}}{T_i} * 100$
Response time	Duration of silence between the end of the counterpart's turn and the first voiced utterance from the negotiator.	Median	Midpoint of the distribution of response time of a negotiator.	if $T_i$even: $Med_{GLi} = \frac{RT_{T_i/2} + (RT_{T_i/2} + 1)}{2}$ if $T_i$odd: $Med_{GLi} = RT_{(T_i + 1)/2}$
		Coefficient of Variation	Ratio between the standard deviation of a negotiator's response time and her average response time.	$CV_{RTi} = \frac{SD_{RTi}}{M_{RTi}}$

Adaptability	Spearman correlation between the negotiator's response time at time *t* and the counterpart's response time at time *t-1*.	$rc_{xy} = \frac{s_{xy}}{s_x s_y}$
Predictability	Spearman correlation between the negotiator's response time at time *t* and the counterpart's response time at time *t-1*.	$rc_{xy} = \frac{s_{xy}}{s_x s_y}$

Symbol summary: T: turn. TL: turn length. NL: total negotiation length. NT: total number of turns. TP: number of pauses in a turn. WPM: words per minute. I: an interruption. RT: response time.

2.6 Results

2.7 Examining the interrelationships between measures of conversation dynamics

As depicted in Figure 2, the LASSO estimated partial correlation network shows that many conversation measures are related (see Supplementary Materials, Note 7 for the complete correlation matrix). Negotiators who used long speech turns tended to do this consistently (displaying lower turn length variability, $r_{partial}$ = -.50, p < .001), speaking more overall ($r_{partial}$ = .37 p < .001), and using fewer backchannels ($r_{partial}$ = -.19, p < .001)— suggesting a broader individual difference in the propensity to "talk vs. listen". We also observe, somewhat counter-intuitively, that fast talkers also tend to have more pauses ($r_{partial}$ = .22, p < .001).

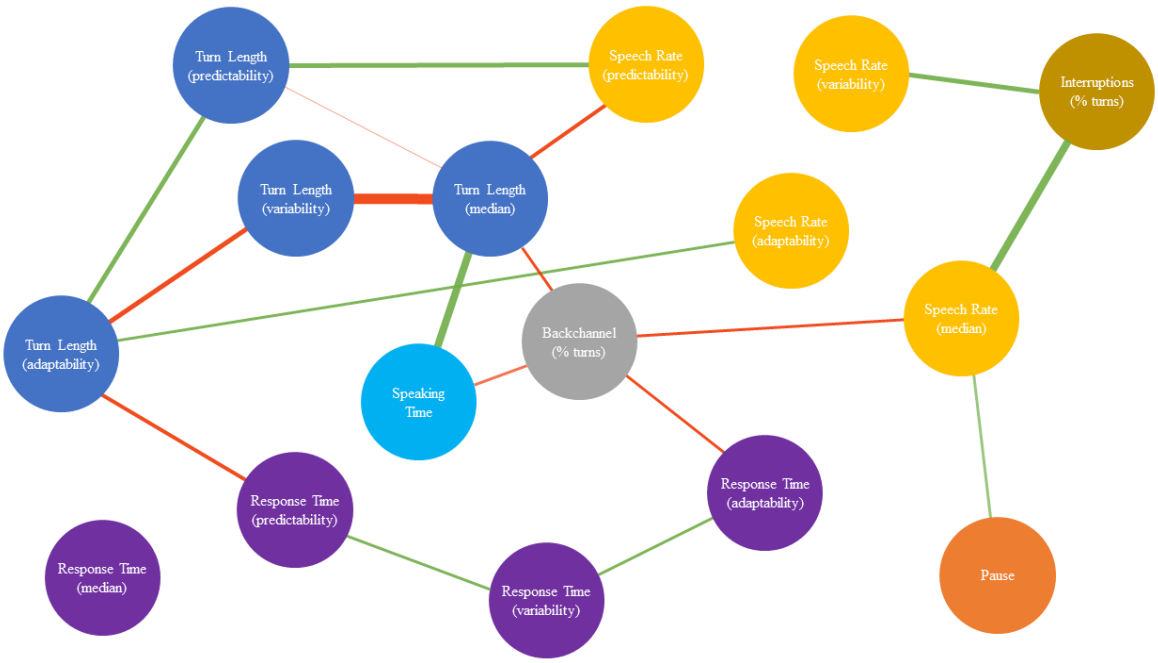

Figure 2. Evaluating the relationship between all conversation dynamics measures. *Regularized partial correlations (*N=*478). All variables are* z*-transformed. Green lines represent positive relations, and red lines indicate negative relations. Edge thickness and transparency correspond with the degree of association. Nodes with the same color pertaining to the same underlying dimension.

In many cases, measures of adaptability and predictability are also intertwined. For instance, negotiators who adapt the duration of their turns to those of their counterparts also tend to adapt their speech rate ($r_{partial}$ = .14, p < .01) and display more predictable turn duration

($r_{partial}$ = .24, p < .001). And more predictable turn duration relates to predictable speech rate ($r_{partial}$ = .19, p < .001). This suggests that mimicking the counterpart's speech patterns may affect the rhythm and consistency of conversations across several dimensions.

Finally, response time is relatively isolated in this network, suggesting that propensities to respond quickly may be independent from the tendency to dominate conversations (speaking time) or signal interest by using backchannels.

2.8 Predicting negotiation outcomes from conversation dynamics

Main Results. As shown in Table 2, conversation measures explained 9% of the variance in objective negotiation outcomes. Three significant predictors emerged from mixed-effects linear regression analyses. Negotiators with more speaking time (p=.013), faster speech rates (p=.01), and fewer pauses (p=.004) tended to obtain more favorable deals. Results were similar using the LASSO approach. The optimal solution was observed with a λ value of 0.04. This penalty regularized the paths of 7 of the 16 variables to zero, yielding the most parsimonious model representation. Of the remaining 9 variables, only speaking time, pauses, and median speech rate significantly predicted objective outcomes.

As shown in Table 3, conversation measures explained 8% of the variance in relational negotiation outcomes. Mixed-effect linear regressions revealed that the predictability of negotiators' turn length (p=.03) and the propensity to interrupt the counterpart (p=.009) were negatively related to relational outcomes. The LASSO approach corroborated these results. The optimal solution was observed with λ = 0.02, a penalty that regularized the paths of 7 of the 16 variables to zero. Of the remaining nine variables, only the predictability of turn length, and the frequency of interruptions emerged as significant predictors of relational outcomes.

Robustness Checks. Results from the models above were robust to the inclusion of negotiation length, participant gender, and the role they played in the negotiations (e.g., candidate vs. recruiter) as control variables. Results were also virtually identical when controlling for the counterpart's conversation dynamics metrics and when Winsorizing outliers. In total, we performed 11 models, including the two described in the present manuscript and 9 additional models reported in the Supplementary Materials, Note 8. The results from these models are virtually identical to the ones we report here.

Next, we performed additional analyses to ensure that our results could not be explained by some participants participating in two different negotiations. Following a standard approach in economics (Wooldridge, 2010), we regressed the metrics with clustered standard errors at the individual level. We also ran versions of the models where we only kept the first negotiation participants' engaged in (removing the nested data structure altogether). These additional models are described in more detail in Supplementary Materials (Tables S10 and S11) and show virtually identical results to the multilevel models we report in the main manuscript.

We also tested whether our results significantly differed between (i) negotiation tasks and (ii) audio processing methods. To do this, we included these two factors as interaction terms in our regression analyses. Results from these analyses are presented in Supplementary Materials (Table S12a/b). The main results remain robust when accounting for these differences. None of the significant conversation dynamics predictors of negotiation outcomes reported above significantly differ between audio processing methods (all ps > .12). With the exception of speaking time, which is more strongly related to objective outcomes in the Pacific Sentinel case than in the McConsult case (interaction term: b = .23, p = .02), none of the predictors differed by negotiation case (all other ps > .37).

Finally, in an effort to hold the context as constant as possible, we present results focusing only on our largest subsample (the Pacific Sentinel negotiation with single audio processing; N = 121) in the Supplementary Materials (Note 10). Except for Speech Rate (median), these analyses show that the effect sizes align closely with our main analyses for both objective and subjective outcomes.

Table 2. Conversation dynamics measures and objective outcomes.

	Correlation	Hierarchical Regression	
	r	β (all variables)	β LASSO selected variables
Speaking Time	.16***	.13*	.13**
Turn Length (median)	.08+	.09	.07
Turn Length (variability)	.00	.04	
Turn Length (adaptability)	-.06	-.08+	-.08+
Turn Length (predictability)	.05	.07	.07
Pauses	-.12*	-.14**	-.13**
Speech Rate (median)	.09*	.13**	.11*
Speech Rate (variability)	-.02	-.02	
Speech Rate (adaptability)	.02	.04	
Speech Rate (predictability)	.10*	.09+	.09+
Interruptions (% turns)	.06	-.02	
Backchannel (% turns)	-.10*	-.02	-.01
Response Time (median)	.02	.04	
Response Time (variability)	-.04	.04	
Response Time (adaptability)	-.02	-.04	
Response Time (predictability)	.09+	.04	.04
Observations (*N*)	478	478	478
Marginal R^2		.09	.08

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1.

Table 3. Conversation dynamics measures and relational outcomes.

	Correlation	Hierarchical Regression	
	r	β (all variables)	β LASSO selected variables
Speaking Time	.00	.01	
Turn Length (median)	.00	-.02	
Turn Length (variability)	-.06	-.04	-.04
Turn Length (adaptability)	.02	.03	
Turn Length (predictability)	-.12*	-.09*	-.08*
Pauses	.03	-.01	
Speech Rate (median)	-.03	.02	
Speech Rate (variability)	.01	.03	
Speech Rate (adaptability)	-.02	-.01	
Speech Rate (predictability)	-.08	-.03	-.03
Interruptions (% turns)	-.14**	-.11**	-.10*
Backchannel (% turns)	.09+	.07+	.07+
Response Time (median)	-.05	-.02	-.02
Response Time (variability)	.05	.05	.05
Response Time (adaptability)	-.07	-.00	-.00
Response Time (predictability)	-.10*	-.05	-.07+
Observations	424	424	424
Marginal R^2		.09	.08

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1.

2.9 Discussion

In any given week, most of us are involved in conversations that require negotiation—and yet our scientific understanding of how people can navigate these conversations more effectively is still in its infancy. Building on pioneer work by Curhan and colleagues (Curhan et al., 2022; Curhan & Pentland, 2007), we report the most comprehensive investigation of conversation dynamics and turn-taking behaviors in negotiation to date. We recorded a corpus of over 38,564 conversation turns from 239 online negotiations and derived 16 conversation metrics for each speaker.

By examining the interrelationships between a large set of measures, our work highlights for the first time the high level of dependency between the different conversation measures. Some associations are intuitive. For example, we find a strong relationship between turn length and overall speaking time. Other associations are unexpected and open the door to new research questions. For example, we find a positive relationship between the average number of pauses people make and how fast they talk. Do fast talkers tend to use more "dramatic pauses"? Or might they need to catch their breath more often? More broadly, there is currently an explosion of research on individual dimensions of conversation and turn-taking behaviors (e.g., *response time*: Templeton et al., 2022; Corps, Knudsen, & Meyer, 2022, *interruptions*: Lestary, Krismanti, & Hermaniar, 2018; Miller & Sutherland, 2022; *pauses*: Liu et al., 2022). Our findings stress the importance of examining *multiple* dimensions of conversation dynamics simultaneously. For instance, in our study, the significant correlation between backchannels and objective outcomes completely disappears once other dimensions of conversation dynamics are included in the model.

Even when considering the interplay of various conversation dynamics, several behaviors uniquely predict objective and relational negotiation outcomes. At the objective

level, negotiators who speak more, faster, and with fewer pauses get better deals. At the relational level, negotiators who interrupt less often and exhibit more variable turn lengths get better evaluations from their counterparts.

Our results dovetail with a large body of research showing that effective communication goes beyond verbal cues (see Thompson et al., 2017 for review) and suggests that conversation dynamics offer important insight to successful negotiation. In line with recent research on turn-taking behaviors and virtual team effectiveness (O'Bryan et al., 2022), speaking time was the strongest predictor of objective outcome, suggesting that asserting oneself in negotiation might be beneficial. To provide an intuitive figure for the size of this effect, an increase of one standard deviation in speaking time (e.g., talking 60% vs. 50% of the time in the negotiation) is associated with a .13 standard deviation increase in objective personal outcomes. This effect may occur because people who talk more convey dominance (Bottger, 1984; Mast, 2002; Sinaceur & Tiedens, 2006) or because they are in a better position to control the way negotiation issues are framed, linked, and ordered (Druckman & Wagner, 2021). By the same token, two other predictors – faster speech rate and fewer pauses – may signal more confidence (Kimble & Seidel, 1991), which in turn improves one's position in the negotiation. For relational outcomes, the strongest (negative) predictor was negotiators' propensity to interrupt their counterpart. This result is consistent with previous research showing that people who are frequently interrupted by their conversation partners report experiencing a loss of status (Farley, 2008). To provide an intuitive figure for the size of this effect, an increase of one standard deviation in the number of turns negotiators interrupt (e.g., interrupting the counterpart on 15% vs. 10% of turns) is associated with a .11 standard deviation decrease in relational outcomes. People also seem to dislike individuals with recurrent turn length. In smooth conversations, individuals tend to adapt to each other's behavior (Abney et al., 2014; Chartrand & Bargh, 1999; Chartrand & Lakin, 2013; Gonzales,

Hancock & Pennebaker, 2010; Nowicki et al., 2013). Monotonous conversation patterns may be perceived as a sign of low engagement, hurting the relationship with the counterpart.

In our study, conversation measures explained 9% and 8% of the variance in objective and relational outcomes, respectively. These effect sizes are non-trivial, especially when compared to other negotiation findings. For example, Stuhlmacher and Walters (1999) found that gender explains a bit less than 1% of the variance in objective individual outcomes, which has been argued to be not only statistically significant but also a relevant component of gender wage inequity. Similarly, Sharma et al. (2013) reported that general cognitive ability and emotional intelligence explain 0.5% and 2% of variance, respectively. In terms of negotiation strategies, expressing negative (vs. positive) emotions in negotiations accounts for 2% of variance (Sharma et al., 2020), and having a goal (vs. not) when walking into a negotiation accounts for 8% (Zetik & Stuhlmacher, 2002). The most famous and robust effect, the magnitude of the first offer in distributive negotiation, accounts for 25% (Orr & Guthrie, 2005), though this comparison may be unfair given that our study focuses on more complex integrative tasks. In light of these benchmarks, the magnitude of the relationship between conversation dynamics and negotiation outcomes reported here seems to be both statistically and practically meaningful.

Our results also suggest that objective and relational outcomes are not orthogonal indicators of negotiation success. For example, being more talkative may benefit negotiators' ability to obtain value without compromising the relationship. These results align with recent findings by Hirschi, Wilson, and Gilbert (2022) showing that contrary to people's intuition, speaking more is not detrimental to liking in conversation. Conversely, interrupting one's counterpart seems to hurt the relational outcomes but does not improve negotiators' objective outcomes. These findings suggest that conversational turn-taking strategies that may help

negotiators claim more value do not necessarily come at the expense of the quality of the relationship. This contrasts with previous research showing that many verbal strategies like expressing anger (Côté et al., 2013; Van Kleef & Côté, 2007) or using tough language (Jeong, Minson, Yeomans, & Gino, 2019; O'Hara, 2015) may have a beneficial effect on objective outcomes but hurt relational outcomes.

Because our data is observational, we cannot rule out that confounding factors (e.g., negotiators who talk more may also be better prepared) and reverse-causal mechanisms (e.g., getting great deal terms may lead negotiators to feel at ease and talk more) may have driven the associations we observed. Future research should manipulate aspects of conversation highlighted in this research to examine which – if any – have a causal impact on negotiation outcomes. Beyond causality, our findings also raise the question of awareness and control. For instance, previous verbal-level research has shown that individuals often employ intentional linguistic choices to influence others (Gumperz, 1982; Myers-Scotton & Bolonyai, 2001; Wei, 2005). The degree to which people strategically align (or misalign) their messages with their counterparts has been found to predict cooperative behavior in social dilemmas (Adams, Ludwiczak, Sharma, & Osman, 2022). Given this, it is pertinent to question whether individuals are conscious of the length or speed of their speech. And could they strategically modify these behaviors to enhance their negotiation outcomes? Further research is needed to explore these intriguing possibilities.

The conversation measures detailed in our work likely interact with the content of these conversations, the context in which they're happening, and the characteristics of the actors involved. To take one example, our findings indicate a negative correlation between interruptions and relational outcomes. The *content* of these interruptions could play a pivotal role in how they are received. Negotiators who tend to make respectful, constructive

interruptions, framed as attempts to clarify or enhance the discussion, may not experience the same backlash as those who interrupt in an abrasive or dismissive manner (Li et al., 2004). Likewise, interrupting minor points may not have the same impact as interrupting key arguments. Interruptions are also situated within the *context* of the negotiation itself. For instance, interruptions in a high-stress interpersonal conflict might amplify tensions, whereas in a collaborative, win-win-oriented conversation they might be perceived more positively. Evidence from our study underscores this point, as speaking time correlated more strongly with objective outcomes in the Pacific Sentinel case than in the McConsult case, suggesting that context indeed influences conversation dynamics. Finally, *characteristics of the actors* (individuals and dyads) could also play a fundamental role. For example, individuals with high agreeableness might be more open to interruptions than their less agreeable counterparts. Cultural backgrounds, which dictate norms and expectations around conversation etiquette, may also moderate the link between conversation dynamics and outcomes. At the dyadic level, longstanding friends may show more tolerance towards interruption and other contentious behaviors than those talking for the first time. Given the complexity of conversation dynamics in negotiation underscored by these potential moderating factors, future research should "zoom back in" to examine how these conversation measures relate to the specifics of what people say, when they say it, and with whom they are conversing.

Finally, our results may be specific to the online context. Conversation dynamics in virtual negotiations may be meaningfully different from face-to-face conversations. For instance, research indicates that transmission delays over platforms like Zoom disrupt conversation rhythms, leading to longer response times (Boland et al., 2022). Additionally, people have access to different information channels depending on the mode of communication. While video conferencing typically focuses on voice and facial expressions, face-to-face conversations allow for communication using one's entire body and direct eye

contact. These differences have been shown to impact negotiation strategies and even outcomes. For example, people in face-to-face negotiations tend to collaborate more than those using less rich media (Purdy, Nye & Balakrishnan, 2000). Face-to-face help requests have also been shown to be more effective than those made over videoconference (Roghanizad & Bohns, 2022). It is possible that some relationships we report here may be magnified in a videoconference context. For example, speech rate may become more crucial in delivering persuasive arguments when counterparts lack access to other communication cues like gestures. Other relationships may be dampened in virtual settings. For example, the weak association between backchannels and relational outcomes that we observed in our data may be due to small lags introduced by video conferencing. These delays may reduce the effectiveness of backchannel responses like "yeah", "ok", "uh huh", and "mhmm" compared to perfectly timed ones. Future work should investigate how the relationships we observed between these conversation measures as well as their impact on negotiation outcomes compare to face-to-face negotiations.

Video calls have become an essential part of daily life. From an applied perspective, the 16 measures of conversation dynamics we describe here can be derived from the physical property of an audio signal—with almost instantaneous calculations. Our approach could be used to provide people with live conversation analytics and recommendations. This type of feedback may allow negotiators to make adjustments to deliver more productive and satisfying conversations in real-time.

Negotiations—like any conversation—involve thousands of repeated decisions about how and when to speak, listen, and produce timely responses. These processes are so finely coordinated in human communication that negotiators rarely stop to think about the impact of conversation dynamics on their prospect of success. In line with recent research showing that

communication style is an important element in negotiation (Jeong et al., 2019; Minson, VanEpps, Yip, & Schweitzer; 2018), our study suggests that the way negotiators talk, pause, and coordinate their speech turns can make or break a deal.

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2.11 Supplementary Materials

Note 1: Negotiation Cases and Audio Processing Methods

We collected data from two negotiation cases as part of MBA courses in several European Business Schools: The Pacific Sentinel case (N = 185) and the McConsult case (N = 54). In addition, some data was collected using a single audio file processing method (N = 121) and other data was collected using a separate audio files processing method (N = 118). The distribution of participants across negotiation cases and audio processing methods is shown in Table S1.

Table S1: Distribution of participants across negotiation cases and audio processing methods.

Audio processing	Negotiation Case	
	Pacific Sentinel	McConsult
Single audio	N = 121	N = 0
Separate audio	N = 64	N = 54

Only a small percentage of participants negotiated both cases. If they did so, their counterpart was systematically different for the second case. So, if Alice and Ben negotiated Pacific Sentinel together, then Alice and Ben would not be paired again for McConsult. Note that the same case was never negotiated more than once by any of the participants (see Table S2).

Table S2: Distribution of participants who engaged in one or two negotiations.

Audio processing	Negotiation Case		
	Pacific Sentinel Only	McConsult Only	Participated in both cases
Single audio	225 (59%)	0 (0%)	17* (5%)
Separate audio	47 (12%)	10 (3%)	81 (21%)

*All single audio files are from the Pacific case; the McConsult case used separate audio.

Note 2: Methods for data processing

Speech turns. The primary unit of analysis is "speech turn" which we define in the following ways. A turn is a succession of words a speaker said before their partner began talking. In a dyadic conversation, speakers alternate speech turns. Speech turns may contain pauses (silences between utterances ≥ 180ms). In between speakers' turn may have no silence (end time of turn ≥ start time of following turn) or some silence (end time of turn < start time of following turn).

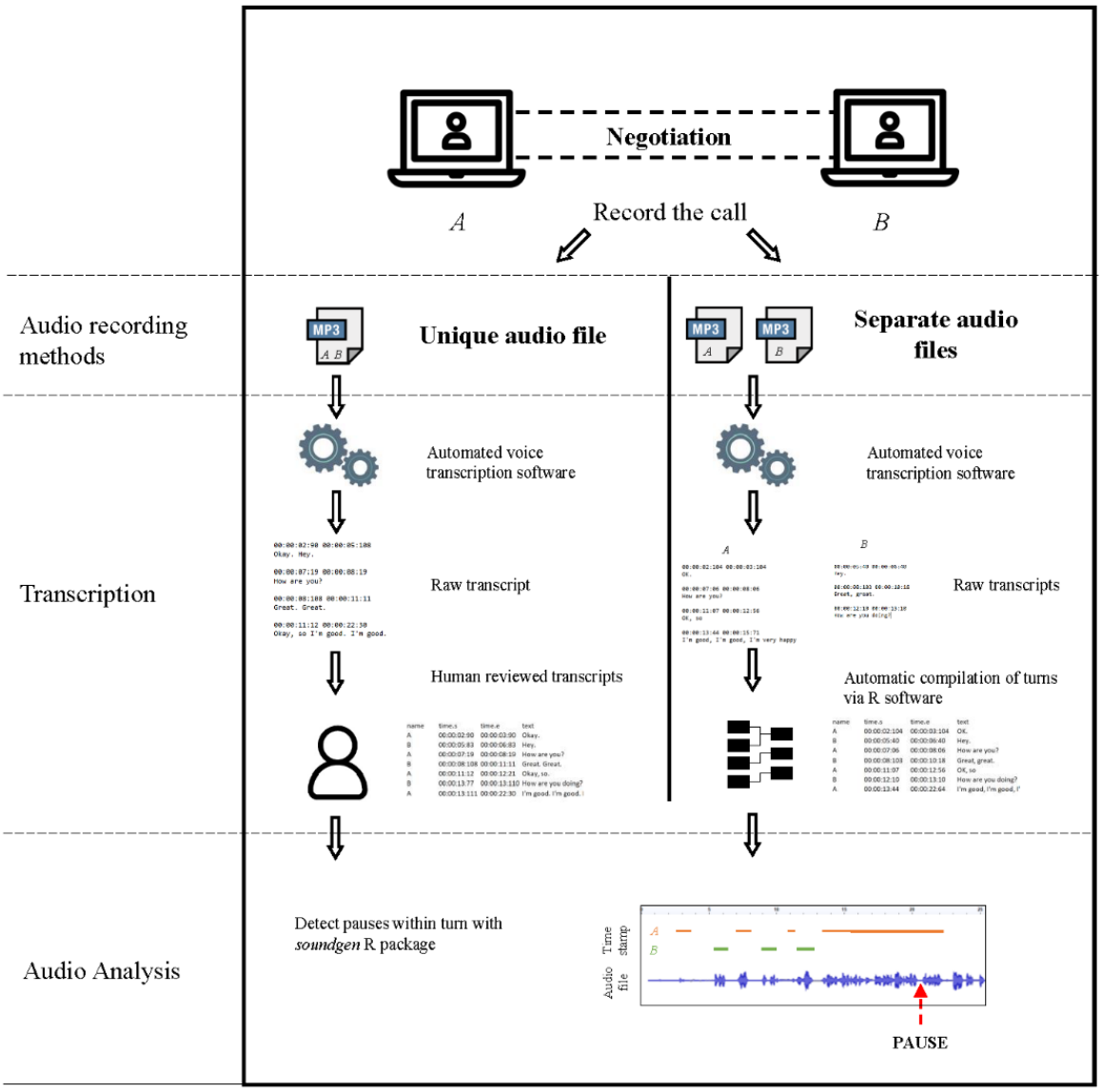
Our data includes 121 negotiation audio recordings featuring a *single audio file* for both speakers. We transcribed these negotiations using a hybrid method of automated speech recognition software and trained humans (Yeomans et al., 2021). First, the software created a draft time-stamped transcription. Then, coders went over each transcript while listening to the recording and manually checked, corrected, and annotated (e.g., tagging interruption) each speech turn. Our data also includes 118 negotiation audio recordings featuring *separate audio files* for each speaker (using Zoom's option to record participants' audio streams as separate files). We transcribed these negotiations using automated speech recognition and then reconstructed the turn-by-turn structure of the dyadic conversation using R, concatenating text until change of speaker (Figure S1). Our custom R function to reconstruct turn-by-turn conversations from individual transcripts is available at

https://osf.io/as8nu/?view_only=b6dd2e6b5b514bab9d1ea0db3ad167b1.

Pauses. To identify speakers' propensity to pause, we performed an acoustic analysis for each speech turn (excluding backchannels) using the function `analyze` from R's *soundgen* package (v.2.3.0). Specifically, we broke down each speech turn into a series of successive 25ms sound segments and analyzed their spectrum using Fast Fourier Transform (Anikin, 2019). Following, seminal guidelines by Hedlund and Eñdner (2010), we counted a

within-turn pause every time no voice activity was detected over a series of segments lasting longer than 180ms.

Figure S1. *Summary of data processing*.



Data Structure. As illustrated in the table below our transcripts included for each turn: (i) a progress variable (Progress), (ii) the speaker identifier (Id), (iii) a start timestamp, (iv) an end timestamp, (v) within turn pauses, and (vi) word count.

Table S3: Structure of the transcript datafile

Progress	Id	Time Start[1]	Time End[1]	Number Pauses	Word Count
1	55	00:00:03:48	00:00:04:48	NA[2]	1
2	32	00:00:04:61	00:00:05:61	NA	2
3	55	00:00:05:114	00:00:09:89	0	8
4	32	00:00:10:07	00:00:12:99	1	4
5	55	00:00:14:52	00:00:15:91	0	3
6	32	00:00:16:95	00:00:20:77	1	7
7	55	00:00:21:29	00:00:25:17	1	9
8	32	00:00:25:106	00:00:42:85	4	34
9	55	00:00:44:73	00:00:48:28	0	7
10	32	00:00:49:62	00:00:50:62	NA	1
11	55	00:00:52:13	00:00:56:65	1	6

[1] The unit of measure is hh:mm:ss:fps. fps: 120 frames per second.

[2] 1 ≤ second turns were considered backchannels. For this reason pauses within turn do not apply.

Note 3: Comparing measures derived from single vs. separate audio files

We examined 8 negotiations for which we had both (A) a single audio file featuring the voices of the two negotiators and (B) separate audio files for each speaker. We then derived our conversation metrics for A and B using the two methods outlined in Note 1 and 2 (human reviewed transcripts and fully automated conversation reconstruction, respectively). As shown in the table below, the correlation between the two methods was very high for almost all variables. Note that these analyses do not include backchannels and interruptions, as these variables require decisions on thresholds that we address separately in details in Notes 5 & 6.

Table S4: Pearson correlations between measures derived from the two audio processing methods.

Variable	***r***
Speaking Time	1
Turn Length (median)	.98
Turn Length (variance)	1
Turn Length (adaptability)	.97
Turn Length (predictability)	.85
Speech Rate (median)	.97
Speech Rate (variance)	.68
Speech Rate (adaptability)	.87
Speech Rate (predictability)	.93
Response Time (median)	.86
Response Time (variance)	.69

Response Time (adaptability)	.48
Response Time (predictability)	.88
Pauses	.98
Mean	.87
Median	.91

Note: decimals were increased by 1 if next digit ≥ 5.

Note 4: Mc Consult Case Payoffs

	Candidate	Recruiter
GAINS (points)	Points Earned - BATNA (260)	BATNA (500) - Points Spent
Salary	No way you can get by with less than 50,000 euros a year, regardless of how attractive other elements of the offer are to you. Every 1000 euros beyond your 50K limit would bring you 2 points of happiness.	The largest starting offer you ever made was 150,000 euros a year. There is no way you would ever go beyond that. Obviously, the lower you can keep the salary costs, the better. You estimate that every 1000 euros per year cost you 2 points.
Sign-up Bonus	Every 1000 euros of sign-up bonus would bring you 1.2 points	You are authorized to offer as high as 50,000 euros in immediate cash to help seal the deal with top candidates. You estimate that every 1000 euros of sign-up bonus cost you 2 points.
Location	• The Next Town B Office (90 min commute) is worth 0 point • The Next Town A Office (70 min commute) is worth 30 points • The Borough B Office (50 min commute) is worth 60 points • The Borough A Office (30 min commute) is worth 90 points • The Downtown Office (10 min commute) is worth 120 points	• The Next Town B Office (90 min commute) would cost McConsult 0 points • The Next Town A Office (70 min commute) would cost McConsult 45 points • The Borough B Office (50 min commute) would cost McConsult 90 points • The Borough A Office (30 min commute) would cost McConsult 135 points • The Downtown Office (10 min commute) would cost McConsult 180 points
Assignment	• Level-1 assignments are worth 0 point • Level-2 assignments are worth 45 points • Level-3 assignments are worth 90 points • Level-4 assignments are worth 135 points • Level-5 assignments are worth 180 points	• Level-1 assignments would cost 0 points • Level-2 assignments would cost 30 points • Level-3 assignments would cost 60 points • Level-4 assignments would cost 90 points • Level-5 assignments would cost 120 points
Division	• Division A is worth 0 point • Division B is worth 25 points • Division C is worth 50 points • Division D is worth 75 points • Division E is worth 100 points	• Division A would cost McConsult 0 point • Division B would cost McConsult 15 points • Division C would cost McConsult 30 points • Division D would cost McConsult 45 points • Division E would cost McConsult 60 points

Note 5: Operationalization of Interruptions

In conversation research, interruptions are often operationalized in qualitative ways (Covelli & Murray, 1980; Farley, 2008; Goldberg, 1990; Li et al., 2004; Murray, 1985). This might be partly because, as Murray (1985) pointed out, overlapping speech is not a sufficient condition to determine interruptions. Overlaps can be cooperative and reflect attempts to show engagement (Dong et al., 2012; Hilton, 2018; Lai & Murray, 2018). They can also result from fast turn transitions (Heldner & Edlund, 2010) or coordination problems such as simultaneous turn startups (Clark, 1994; Gervits & Scheutz, 2018). While these overlaps tend to be shorter than "interruption" overlaps—where a person tries to take over the conversation floor (Covelli & Murray, 1980; Murray, 1985)—there are no clear guidelines in the literature for what should be the minimum length of an interruption or when it should occur in a turn, for example.

To solve these issues, we took a data-driven approach and examined the set of 120 negotiations that had been manually coded by our research assistants. Out these, 76 negotiation recordings were flagged with at least one instance of interruptions. We defined interruptions as conversational instances where the right to make a point in a speech turn was not satisfied (Goldberg, 1990; Murray, 1985). We used this data to train a machine learning model predicting whether instances of overlapping speech in the remaining non-human coded recordings should be considered as interruptions. Specifically, we ran a non-parametric multivariate imputation by the chained random forest (Mayer, 2019) that used all turn level measures as predictors (i.e., turn length, turn speech rate, response time, backchannels). These variables have already been related to interruptions in previous research (Farley, 2008; Heldner & Edlund, 2010; Li et al., 2004; Murray, 1985). In addition to turn level measures, we added the interruptee's previous turn metrics as a predictor. As Murray (1985) pointed out, interruptions also depend on what happened on the interruptee's previous. Results from this model replicate the structure of the coded dataset. Namely each turn was assigned with a

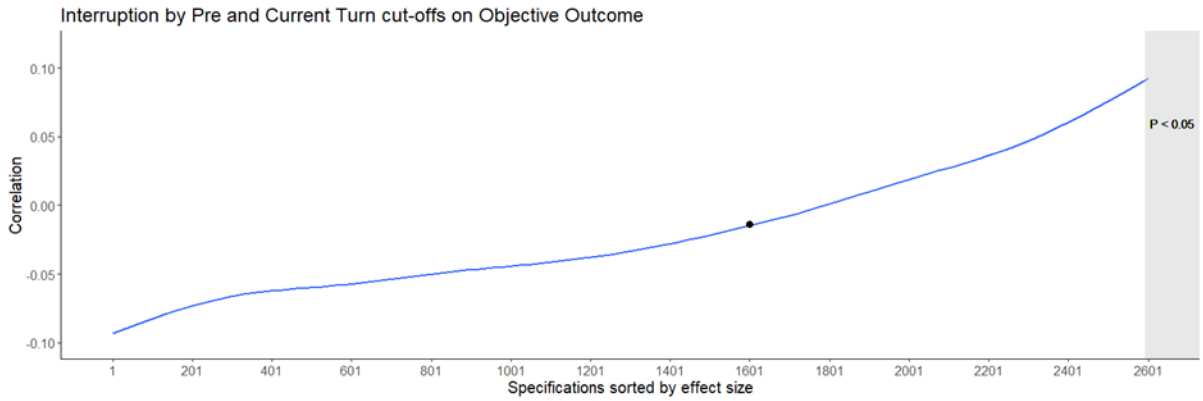
dichotomous variable: 1 (interruption turn) and 0 otherwise. We note that the negative relationship between interruptions and relational outcomes we report remains significant when focusing only on the subset of manually coded interruptions (r = -.18, p = .03).

While we favor the more comprehensive machine-learning approach, an alternative is to determine interruption instances based on predetermined rules and cut-offs. For example, to determine if Alice interrupts Ben, Alice needs to talk over Ben for more than 1 second (overlapping speech > 1 sec) to avoid mistakenly interpreting Alice's backchannels as an interruption; ref). Likewise, Ben needs to have been talking, not backchallenging (interrupted turn > 1 sec). In addition, brief interactions may more likely signal engagement (Dong et al., 2012; Lai & Murray, 2018) or coordination problems (Clark, 1994) than the intention to take over the conversation floor. In contrast, if Alice talks over Ben for a relatively long time and then continues talking for a while once Ben has stopped, it is likely to represent an instance of interruption (Covelli & Murray, 1980). Therefore, as Murray (1985) pointed out, interruptions depend on both on what happens during the interrupter's turn and the interruptes's previous turns; mere overlapping is not a sufficient condition.

Because of lack previous literature does not provide consistent thresholds for what constitute sufficiently long turns (both for the interrupter and the interruptee), we considered the following cutoffs: Interuptee's previous turn >1s and interupter's takeover turn >6s. These values represent the most parsimonious approach in our data with over 90% of manually coded interruptions taking place when the interruptee's previous turn was > 1s and over 54% when the interrupter's turn takeover turn was > 6s). Results using this rule-based approach are very similar to the ones we report in the main text (machine learning approach): Rule-based interruptions are negatively and significantly related to relational outcomes (b = -.10, p = .03).

We recognized that other researchers might have made different decisions regarding the ideal thresholds for this rule-based approach. Therefore, we report a specification curve (see Simonsohn, Simmons & Nelson, 2020) examining the relationship between interruptions and negotiation outcomes (correlation coefficient) for every sensible combination of thresholds for both interruptee's previous turn and interrupter's current takeover turn from 1 to 11 seconds in 0.2 seconds increments (80% interruption turns lasted maximum 11 seconds).

a.



b.

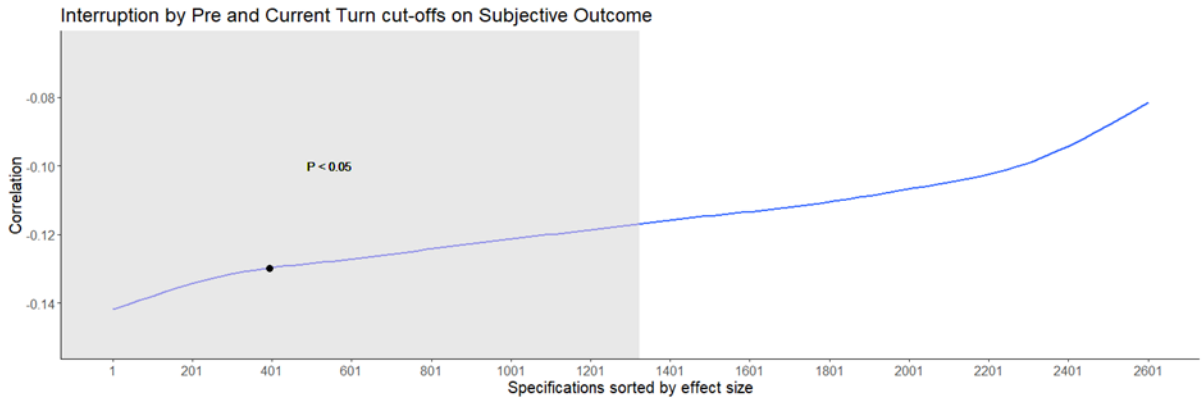
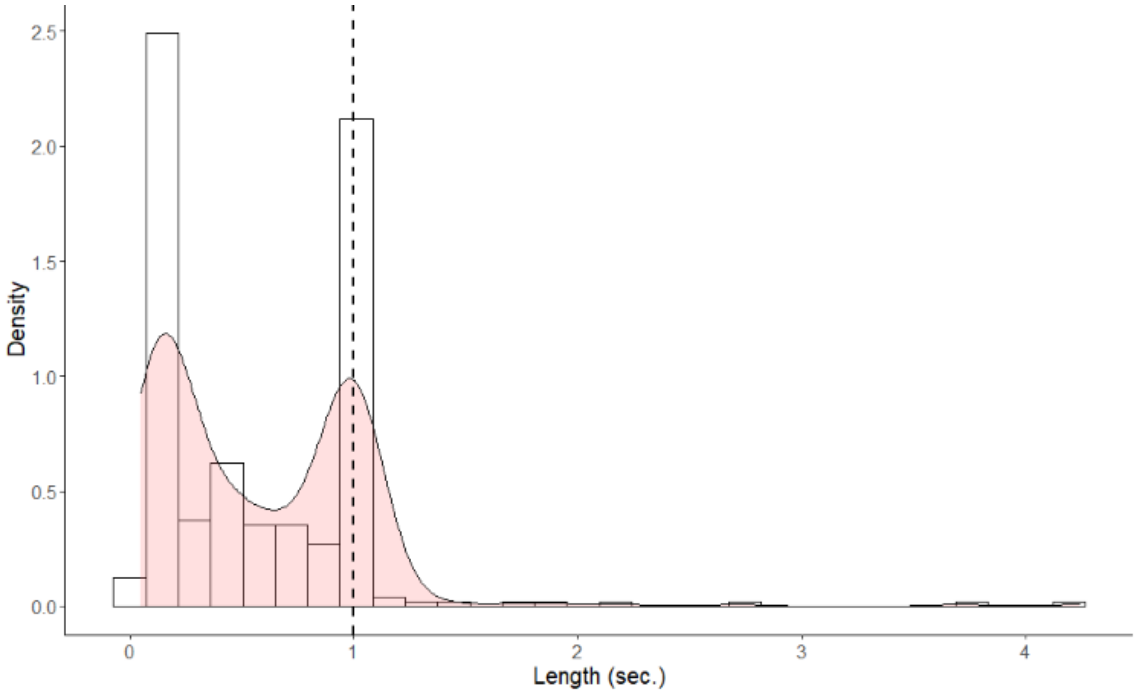


Figure S2a&b. Specification curves for Interruptions and Outcomes. There are 1601 combinations of specifications for non-coded negotiations. Each combination represents the thresholds to detect instances of interruptions. The effect size represents how the frequency of interruption with the specific thresholds relate to objective (a) and relational (b) outcomes. The gray square indicates specifications for which interruptions significantly relate to negotiation outcomes ($p < 0.05$). The black dot represents the specification we mention in the the main text of this document.

Note 6: Operationalization of Backchannels

Backchannels are typically defined as the intermittent vocal noises (e.g., uh-huh, oh, right, okay) made by the listener while in conversation with another person (Peters & Wong, 2015). Backchannels are short events and a 1-second cutoff has often been used to identify backchannels in an automated way and distinguish them from other instances of overlapping speech such as interruptions. To make sure that using this cutoff was sensible in our data, we asked independent research assistants to code 19 negotiations for backchannels. In line with previous research, over 95% of the human coded backchannels lasted no more than 1 second.



Note 7: **Descriptive Statistics**

Table S5. Descriptives of conversation dynamics measures

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
Speaking Time	1	478	45.58	9.29	44.91	45.49	9.47	18.49	75.49	57.00	0.11	-0.13	0.43
Turn Length (median)	2	478	15.83	10.37	12.83	14.36	7.37	1.91	89.85	87.94	2.17	8.29	0.47
Turn Length (variability)	3	478	1.07	0.23	1.05	1.06	0.21	0.52	2.27	1.75	0.65	1.26	0.01
Turn Length (adaptability)	4	478	0.18	0.22	0.17	0.18	0.21	-1.00	1.00	2.00	-0.21	1.65	0.01
Turn Length (predictability)	5	478	0.00	0.20	0.00	0.01	0.18	-1.00	0.62	1.62	-0.62	2.49	0.01
Pause	6	478	28.23	6.34	28.18	28.18	6.30	8.28	47.49	39.20	0.08	-0.02	0.29
Speech Rate (median)	7	478	191.78	25.83	190.38	191.49	23.72	118.04	281.22	163.17	0.16	0.59	1.18
Speech Rate (variability)	8	478	0.29	0.15	0.26	0.27	0.07	0.07	1.67	1.61	4.47	30.01	0.01
Speech Rate (adaptability)	9	478	0.03	0.19	0.03	0.03	0.17	-1.00	0.60	1.60	-0.36	1.79	0.01
Speech Rate (predictability)	10	478	-0.01	0.21	0.00	0.00	0.20	-1.00	0.47	1.47	-0.65	1.72	0.01
Interruptions (% turns)	11	478	3.15	5.48	1.18	1.82	1.74	0.00	41.72	41.72	2.89	10.07	0.25
Backchannel (% turns)	12	478	26.08	11.09	24.61	25.33	10.44	0.00	65.22	65.22	0.65	0.42	0.51
Response Time (median)	13	478	1.41	0.55	1.33	1.37	0.56	0.36	3.89	3.53	0.77	1.07	0.03
Response Time (variability)	14	478	1.07	1.02	0.85	0.92	0.38	0.00	14.90	14.90	7.43	81.30	0.05
Response Time (adaptability)	15	478	0.01	0.16	0.01	0.01	0.14	-0.70	0.56	1.26	-0.04	1.27	0.01
Response Time (predictability)	16	478	0.00	0.15	0.00	0.00	0.12	-1.00	1.00	2.00	-0.41	8.71	0.01

Table S6.

a. Correlation between the different conversation dynamics measures

	Speaking Time	Turn Length (median)	Turn Length (variability)	Turn Length (adaptability)	Turn Length (predictability)	Pause	Speech Rate (median)	Speech Rate (variability)	Speech Rate (adaptability)	Speech Rate (predictability)	Interruptions (% turns)	Backchannel (% turns)	Response Time (median)	Response Time (variability)	Response Time (adaptability)	Response Time (predictability)
Speaking Time																
Turn Length (median)	0,32***															
Turn Length (variability)	-0,02	-0,51***														
Turn Length (adaptability)	-0,01	0,12*	-0,19***													
Turn Length (predictability)	-0,06	-0,17***	0,04	0,22***												
Pause	0,05	0,08+	0,03	0,07	0,01											
Speech Rate (median)	0,00	0,06	-0,06	0,08+	0,01	0,16***										
Speech Rate (variability)	-0,06	-0,11*	0,11*	-0,08+	0,00	0,01	0,04									
Speech Rate (adaptability)	-0,02	-0,10*	-0,03	0,14**	0,06	-0,03	-0,07	0,01								
Speech Rate (predictability)	0,02	-0,18*	0,08+	0,06	0,22***	-0,09*	-0,01	0,02	0,07							
Interruptions (% turns)	-0,03	0,10	0,00	0,07	0,09+	-0,07	0,29***	0,25***	0,04	-0,03						
Backchannel (% turns)	-0,19***	-0,21***	0,16***	0,00	0,03	0,11*	-0,16***	0,04	0,01	-0,07	-0,05					
Response Time (median)	-0,11*	0,11	-0,08+	-0,05	0,07	0,11*	-0,03	0,12**	0,04	-0,01	0,01	-0,11*				
Response Time (variability)	-0,03	0,02	0,08+	0,00	-0,08+	0,04	0,05	0,01	-0,01	0,12*	0,03	-0,07	-0,10*			
Response Time (adaptability)	-0,12*	0,10*	-0,05	0,00	0,06	0,03	0,06	0,07	-0,01	0,06	0,09*	-0,19***	0,13**	0,09*		
Response Time (predictability)	0,10*	0,06	0,09+	-0,18***	0,03	-0,06	-0,04	-0,04	-0,07	0,04	0,03	-0,07	0,02	0,05	0,15**	

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1

b. Partial correlation between the different conversation dynamics measures

	Speaking Time	Turn Length (median)	Turn Length (variability)	Turn Length (adaptability)	Turn Length (predictability)	Pause	Speech Rate (median)	Speech Rate (variability)	Speech Rate (adaptability)	Speech Rate (predictability)	Interruptions (% turns)	Backchannel (% turns)	Response Time (median)	Response Time (variability)	Response Time (adaptability)
Speaking Time															
Turn Length (median)	0,37***														
Turn Length (variability)	0,18***	-0,51***													
Turn Length (adaptability)	-0,03	0,11*	-0,11*												
Turn Length (predictability)	0,01	-0,17***	-0,02	0,24***											
Pause	0,08	0,09	0,09*	0,07	0,04										
Speech Rate (median)	-0,03	-0,05	-0,06	0,05	-0,03	0,22***									
Speech Rate (variability)	0,02	-0,10*	0,03	-0,07	-0,05	0,02	-0,02								
Speech Rate (adaptability)	0,05	-0,14**	-0,08	0,14**	-0,01	-0,01	-0,09	-0,01							
Speech Rate (predictability)	0,09	-0,16***	-0,01	0,05	0,19***	-0,09*	0,01	0,02	0,04						
Interruptions (% turns)	-0,06	0,17***	0,10*	0,04	0,12*	-0,15**	0,31***	0,26***	0,07	-0,06					
Backchannel (% turns)	-0,20***	-0,06	0,08	0,02	0,02	0,17***	-0,18***	0,05	0,00	-0,06	0,02				
Response Time (median)	-0,18***	0,14**	-0,01	-0,09	0,09	0,14**	-0,07	0,13**	0,06	0,02	-0,03	-0,14**			
Response Time (variability)	-0,08	0,08	0,11*	0,02	-0,10*	0,06	0,01	0,01	0,01	0,14**	0,02	-0,07	-0,13**		
Response Time (adaptability)	-0,19***	0,11*	0,02	0,00	0,05	0,05	0,00	0,07	0,00	0,06	0,04	-0,18***	0,06	0,06	
Response Time (predictability)	0,09	0,08	0,10*	-0,17***	0,07	-0,06	-0,03	-0,06	-0,04	0,03	0,03	-0,01	0,02	0,04	0,14**

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1

Table S7. Correlation between the different conversation dynamics measures at dyadic level.

	Negotiator 2															
Negotiator 1	Speaking Time	Turn Length (median)	Turn Length (variability)	Turn Length (adaptability)	Turn Length (predictability)	Pause	Speech Rate (median)	Speech Rate (variability)	Speech Rate (adaptability)	Speech Rate (predictability)	Interruptions (% turns)	Backchannel (% turns)	Response Time (median)	Response Time (variability)	Response Time (adaptability)	Response Time (predictability)
Speaking Time	**-0,80*** **	-0,35***	0,11+	0,08	0,22***	-0,03	-0,03	0,01	0,04	0,07	0,03	0,21***	-0,03	-0,09	0,03	-0,09
Turn Length (median)	-0,30***	**0,55*** **	-0,32***	0,15*	-0,05	0,09	0,00	-0,07	-0,10	-0,21***	0,10	0,07	0,15*	-0,06	0,10	0,07
Turn Length (variability)	0,00	-0,27***	**0,40*** **	-0,17**	0,05	0,13*	-0,05	-0,04	0,07	0,08	0,07	0,14*	-0,11+	0,03	-0,11+	0,00
Turn Length (adaptability)	0,05	0,27***	-0,15+	**0,00**	0,09	-0,10	0,01	-0,12+	-0,08	-0,21***	0,07	-0,17**	-0,06	-0,11+	0,07	0,21***
Turn Length (predictability)	0,00	-0,16*	0,05	0,26***	**0,22*** **	0,03	0,07	0,00	0,29***	0,02	0,15*	-0,03	0,09	0,04	0,03	-0,11+
Pause	-0,09	0,09	0,00	0,07	0,01	**0,17** **	0,07	-0,08	-0,08	0,04	-0,13*	0,10	0,07	-0,03	-0,04	0,05
Speech Rate (median)	-0,13*	0,05	-0,02	0,01	-0,06	-0,01	**0,29*** **	0,13*	-0,07	-0,23***	0,31***	0,12+	-0,03	-0,08	0,01	0,04
Speech Rate (variability)	-0,06	-0,02	0,03	-0,08	-0,02	-0,04	0,13*	**0,34*** **	0,04	0,17**	0,22***	-0,14*	0,23***	0,03	0,00	0,03
Speech Rate (adaptability)	0,05	0,01	0,06	-0,04	-0,11+	0,01	0,11+	0,05	**-0,06**	0,10	0,00	-0,15*	-0,01	0,04	0,17**	0,16*
Speech Rate (predictability)	-0,02	-0,25***	0,10	0,25***	0,19***	0,10	0,02	0,06	0,24***	**0,08**	0,05	0,09	0,02	0,08	-0,04	-0,18**
Interruptions (% turns)	-0,14**	0,10	-0,03	0,09	0,12+	-0,05	0,26***	0,23***	0,05	0,04	**0,71*** **	-0,06	-0,01	0,08	0,11	0,00
Backchannel (% turns)	0,26***	-0,07	0,11+	-0,10	-0,01	0,00	-0,05	-0,08	0,09	0,05	-0,17**	**-0,13** **	-0,16*	0,06	-0,15*	-0,02
Response Time (median)	-0,19***	0,08	-0,05	-0,03	0,04	0,15*	-0,04	0,02	0,09	-0,04	0,03	-0,07	**1,00*** **	-0,12+	0,05	-0,03
Response Time (variability)	-0,06	0,02	0,03	-0,04	0,00	0,08	0,06	0,04	-0,13*	0,04	0,01	0,06	-0,10	**-0,05**	0,00	-0,08
Response Time (adaptability)	-0,07	0,12+	-0,13+	0,13*	-0,05	0,03	0,05	-0,04	0,11+	0,01	0,09	-0,04	0,22***	0,02	**0,04**	0,00
Response Time (predictability)	-0,08	-0,21***	0,19***	0,06	0,10	0,09	-0,03	0,07	0,21***	0,10	0,11+	0,04	0,07	0,02	0,08	**-0,09**

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1

Note 8: Robustness checks

All models are hierarchical linear models that include random intercepts for negotiator, case, role, and dyad.

Model I. We control for gender, negotiation length, type of negotiation and role (drawing from Curhan & Pentland, 2007; Curhan et al., 2022).

Model II. We use the mean instead of the median as a centrality measure for the Turn Length, Speech Rate, and Response Time.

Model III. We add controls for the counterpart's measures. In other words, we control for the same 16 measures of the dyadic partner. In this way we rule out the alternative explanation that individual gains depend on the counterpart's measures or that the outcome is determined at dyadic level.

Model IV. We regress the conversation dynamics measures (same model displayed in Table 2 of main manuscript) on the counterpart's individual gains (Note for interpretation: coefficients have opposite signs). This model was performed to rule out the possibility of within-person confounding (Yeomans et al., 2021).

Model V. We Winsorized (replacing top 5% and bottom 5% data points with 5th percentile and 95th percentile) all the variables to eliminate outliers. We do this to check that our results are not driven by outliers. The downside of this approach is that the estimates may be biased.

Model I to V for objective outcomes can be found in Table S8. Results are consistent across different models with a few of exceptions. Speaking Time in model III loses significance. This may be explained by the nature of the variable and how it is computed.

Speaking time measures how the conversation is split between the two speakers. This variable is highly correlated to counterpart's speaking time (r = 0.8). Hence, the variable loses significance because it cannot vary holding counterpart's variable constant. The interpretability of that coefficient is more about the silences (response time) than the negotiators' speaking time. Speech Rate (median) in model IV loses significance. In this case, the speech rate of the counterpart does not relate to negotiation gain.

Model I, II, III, & V for relational outcomes can be found in Table S9. Results are consistent across models. Interestingly, interruption becomes significant at $p < .10$ when controlling for the duration of the negotiation. The duration of negotiations is highly negatively related to relational outcomes (r = -.24, p <.001), suggesting that people do not enjoy long negotiations. On average longer negotiations had more frequent interruptions (r = .30, p <.001). Finally, we observe a significant interaction between negotiation duration and interruption in predicting relational outcomes (b = -.08, p = .03). Taken together, the results suggest that interruptions take place mostly in long negotiations and that they negatively relate to relational outcomes mostly in longer conversations.

Table S8. Conversation dynamics measures and objective outcomes.

	(I)		(II)		(III)		(IV)		(V)	
	(all variables)	LASSO	(all variables)	LASSO	(all variables)	LASSO	(all variables)	LASSO	(all variables)	LASSO
Speaking Time	.13*	.14**	.13*	0.15**	.06	.09	-.12*	-.11*	.14**	.15**
Turn Length (median)	.12^{+}	.08	.04		.15^{+}		-.18**	-.18**	.07	.04
Turn Length (variance)	.07		.00		.10		-.10^{+}	-.11*	.04	
Turn Length (adaptability)	-.08	-.08	-.08	-.07	-.05	-.05	.08	.07	-.08	-.08
Turn Length (predictability)	.08	.08	.06	.06	.09	.09	-.11*	-.11*	.06	.06
Pauses	-.12*	-.11*	-.13**	-.13**	-.12*	-.14**	.10*	.10*	-.15**	-.14**
Speech Rate (median)	.13**	.12*	.10*	.10*	.12*	.10*	-.07	-.06	.10*	.10*
Speech Rate (variance)	-.01		-.01		-.02		.05	.05	-.06	-.05
Speech Rate (adaptability)	.05		.04		.06		-.12*	-.12**	.02	
Speech Rate (predictability)	.10*	.10*	.08^{+}	.07	.08^{+}	.10*	-.10*	-.10*	.09^{+}	.09
Interruptions (% turns)	.00		-.00		.05		.06	.06	-.00	.06
Backchannel (% turns)	-.02	-.02	-.03	-.03	-.01	-.02	-.02		.01	
Response Time (median)	.05		-.00		.03		.01		.06	.06
Response Time (variance)	.03		.03	.04	.03		-.02		.04	.04

Response Time (adaptability)	-.04		-.03		-.03		.03	.03	-.01	
Response Time (predictability)	.06	.06	.04	.04	.05	.06	-.03	-.03	.08	.08
Observations	478	478	478	478	478	478	478	478	478	478
Marginal R2	0.10	0.9	0.08	0.08	0.15	0.13	0.10	0.10	0.09	0.09

Table S9. Conversation dynamics measures and relational outcomes.

	(I)		(II)		(III)		(V)	
	(all variables)	LASSO	(all variables)	LASSO	(all variables)	LASSO	(all variables)	LASSO
Speaking Time	-.02		.00		-.04		.01	
Turn Length (mean)	.03		-.01		-.03		-.04	
Turn Length (variance)	.01	-.01	-.03	-.03	-.04		-.05	
Turn Length (adaptability)	.04		.03		.03		.05	
Turn Length (predictability)	-.08*	-.08*	-.09*	-.08*	-.09*	-.09*	-.11**	-.11**
Pauses	-.03		-.02		.00		-.00	
Speech Rate (mean)	.01		.04		.01		.00	
Speech Rate (variance)	.04		.04		.03		.02	
Speech Rate (adaptability)	-.00		-.01		.00		-.01	

Speech Rate (predictability)	-.01	-.01	-.03	-.03	-.05		-.02	
Interruptions (% turns)	-.08+	-.06	-.11**	-.10*	-.11*	-.09*	-.09*	-.09*
Backchannel (% turns)	.06	.06	.07	.07	.08+	.07+	.05	.06
Response Time (mean)	-.01	-.01	-.06	-.06	-.04		-.03	
Response Time (variance)	.06	.06	.06	.06	.05		.00	
Response Time (adaptability)	-.01	-.00	.00		-.02		.00	
Response Time (predictability)	-.05	-.06	-.06	-.07	-.05	-.06	-.05	-.07+
Observations	424	424	424	424	424	424	424	424
Marginal R2	0.11	0.10	0.09	0.09	0.12	0.09	0.08	0.07

Table S10: Conversation dynamics measures and objective and relational outcomes using only the first negotiation performed by participants.

	Objective		Relational	
	(all variables)	LASSO	(all variables)	LASSO
Speaking Time	.20**	.20***	-.00	
Turn Length (median)	.03	.03	-.02	
Turn Length (variability)	.02		-.04	-.03
Turn Length (adaptability)	-.07	-.09	.08	
Turn Length (predictability)	.12	.11*	-.08+	-.06
Pauses	-.13*	-.12*	-.03	
Speech Rate (median)	.12*	.11*	.05	
Speech Rate (variability)	.00		.05	
Speech Rate (adaptability)	-.03		-.02	
Speech Rate (predictability)	.06	.06	-.06	-.05
Interruptions (% turns)	-.01		-.14**	-.11**
Backchannel (% turns)	-.06		.07	.08+
Response Time (median)	.06		-.02	
Response Time (variability)	.04		.09*	.09*
Response Time (adaptability)	-.03		.01	.01
Response Time (predictability)	.06		-.12**	-.13**
Observations (*N*)	370	370	328	328
Adjusted R^2	0.07	0.08	0.06	0.07

Table S11: Conversation dynamics measures and objective and relational outcomes using clustered standard errors at the individual level.

	Objective		Relational	
	(all variables)	LASSO	(all variables)	LASSO
Speaking Time	.11*	.12*	.01	
Turn Length (median)	.11^{+}	.09^{+}	-.04	
Turn Length (variability)	.04		-.06	-.04
Turn Length (adaptability)	-.08	-.08	.02	
Turn Length (predictability)	.09^{+}	.08^{+}	-.08^{+}	-.06^{+}
Pauses	-.15**	-.14**	.00	
Speech Rate (median)	.14**	.13**	.01	
Speech Rate (variability)	-.01		.02	
Speech Rate (adaptability)	.04		-.02	
Speech Rate (predictability)	.08^{+}	.09^{+}	-.04	-.04
Interruptions (% turns)	.01		-.11*	-.10*
Backchannel (% turns)	-.04	-.04	.08^{+}	.08*
Response Time (median)	.07		-.01	.01
Response Time (variability)	.04		.06*	.06*
Response Time (adaptability)	-.03		-.02	-.01
Response Time (predictability)	.05	.05	-.06^{+}	-.06*
Observations (*N*)	478	478	424	424
Adjusted R^2	0.05	0.05	0.03	0.04

Note 9: Method and Case Interaction

All models are hierarchical linear models that include random intercepts for individual and dyad. All models are hierarchical linear models that include random intercepts for individual and dyad. Because we used different data processing methods and cases, we performed additional analyses to explore context-specific influences. By including interaction terms in our regression analyses, we examined the potential interaction of negotiation types with our central variables. For parsimony, we report below the models where we interact method and case with significant variables for the objective and relational outcomes.

These analyses reveal that our main conclusions remain robust across negotiation cases and processing methods (Table S12a/b), with only one of the 10 moderation analyses being statistically significant. None of the significant conversation dynamics predictors of negotiation outcomes significantly differ across audio processing methods (all ps > .12). Moreover, with the exception of speaking time, which is more strongly related to objective outcomes in the Pacific Sentinel case than in the McConsult case (interaction term: b = .23, p = .02), none of the predictors differed by negotiation case (all other ps > .37). Some of the main interaction predictors may lose significance in the direct effect. These models use more degrees of freedom. This results in higher standard errors in coefficient estimates. However, the effect size is virtually identical apart from the model where speaking time is interacted with case.

Table S12-a: Conversation dynamics measures interacted by method and case for objective outcome. The variable on top of the column indicates the interaction variable.

	Method			Case		
	Speaking Time	Pause	Speech Rate	Speaking Time	Pause	Speech Rate
Speaking Time	.14+	.11*	.12*	-.04	.13*	.13*
Turn Length (median)	.11	.11+	.10	.07	.09	.09
Turn Length (variability)	.04	.04	.04	.03	.04	.04
Turn Length (adaptability)	-.08+	-.08	-.08	-.08	-.08	-.08
Turn Length (predictability)	.09+	.09+	.09	.09	.08	.08
Pauses	-.15**	-.12+	-.15**	-.14**	-.15+	-.14**
Speech Rate (median)	.14**	.14**	.06	.12*	.13**	.12
Speech Rate (variability)	-.01	-.01	-.01	-.01	-.02	-.02
Speech Rate (adaptability)	.04	.04	.04	.04	.04	.04
Speech Rate (predictability)	.08	.08	.07	.07	.08	.08
Interruptions (% turns)	.01	.01	.03	-.01	-.01	-.01
Backchannel (% turns)	-.04	-.04	-.04	-.03	-.03	-.03
Response Time (median)	.07	.07	.07	.05	.05	.05
Response Time (variability)	.04	.04	.04	.05	.04	.04
Response Time (adaptability)	-.03	-.03	-.03	-.04	-.04	-.04
Response Time (predictability)	.05	.05	.05	.05	.04	.04
Interaction	-.05	-.05	.15	.23*	.02	.01
Observations (*N*)	478	478	478	478	478	478
Marginal R^2	.09	.09	.09	.09	.08	.08

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1.

Table S12-b: Conversation dynamics measures interacted by method and case for relational outcomes. The variable on top of the column indicates the interaction variable.

	Method		Case	
	Interruption	Turn Length (predictability)	Interruption	Turn Length (predictability)
Speaking Time	.01	.001	.004	.006
Turn Length (median)	-.02	-.02	-.01	-.012
Turn Length (variability)	-.03	-.03	-.03	-.04
Turn Length (adaptability)	.03	.04	.03	.03
Turn Length (predictability)	-.09*	-.10^{+}	-.09*	-.08
Pauses	-.01	-.013	-.01	-.01
Speech Rate (median)	.03	.03	.03	.03
Speech Rate (variability)	.03	.03	.03	.03
Speech Rate (adaptability)	-.01	-.01	-.01	-.01
Speech Rate (predictability)	-.03	-.03	-.03	-.03
Interruptions (% turns)	-.12**	-.11*	.13**	-.11**
Backchannel (% turns)	.06	.07	.07	.07^{+}
Response Time (median)	-.02	-.02	-.02	-.02
Response Time (variability)	.0	.05	.05	.05
Response Time (adaptability)	.003	.002	.002	.001
Response Time (predictability)	-.06	-.06	-.06	-.06^{+}
Interaction	.21	.03	-.25	-.011
Observations (*N*)	424	424	424	424
Marginal R^2	.06	.06	.06	.06

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1.

Note 10: Result from Pacific Sentinel / single audio sample

We performed additional analyses to control for context-specific influences. For this reason, we report the results using data only from the Pacific Sentinel / single audio sample negotiations (N = 121) holding the context as constant as possible. We report below the full and LASSO models.

These analyses reveal that our main conclusions remain consistent (Table S13), with all significant variables in the main analysis having the same direction. The effect size is virtually identical apart from Speech Rate (median) in predicting objective outcomes. Speaking Time is significant at p = .002 in the LASSO model. Pause has a p = .08 in the full model and Speech Rate (median) lost significance. Interruption is significant both in the full (p = .007) and in the LASSO model (p = .02). Turn Length (predictability) is significant in the full (p = .04).

Table S13: Conversation dynamics measured using data only from the Pacific Sentinel / single audio subsample for objective and relational outcomes.

	Objective		Relational	
	(all variables)	LASSO	(all variables)	LASSO
Speaking Time	.16^{+}	.19**	.00	
Turn Length (median)	.09		-.01	
Turn Length (variability)	.05		-.04	-.01
Turn Length (adaptability)	-.06		.10	.09
Turn Length (predictability)	.14*	.12^{+}	-.11*	-.10^{+}
Pauses	-.12^{+}		-.04	
Speech Rate (median)	.05		.07	
Speech Rate (variability)	.02		.05	
Speech Rate (adaptability)	-.05		-.02	
Speech Rate (predictability)	-.03		-.01	
Interruptions (% turns)	.03		-.17**	-.13*
Backchannel (% turns)	-.04		.06	
Response Time (median)	.09		-.05	
Response Time (variability)	.06		.08	.08
Response Time (adaptability)	.07		.02	
Response Time (predictability)	.08	.11	-.08	-.08
Observations (*N*)	242	242	214	214
Marginal R^2	0.09	0.06	0.13	0.11

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1.

3. Questions in Negotiations

Abstract

A vast wisdom literature espouses the power of asking open-ended questions during negotiations: questions invite counterparts to disclose information, and, in doing so, put askers at an informational advantage. But is this advice necessary and, more importantly, is it effective? In the current work, we analyzed 53,612 speech turns from the transcripts of 305 dyadic interactions using Natural Language Processing to estimate the frequency and effectiveness of question-asking in negotiations (Study 1). Open-ended questions were uncommon, occurring in less than 9% of all negotiators' speech turns. But there was a robust positive linear relationship between asking open-ended questions and earning individual gains in the negotiation. In contrast, asking closed-ended questions and making non-question statements did not significantly impact individual gains. Open-ended questions solicited next-turn responses that were twice as long as those prompted by closed-ended questions or non-question statements—an informational edge that at least partly explains the success of more inquisitive negotiators. To experimentally substantiate this descriptive effect, we instructed some participants to prepare and ask either open-ended questions or statements prior to engaging in live chat negotiations. Participants who were instructed to ask open-ended questions realized significantly higher individual gains than those who were not (Study 2). Collectively, these findings offer empirical support for the widely accepted—but previously untested—assumption that negotiators focus excessively on influencing (by making statements) at the expense of learning (by asking questions).

3.1 Introduction

If you open a negotiation handbook, you'll almost certainly read that asking open-ended questions is one of the most powerful tactics in a negotiator's toolkit (e.g., Fisher, Ury & Patton, 2011; Malhotra & Bazerman, 2007; Voss & Raz, 2016). Negotiation theorists and thought leaders alike suggest that negotiators mistakenly devote too much time at the bargaining table arguing and defending their positions rather than asking questions to understand their counterparts' points of view (Jeong, Minson & Gino, 2020; Pinkley, Griffith, & Northcraft, 1995). Open-ended questioning skills are integral to many negotiation training programs, ranging from mediation (Moore, 2003) and sales (Singh, Manrai, & Manrai, 2015) to hostage negotiation (Van Hasselt et al., 2006). However, to our knowledge, no empirical study has quantified negotiators' propensity to ask open-ended questions (vs. close-ended questions or non-question statements) in real dialogues between negotiators, nor demonstrated the impact of question-asking–prevalence or type–on negotiated outcomes.

Following an emerging emphasis in behavioral science to study turn-by-turn conversational behavior (e.g., O'Bryan et al., 2022; Templeton et al., 2022; 2023, Yeomans et al., 2021; 2023), recent work has begun to uncover links between question-asking and outcomes in cooperative domains. For example, asking more questions increases interpersonal liking on speed dates and get-to-know-you conversations between strangers (Huang et al., 2017; Yeomans et al., 2019), an effect driven by asking follow-up questions, a specific question type that elaborate on what an interlocutor has previously said. Earlier work suggests that preparing elaboration questions ahead of time caused participants to be more open to the idea of having a conversation at all (Chen et al., 2010), and current work lends support to the notion that thinking about conversational questions and topics before conversations begin improves fluency, topic selection, information exchange, and enjoyment (Abi-Esber, Brooks, Yeomans & Berger, 2022).

Other work investigates how structural variables and individual differences may influence the propensity to ask questions. For example, research by Carter et al. (2018) found that across 250 seminars in 10 countries, compared to men, women asked absolutely and relatively fewer questions during academic seminars, especially when a man was the first to ask a question or when there were fewer questions asked overall. The average question-asking rate in a group may establish a temporary conversational norm, one that made women feel disproportionately less welcome to ask questions. While the decision to ask questions is consequential, no empirical work has identified the effects of asking questions during unfolding negotiation dialogues.

3.2 Question Types and Negotiated Outcomes

A question is a sentence or phrase aimed to solicit information (Cambridge, 2023). Although numerous typologies of questions exist (based, for example, on how appropriate, productive, or expected they are; Griffiths & Milne, 2006; Milne & Bull, 1999; Vrij et al., 2009) or how a question relates to the verbal content that's preceded it (e.g., to follow up, switch topics, or mirror an earlier question; Huang et al., 2017), the majority of research on question-asking has focused on the distinction between open- and closed-ended questions (e.g., Dillon, 1988; Schuman & Presser, 1996). This distinction holds particular importance in the context of negotiation, where achieving one's goals often hinges crucially on extracting accurate information about a counterpart's preferences, goals, and beliefs (Yeomans et al., 2021). Indeed, while perspective-taking has been identified as the greatest psychological barrier to conflict management and resolution overall (Friend & Malhotra, 2019), asking questions through dialogue has been suggested as the most direct (and perhaps only) path to uncovering others' perspectives (Eyal, Steffel, & Epley, 2018).

Open-ended questions are defined as a specific type of inquiry that encourages free-narrative answers (Kelly & Valencia, 2021). They encompass questions using the “5WH” interrogative adverbs (what, when, where, who, why, and how) or free-narrative style imperatives (“tell” or “explain”) and allow for a broad range of responses without being restricted by predetermined options (Dillon, 1988). In the context of negotiation, examples of open-ended questions might include "What are your primary concerns regarding this offer?" or "How do you feel about this issue?" Conversely, closed-ended questions are generally defined as a specific type of inquiry that limits respondents' answers to a fixed set of choices, often requiring a simple "yes" or "no" or a selection from a predefined list (Schuman & Presser, 1996). In a negotiation setting, closed-ended questions might include "Are you willing to accept a 10% discount?" or "Do you prefer option A or option B?" In our work, we will be able to differentiate between open-ended and closed-ended questions, as well as examine, in descriptive exploratory analysis, whether question formulation using the “5WH” words matters. Is asking "*Why* is this deadline important to you?" psychologically different – or better – than asking "How is this deadline important to you?" or "What is the importance of this deadline to you?”

There are at least two reasons why asking open-ended questions (compared to asking closed-ended questions or not asking questions at all) might lead to higher personal gains in negotiation. First, open-ended questions may facilitate a deeper understanding of the other party's positions, interests, and constraints, increasing the information available to adapt one’s negotiation strategies accordingly. Second, open-ended questions may foster rapport and a collaborative atmosphere between the negotiating parties. These mechanisms track the informational and relational goals that underpin much of human-to-human conversation (Yeomans et al., 2021).

Informational Outcome. Success in negotiation hinges on a deep understanding of the position, needs, constraints, and interests of one's counterpart (e.g., Loschelder et al., 2016; Lee & Ames, 2017; Lee et al., 2018; Thompson, 1991). However, accurately discerning another individual's thoughts and feelings can be a surprisingly difficult task (Yeomans et al., 2021). In a seminal paper, Eyal and colleagues (2018) conducted 25 experiments testing the accuracy of people's interpersonal insight across a wide range of domains—from predicting another person's emotions, preferences, and attitudes to discerning whether they were lying or telling the truth. In every study, people failed to guess others' inner states accurately. Notably, the only study in which participants demonstrated increased interpersonal accuracy (Study 25) was when they were instructed to ask questions about their counterparts' thoughts and feelings rather than attempting to guess what was on their minds.

Prior work using negotiation scenario studies suggests that different question formulations influence the veracity of information one receives in response. For example, "negative assumption" questions, which presuppose a problem (e.g., "You occasionally use work time for social media, right?"), have been found to increase the veracity of a counterpart's response compared to "positive assumption" questions that presuppose the absence of a problem or general questions that don't reference a problem (e.g., "You don't occasionally use work time for social media, right?"). Despite soliciting more honest responses, "negative assumption" questions tend to be perceived as accusatory and can harm perceptions of the question asker (Minson et al., 2018). To achieve both high-informational and high-relational goals simultaneously (Yeomans et al., 2021), open-ended questions may be a particularly important tool for uncovering what's on a negotiator's mind, as they encourage respondents to provide more detailed and personal information than closed-ended questions, without making an accusation or conveying a negative assumption toward the counterpart.

Research suggests that open-ended questions can help create an environment of psychological safety and trust, encouraging individuals to share their thoughts, feelings, and experiences more openly (Tynan, 2005). This style of questioning also enables respondents to convey information in their own words, which can reveal greater insights into their attitudes, motivations, and emotional states (Pennebaker, Mehl, & Niederhoffer, 2003) and even their trustworthiness (Turmunkh, Van den Assem, & Van Dolder, 2019). Further, open-ended questions offer more flexibility in the types of information that can be disclosed, allowing respondents to share unexpected or previously undisclosed details (Leach et al., 2023). This may be especially helpful as negotiators often don't have a complete understanding of the challenges, issues, constraints, or opportunities that may be relevant to the negotiation. By asking open-ended questions, negotiators should be more likely to uncover critical strategic information about the other party's preferences and priorities, enabling them to devise better deals.

Relational Outcome. Open-ended questions have been shown to increase liking and rapport between individuals due to their ability to foster a sense of intimacy and mutual understanding (Alison & Alison, 2020; Huang et al., 2017; Sprecher et al., 2013; Yeomans et al., 2019), without presupposing problems, making assumptions about the asker, or constraining their response by, for example, offering candidate answers (Minson et al., 2018; Pomerantz, 1988; Stokoe, 2010). In turn, increased rapport may help negotiators elicit "good will" (i.e., trust) and bigger concessions (Neale & Bazerman, 1992; Thompson, 2006). Supporting this idea, Kelly and Valencia (2021) studied police investigative interviews. They found that using appropriate questions (e.g., open-ended questions) positively predicted suspect cooperation, while accusatorial tactics were linked to resistance.

3.3 Overview of Current Studies

The present research aims to quantify the rate at which negotiators naturally ask questions and examine the link between question-asking rate and negotiated outcomes. In Study 1, we investigate how the frequency at which negotiators ask questions relates to individual gains using natural language processing in a large observational dataset. We then test the informational and relational mechanisms that might explain this relationship. Finally, we explore, at the turn level, how different question formulations (e.g., how vs. why) predict informational and relational aspects of the counterpart's response (which we operationalize as information disclosure and sentiment, respectively). In Study 2, we test the causal relationship between asking open-ended questions in a controlled live-chat experiment, investigating the mediating roles of information disclosure and sentiment. Compared to prior work using hypothetical vignettes, confederate interaction partners, or post-hoc surveys after interactions have ended, our methods contribute to an emerging emphasis in behavioral science to capture and analyze transcript data from real interactions to understand the unfolding decisions people make—and could make more effectively—during dialogue.

3.4 Study 1: Question-Asking Rates and Negotiation Outcomes

3.4.1 Method

Transparency and Openness. We describe our sampling plan and all measures in the study. All data, analysis code, and research materials are available at https://researchbox.org/1941&PEER_REVIEW_passcode=TJEFDL and in the Supplemental Material. Data were analyzed using R, version 4.1.0 (R Core Team, 2021). The study design and its analysis were not preregistered.

Participants. Our study consisted of 305 dyadic negotiation simulations recorded from a diverse pool of 512 MBA students across three European business schools (34% women). The majority of participants (N = 368) engaged in a firm resource allocation simulation (the

Pacific Sentinel case; Valley & Witter, 2004). A smaller subset participated in a business units merger simulation (N = 134; the Web Service case; Eisenkraft, 2016) or a job offer simulation (N = 108; the McConsult case; Di Stasi, Templeton, & Quoidbach, in press). Of the total participants, 414 engaged in one case simulation, while 98 engaged in two separate cases (with a different partner each time). To incentivize performance, students' grades in the class were tied to their individual negotiation gains.

Procedure and Material. Participants were instructed to negotiate using the Zoom video conferencing system set on gallery view (i.e., with both negotiators always visible on screen). The negotiation simulations had no time limit (M = 32 min; $S.D.$ = 17 min; Range = 8 to 120 min). Participants were asked to stop the recording immediately after the negotiation to prevent non-negotiation-related topics from being included in the analyses (e.g., post-deal debriefing, practical discussion about uploading the recording).

We used three different scorable multi-issue two-party negotiation simulations with integrative potential (i.e., opportunities to create value by trading across multiple issues). The first simulation, the *Pacific Sentinel* negotiation (Valley & Witter, 2004), replicates a budget allocation discussion where the Executive Editor and Advertising Manager of a mid-sized newspaper decide on a one million dollar investment's distribution. They must reach a consensus on five key issues: two distributive issues (where a fixed value is contested), two integrative issues (enabling mutually beneficial value creation), and one compatible issue (with shared party preferences). The *Web Service* negotiation (Eisenkraft, 2016; see Supplemental Material – Note 1) emulates a departmental merger situation where unit leaders must agree on five similar issues: four integrative and one compatible. Finally, the *McConsult* negotiation (Di Stasi et al., in press) simulates an employment contract negotiation scenario between a consulting firm recruiter and a prospective job candidate, requiring agreement on one distributive issue and four integrative issues.

3.4.2 Measures

Questions. We first diarized the negotiation audio recordings into speech turns and transcribed the content of the conversations using an automated speech recognition algorithm (see Supplemental Material - Note 2). Our final dataset comprised 53,612 speech turns from 166 hours of negotiation recordings. We then created a natural language processing algorithm to assess whether each speech turn included a question and, if so, whether it was open- or close-ended (see Supplemental Material - Note 3). We tested the reliability of our algorithm against human coders in a random subsample of approximately 5% of the turns (N = 2,923). The algorithm distinguished open-ended questions from closed-ended questions with over 95.6% accuracy compared to human annotation. For each negotiator and question type (open vs. closed-ended), we computed the raw number and the rate of questions—defined as the percentage of the person's speech turns that included a question.

Individual gains. Immediately after the negotiations, participants jointly completed an online "contract" where they entered the terms of their deal. We used this information to compute the *individual gains* for each negotiator. Because the different simulations and roles entail different success metrics (e.g., money vs. points), we standardized individual gains across roles and simulations (M = 0, SD = 1) to allow for comparable outcomes among negotiators.

Informational Outcome. Information was operationalized by the word count of each turn. Although word count is an objective measure of information, it is an imperfect proxy for strategic information. To compensate for this shortcoming, trained research assistants familiar with the negotiation cases but blind to our research question examined a random subset of approximately 5% of the turns. For each, they coded whether the speaker disclosed information that would be useful to the other side (0 = No; 1= Yes). We then examined whether the preceding turn included an open-ended question, closed-ended question, or a non-question statement. Providing reassurance regarding our word count approach, we found that word count

and human-coded strategic information disclosure were significantly correlated in our random subsample of 2,923 turns (r = .30, p < .001).

Relational Outcome. We used automated sentiment text analysis on a turn-by-turn basis to evaluate rapport. Our approach was influenced by recent research by Rathje and colleagues (2023), who demonstrated that OpenAI's GPT large language model outperforms English-language dictionary-based text analysis when it comes to sentiment detection in extensive datasets. They reported strong correlations of approximately r = .70 between GPT and human coders, compared to correlations of around r = 0.25 for dictionary-based methods. Following Rathje and colleagues (2023), we used a simple prompt: "Is the sentiment of this text positive, neutral, or negative? Answer only with a number: 1 if positive, 2 if neutral, and 3 if negative. Here is the text: [negotiation turn text]". This prompt was iteratively applied to our corpus of 53,612 turns using R and GPT's application programming interface (API), configured to GPT 3.5 Turbo. Subsequently, we recoded the values in R into 1 if positive, 0 if neutral and -1 if negative to have a more intuitive interpretation of sentiment. The relevant code is provided in Supplemental Material - Note 4 for reference.

3.4.3 Analytical approach

Question rate and negotiation outcomes. We operationalize question rate as the proportion of speech turns by a negotiator that contain at least one open-ended question. To estimate the rate of question-asking behaviors across negotiators, we used a random intercept-only model, which accommodates the nested structure of the data. Specifically, we accounted for the presence of negotiators who participated in two negotiations, thereby providing two observations. To investigate how different types of questions (open- vs. closed-ended questions) uniquely predict objective negotiation outcomes, we use multi-level linear models with random intercepts for negotiators, case, and dyad. In addition, we controlled for gender and negotiation length. Recognizing that negotiators may adapt their question-asking behavior

in response to their counterparts (such as through verbal synchrony, reciprocity, or accommodation), we conducted supplementary analyses controlling for the questions posed by the negotiators' counterparts. Finally, for robustness, we report additional models in Supplemental Material in which used the raw number of questions asked rather than the proportion of speech turns containing a question as a predictor (see Notes 5 & 6). All analyses were performed using the *lme4* package for R (v.1.1.32).

Examining the informational and relational mechanisms. We investigate the relationships between open-ended questions, informational, and relational outcomes at two levels.

First, we perform analyses at the turn-level. We use time-lagged models to examine whether asking an open-ended question (vs. close-ended and non-question statements) at time *t* relates to informational (word count) and relational (sentiment) features of the counterpart's response at time *t+1*, where *t* represents separate conversational turns.

Second, we perform analyses at the negotiator-level. We conduct a parallel mediation analysis to examine the role of informational and relational outcomes in the relationship between open-ended questions and individual gains. For each negotiator, we first compute the average word count and sentiment score across all the counterpart's turns that follow an open-ended question (vs. a closed-ended question or a non-question statement). Next, following the steps outlined by Hayes (2017), we conducted a parallel mediation analysis using PROCESS (Version 4.3) for R with 10000 bootstrap resamples. Control variables, including gender, length of the negotiation, and the counterpart's question rate were included in the model to account for potential confounding factors. Results are the same across models when excluding these control variables (see Supplemental Material – Note 6).

Examining the impact of question formulation. Is asking "*Why* is this deadline important to you?" psychologically different – or better – than asking "How is this deadline important to you?" or "What is the importance of this deadline to you?" Our question-detection algorithm provides a break down for seven[3] specific subtypes of open-ended question formulations ("What", "How", "Which", "Why", "Where", "Who", and "When"). While the low occurrence of some formulations precludes a meaningful analysis when aggregated at the negotiator level (e.g., *when* and *where* questions both account for less than 2% of open-ended questions), our data can provide valuable insight at the turn-level.

Based on the Conversational Circumplex Framework (Yeomans, Schweitzer, & Brooks, 2021), we examine how various question formulations at turn *t* influence counterparts' responses at turn *t+1* in terms of word count (informational outcome) and sentiment (relational outcome). For simplicity, *when*, *who*, and *where* questions, which typically invite brief, precise responses, were grouped under a *probing* formulation category due to their low frequencies (1.6%, 1.8%, and 3% respectively), leading to imprecise estimates.

To test whether various open-ended formulations lead to responses that significantly differ in terms of informational and relational outcomes, we focus on pair of consecutive turns in which a negotiator asked a least one open-ended question at time *t*. We used dummy variables for *what*, *how*, *why*, *which*, and *probing* formulations at turn *t* in mixed effects models to predict the word count and sentiment at turn *t+1*. To account for the data's nested structure, we included a random intercept for the negotiation dyad. We repeated these analyses in 1000 bootstrap resamples with replacement at the level of the participant, extracting each time the fixed effects from the two models. Finally, we computed the average coefficients (betas) for each question formulation and their 95% confidence intervals from the distribution of resampled estimates.

[3] The algorithm also detected "Whom" formulation. However, we found only one turn containing that formulation. For this reason, we excluded "Whom" formulation from the analysis.

These average beta coefficients represent the estimated impact each open-ended formulation has on the subsequent response's word count and sentiment, while controlling for the concurrent use of other formulations. A positive beta value of X suggests that compared to other formulations, the question type generally increases the response's length or sentiment by X standard deviations. Conversely, a negative beta indicates a decrease. The 95% confidence intervals offer a range where the actual beta is likely to be, enabling meaningful comparisons to determine if question formulations significantly differ from each other on these variables.

3.5 Results

Question-Asking Rates and Negotiation Outcomes

Substantiating the idea that people spend more of their time arguing and defending their positions by making non-question statements rather than learning by asking questions, 16.2% (95% CI [15.4% - 17.0%]) of all the speech turns included a question (open-ended: 8.1%; close-ended: 8.1%). Is this a bad thing? We relate participants' question rate to their individual negotiation gains. Dovetailing with decades of practical wisdom, negotiators who ask more open-ended questions earn higher individual gains (see Table 4). Specifically, we first test the effect of overall question rates (of any kind) compared to non-question statement rates on negotiation gains (model I). We find that negotiators who ask more questions obtain better deals than those who mainly make statements. We then examine the effect of closed and open-ended question rates separately (model II and III, respectively). Closed-ended question rates are not significantly related to negotiation gains ($\beta = 0.66$, $t = 0.90$, $p = .37$). In contrast, open-ended question rates are significantly related to negotiation gains ($\beta = 2.75$, $t = 3.84$, $p < .001$).

Finally, we consider the effect of open and closed-ended questions simultaneously in the same model (IV). We find, again, that negotiators with higher open-ended question rates reap larger gains ($\beta = 2.83$, $t = 3.70$, $p < .001$), whereas those with higher closed-ended question

rates do not (β = -0.18, *t* = -0.38, *p* = .81). The effect of open-ended questions does not differ across the different negotiation cases ($\beta_{\text{open-ended question x Pacific}}$ = 2.59, *t* = 1.15, *p* = .25; $\beta_{\text{open-ended question x Web}}$ = .28, *t* = .09, *p* = .92) and remain robust when controlling for the overall word count of both negotiators (β = 2.34, *t* = 3.23, *p* = .001) and when using the raw number of questions rather than the question rate as predictors (β = .04, *t* = 3.76, *p* < .001).

Table 4. Proportion of speech turns including a question and individual negotiation gains.

	(I)		(II)		(III)		(IV)	
	β	*t-value*	β	*t-value*	β	*t-value*	β	*t-value*
Questions	1.36**	3.06						
Closed-Ended Questions			0.66	0.90			-0.18	-0.38
Open-Ended Questions					2.75***	3.84	2.83***	3.70
Marginal R^2	0.03		0.01		0.04		0.04	

Note. n = 610. Hierarchical linear modeling was applied for all the models. $^{+}$ p < .10. * p < .05. ** p < .01. *** p < .001. (All two-tailed tests). Independent variables take values from 0 to 1. Random effect for individual, role, dyads and negotiation case. Control variables are the counterpart's same variable, length of the negotiation and gender.

Generalized additive model analyses further reveal that the link between question-asking and personal gains is linear (effective degrees of freedom; *edf* = 1.00, *p* = .007; see Figure 3). We find no evidence for the notion that one might ask too many open-ended questions within the natural range we observed in our negotiation recordings.

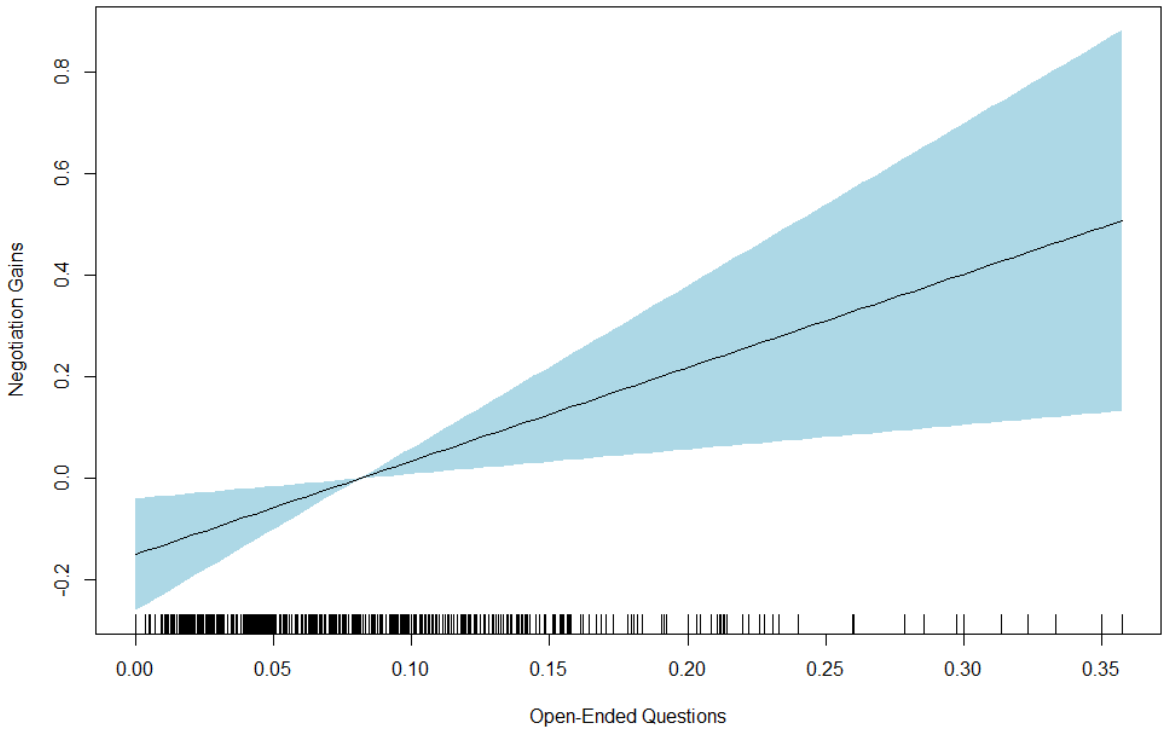


Figure 3. Proportion of speech turns that include open-ended questions and individual negotiation gains.

3.5.1 Examining informational and relational mechanisms

Why do inquisitive negotiators gain more? Examining data at the turn-by-turn level, we find robust evidence for the notion that asking open-ended questions helps negotiators uncover information. As depicted in Figure 4, open-ended questions at turn *t* lead to responses at turn *t+1* that are about twice as long compared to responses to closed-ended questions and non-question statements (M_{opened} = 43, M_{closed} = 24, $M_{statement}$ = 23), $F(2, 53609) = 407$, $p < .0001$). Open-ended questions do not simply elicit longer turns. These turns are also crucially more informative. When examining strategic information disclosure in the human-coded sample of turns (N = 2923), asking an open-ended question at time *t* roughly triples the likelihood that a negotiator obtains useful information at time *t+1*, compared to asking a closed-ended questions or making a non-question statement (logistic regressions controlling for turn word count; open-

ended questions: OR = 3.02, $p < .001$; closed-ended questions: OR = 1.5, $p = .03$; statement: OR = 1.22, $p = .19$). Finally, our turn-level analyses are also consistent with the notion that open-ended questions help build rapport. While conversational turns displayed positive sentiment overall ($M = .02$; $SD = .36$), turns that include an open-ended question a t elicit slightly more positive responses at turn $t+1$ on average than turns that include a closed-ended question and non-question statements ($M_{open} = .03$, $M_{closed} = .01$, $M_{statement} = .02$, open- vs. closed-ended: $t(7936) = 2.45$, $p = .01$, $d = .06$; open-ended vs. statement: $t(49567) = 1.56$, $p = .12$; $d = .03$).

At the negotiator-level, the informational advantage at least partially explains why inquisitive negotiators earn more personal gains. Participants who uncover more information (as measured by the total number of words across all their counterpart's responses over the counterpart's average word count, i.e., how much they talk) achieve better outcomes ($\beta = .13$, $t = 3.13$, $p = .002$). This information outcome mediates the link between open-ended question rates and individual gains (bootstrapped parallel meditation indirect effect: 95% CI [.01 - .24], $p = .03$). Results are similar when including the questioner's own word count and other controls in the regression, as well as when using different proxies of information outcome (see Supplemental Material - Note 6). In contrast, the small relational advantage observed at the turn-level does not explain why inquisitive negotiators earn more. Negotiators' rates of open-ended questions do not significantly predict their counterparts' average sentiment across the entire negotiation ($\beta = .04$, $t = .96$, $p = .34$), nor does the counterpart's average sentiment relate to negotiators' gains ($\beta = .4$, $t = 1.04$, $p = .30$). Still, asking open-ended questions does not harm rapport in the way that previous work has found that asking "negative assumptions" questions can harm rapport (Minson et al., 2018).

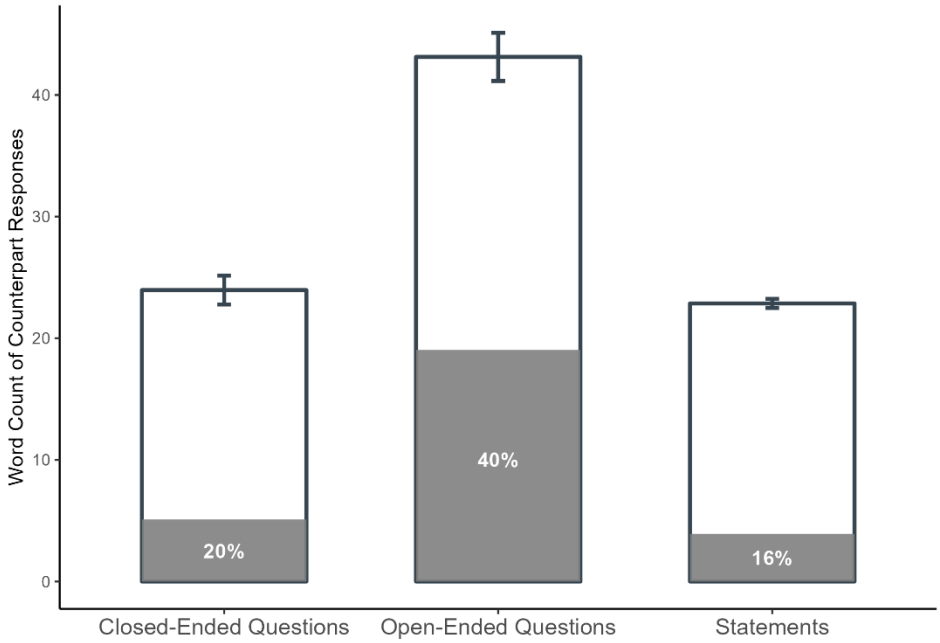


Figure 4. Information yield in turn t+1 based on content of turn t. *Asking open-ended questions (vs. asking closed-ended and making non-question statements) solicited longer responses from counterparts (mean word count). Further, a higher proportion of the counterparts' responses following open-ended questions included strategic information disclosure (based on human ratings of strategic disclosure, displayed in the gray portions of the bars). Error bars represent 95% confidence intervals.*

3.5.2 Which open-ended questions should negotiators ask?

We find robust support for the idea that negotiators who ask more open-ended questions—broadly defined—get better deals, and that asking such questions elicit responses that are a lot more informative and a bit more positive. But does the specific open-ended question formulation matter? We conducted exploratory analyses. As depicted in Figure 5, *what*-questions are the most frequent (58% of all open-ended questions) and lead to responses that are relatively informative (M_{beta} = .19, 95% CI [.08, .30]), but slightly reduce sentiment (M_{beta} = -.15, 95% CI [-.26, -.04]). *How*-questions, which makes up around 21% of all open-ended questions, lead to the most positive responses (M_{beta} = .11, 95% CI [-.006, .236]), but yield relatively lower information (M_{beta} = .019, 95% CI [-.096, .129]). In contrast, *why*-questions, although constituting just 6% of all queries, had the most notable positive effect on

word count (M_{beta} = .28, 95% CI [.10, .47]), but the strongest negative effect on sentiment (M_{beta} = -.29, 95% CI [-.43, -.16]). *Which*-questions, comprising roughly 9% of all questions, had no apparent impact on the word count (M_{beta} = -.01, 95% CI [-.13, .11]) and but a negative effect on sentiment (M_{beta} = -.21, 95% CI [-.34, -.08]). Finally, *probing*-questions, which include "when", "who", and "where", marginally raised the word count (M_{beta} = .05, 95% CI [-.08, .17]), but decreased sentiment (beta = -.13, 95% CI [-.25, -.0002]). These represented about 6% of all questions.

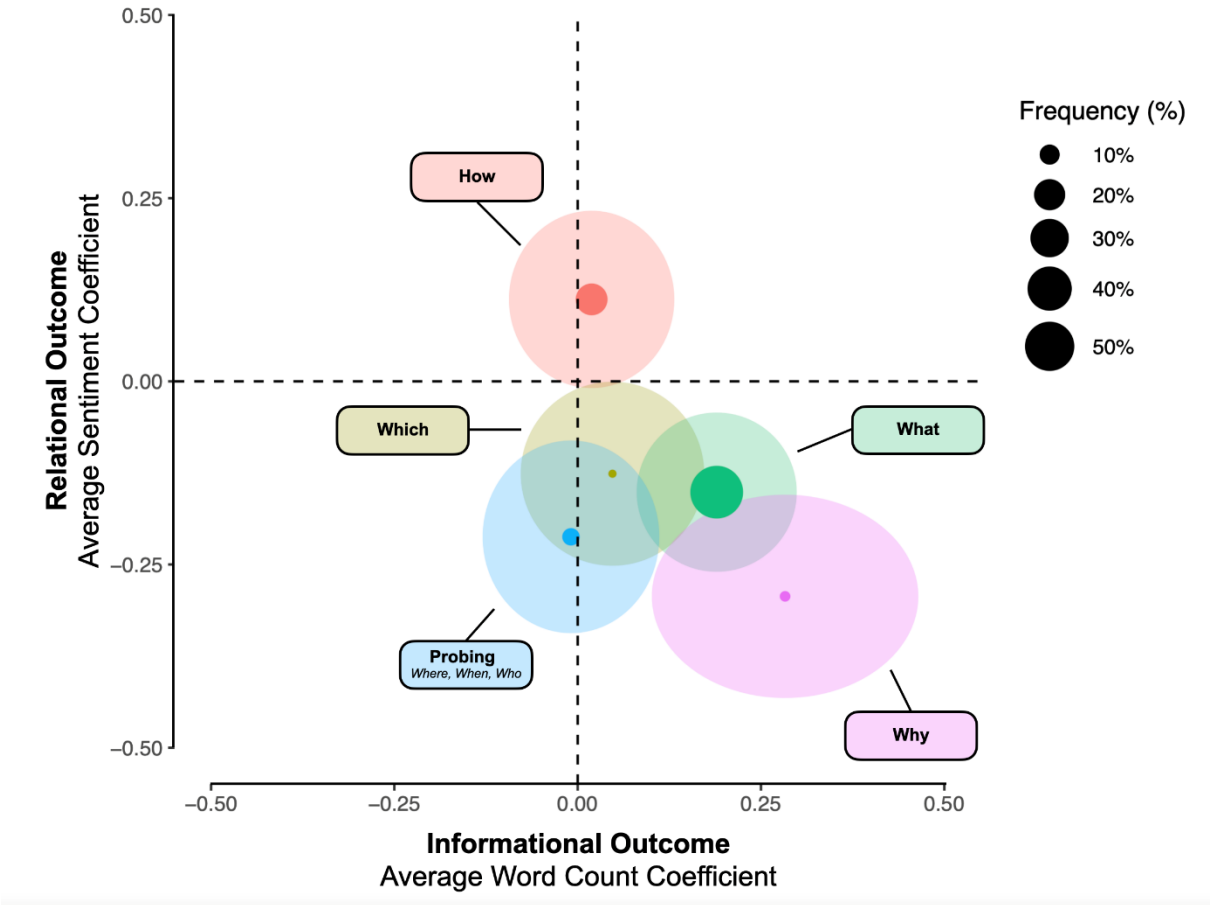


Figure 5. Conversational circumplex and open-ended question formulations. *The informational and relational axes display the average standardized regression coefficients for five question formulations along with their 95% confidence ellipses obtained through a 1000 bootstrap resamples of the data. The dot size represents the relative frequency of each formulation.*

3.6 Study 2: Online Chat Experiment

Taken together, Study 1 suggests that asking open-ended questions can be a very effective—and underused—negotiation strategy. However, the observational nature of this data precludes causal inference. Some unobserved variable(s) (e.g., personality) could explain the higher gains of inquisitive negotiators. Therefore, in Study 2, we examine open-ended question asking in a controlled experiment during live interactions.

3.6.1 Method

Participants. We recruited 577 participants on Prolific Academic to negotiate in dyads via live text-based chat using SMARTRIQS (Molnar, 2019). All data, analysis code, and research materials are available at https://researchbox.org/1941 (passcode=TJEFDL) and in the Supplemental Material. As preregistered (aspredicted.org/NH4_3Y8), we applied several exclusion criteria to ensure our analysis only considered dyads who completed the full experiment and followed instructions. Accordingly, we excluded 122 participants that could not be matched with another participant or quit the experiment before the live interaction started (e.g., abandoned the experiment while preparing questions). We excluded six dyads for which at least one partner reported that s/he was unable to finish the conversation (e.g., Internet connectivity issue) and 15 participants whose counterpart did not report the terms of the agreement. Lastly, we excluded seven dyads in which at least one participant did not follow the experimental instructions (i.e., did not prepare questions or statements) and seven dyads in which one of the negotiators agreed to a deal below their reservation value. The final sample included 400 participants (217 males, 172 females, 4 preferred not to say and 7 other; 54% male; mean age M = 38; SD = 12), or 200 dyads, for our analyses. Participants were paid a flat 1.5£ participation fee and up to 1.1£ as an additional variable compensation based on their performance.

Material and Procedure. Immediately after being paired with a peer, participants received role instructions for a lease negotiation they would complete over text-based online chat. The case, adapted from Eisenkraft (2016), featured an office rental discussion between a landlord and a prospective tenant over three issues with integrative potential (2 tradable issues and 1 compatible issue).

In each dyad, we randomly assigned the participant to the role of tenant to an open-ended question condition or to a control condition. In the open-ended question condition, we asked participants to "write down a minimum of three open-ended questions to ask the landlord," as part of their negotiation preparation. In the control condition, we asked participants to "write down a minimum of three things to say to the landlord." Landlords were naïve: they were not assigned to an experimental manipulation and did not know that their counterpart had extra preparation instructions. Participants were given 10 minutes to prepare the case before entering the live chat.

To incentivize performance, participants' outcomes in the negotiation were tied to their compensation. Specifically, participants could accept any deal above 8 points, but each point earned above that reservation value was worth an extra 10 cents in bonus. The best possible deal that was still viable to the counterpart was worth 19 points (i.e., a 1.10 GBP bonus). After the conversation, participants ended the chat and reported independently the terms of the agreement (or lack thereof). When the deal reported by the two negotiators did not match, we manually check the chat and report the deal (or absence) that was agreed by both. A detailed description of instructions can be found in Supplemental Material – Note 7.

3.6.2 Results

Open-Ended Questions. Following our pre-registration plan, we first applied our question-detection algorithm to the chat transcripts to compute participants' open-ended question rates—the proportion of their conversational turns that included at least one open-

ended question. Consistent with our intended manipulation, tenants who were instructed to prepare open-ended questions asked open-ended questions on average twice as frequently (M = .14, SD = .12) than tenants in the control condition (M = .07, SD = .10), $t(198) = 4.82$, $p < .001$, Cohen's d = .69. Landlords, who received no instructions, displayed similar open-ended question rates than tenants in the control condition (M = .08, SD = .09), $t(198) = .91$, $p = .37$.

Negotiation Gains. The primary dependent measure for this study was the number of points that the Tenant earned in the final deal reached with the Landlord (see Supplemental Material – Note 7). As shown in Figure 6, tenants in the question condition obtained higher individual gains (M = 5.10, SD = 2.79) than tenants in the control condition (M = 4.16, SD = 2.97), $t(198) = 2.31$, $p = .02$; d = .33. The increased gains of inquisitive tenants did not come at the expense of their landlords. Exploratory analyses revealed that landlords paired with question-condition tenants earned equivalent gains (M = 5.35, SD = 2.82) compared to landlords paired with control-condition tenants (M = 4.97, SD = 3.25), $t(198) = .90$, $p = .37$; d = .13). Moreover, joint gains (measured as the sum of both roles' earnings) were higher in the question condition than in the control condition ($M_{question}$ = 10.45, $SD_{question}$ = 3.93 vs. $M_{control}$ = 9.12, $SD_{control}$ = 4.86, $t(198) = 2.13$, $p = .03$, d = .30). When measured as the overall agreement efficiency[4], which identifies the distance of the negotiation agreement with a Pareto efficient deal, joint gains showed the same effect ($M_{question}$ = 87, $SD_{question}$ = 24 vs. $M_{control}$ = 77, $SD_{control}$ = 35, $t(198) = 2.4$, $p = .02$; d = .33).

[4] The score is computed by 1- [(B)/(B + W)], where B is the number of solutions that would be strictly better than the joint outcome, and W is the number of solutions that would be strictly worse for both negotiators (Hyder et al., 2000; Tripp & Sondak, 1992).

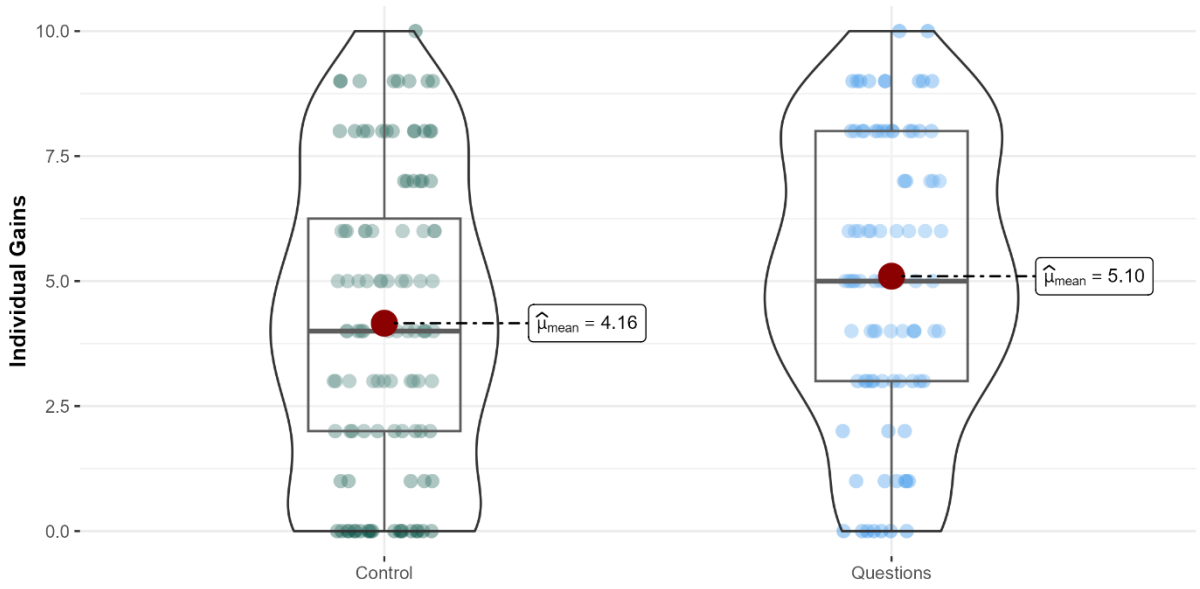


Figure 6. The effect of open-ended question-asking on individual gains.

Informational Outcome. We manually coded information from the chat transcripts from which participants' condition had been previously obscured (Procedure in Supplemental Material – Note 8). Most conversational turns did not contain strategic information disclosure (M = 7.5%, SD = 9.94). However, tenants in the open-ended question condition obtained more information (% of turns containing information) (M = 9.50%, SD = 10.76) from the landlord than did tenants in the control condition (M = 5.71%, SD = 8.89), $t(198) = 2.68$, $p = .008$, Cohen's $d = .39$. And tenants who obtained more information obtained better deals ($\beta = .07$, $t = 3.62$, $p < .001$).

Relational Outcome. As in Study 1, we used OpenAI's GPT 3.5 Turbo API to code turn-by-turn sentiment using R (Rathje et al., 2023; code in Supplemental Material – Note 4). The average turns' sentiment was positive (M = .14, SD = .22). The difference in sentiment conveyed by landlords paired with question-condition tenants (M = .17, SD = .22) and control tenants (M = .14, SD = .24) did not reach significance, $t(198) = .76$, $p = .45$, Cohen's $d = .11$.

And tenants who received more positive sentiment from their landlord counterparts did not obtain better deals (β = .86, t = 0.93, p = .35).

Mediation. We conducted a parallel mediation analysis with 5000 bootstrap resamples using PROCESS (Version 4.3) for R (Hayes, 2017). The model included the experimental condition as the predictor variable (0 = control; 1 = question), average information and rapport as parallel mediators, and gains as the outcome variable. Control variables, such as number of turns and sentiment of the tenant, were included in the analysis, but results were virtually identical without these control variables. As depicted in Figure 7, the total effect of the question (vs. statement) condition on gains was significant (β = .29, SE = .13, 95% CI [.02, .55], p = .03), and this relationship was partially mediated by the overall amount of strategic information obtained (indirect effect of information: β = .07, SE = .04, 95% CI [.01, .16], p < .05). In contrast, the indirect effect for the average rapport elicited was not significant (β = .003, SE = .01, 95% CI [-.02, .04], p = .85). These parallel mediation effects were observed after controlling for our set of covariates, suggesting again that strategic information gains partially explain why inquisitive negotiators earn more.

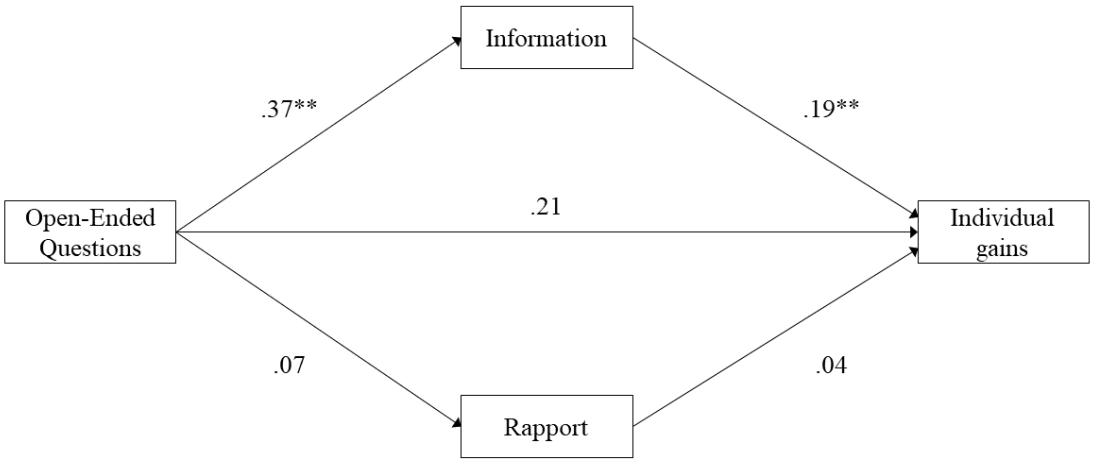


Figure 7. Parallel mediation analysis. *Open-ended Questions is a dummy variable (1 = question condition); Information, Rapport and Individual gains are expressed in standardized units (Z-scores).*

3.7 Discussion

Over one in four of the interactions people have everyday involve some form of negotiation (Di Stasi, Schweinsberg, & Quoidbach, 2023). Recent work suggests that, in the context of live interaction, negotiation may be conceptualized as *topics* on which interlocutors' motives or beliefs conflict—and the duration of these topics can range along a spectrum from brief, fleeting moments of conflict embedded in more cooperative interactions, to whole conversations underpinned by conflict, to multiple conversations or relationships defined almost entirely by conflict (Yeomans et al., 2021). Despite the tremendous pervasiveness of negotiation, though, people seem to overlook a simple strategy to obtain better outcomes during them: asking more open-ended questions. Confirming long-standing expert observations (e.g., Fisher, Ury & Patton, 2011; Malhotra & Bazerman, 2007; Voss & Raz, 2016), our analyses of large-scale negotiation transcripts revealed that negotiators ask a surprisingly low number of open-ended questions—less than one in ten speech turns incorporated an open-ended question. Neglecting to ask is a costly strategic error. Through both observational and experimental data, we found that asking more open-ended questions predicted higher individual outcomes. Inquisitive negotiators (those instructed to ask open-ended questions for which ~14% of turns contain an open-ended question) gain on average 23% more than less inquisitive negotiators (those instructed to prepare statements for which ~7% of turns contain an open-ended question). Our studies have identified one simple underlying reason: the more questions one asks, the more critical strategic information counterparts reveal in response. In our samples, open-ended questions triggered responses that were twice as extensive and informative as responses elicited by asking closed-ended questions or by making non-question statements. In turn, learning more information from a counterpart led to more beneficial personal outcomes.

Our studies quantify, for the first time, people's tendency to spend excessive amounts of time trying to influence the other party (by making statements) and insufficient time learning

(by asking questions) during negotiations. We found an astonishing gap: over 80% of the dialogue in the negotiations in our samples were geared toward influence rather than inquiry. In our studies, participants were equally inclined to ask open-ended and closed-ended questions, a contrast to previous research demonstrating a human tendency to pose more closed-ended questions (Baldwin, 1993; Oxburgh et al., 2012; Snook et al., 2012).

Our findings contribute to a renewed and rapidly burgeoning interest in behavioral science to understand the key ingredients of successful conversations (e.g., Di Stasi, Templeton, & Quoidbach, in press; Templeton et al., 2022, 2023; Reece et al., 2023; Huang et al., 2017; Yeomans et al., 2021; Yeomans et al, 2023). While previous studies have underscored the surprising benefits of asking even seemingly sensitive questions in cooperative conversations to pursue relational motives (Hart et al., 2021; Huang et al., 2017), we demonstrate that asking questions can boost informational and economic outcomes, without harming relational ones, in competitive contexts as well (Yeomans et al., 2019). Notably, in line with Huang et al.'s (2017) findings that follow-up questions are a powerful question type to establish interpersonal liking and signal responsiveness among strangers, and Minson et al.'s (2018) findings that "negative assumption" questions increase the veracity of counterpart responses, our research also finds that question types matter. Specifically, our data suggests that while open-ended questions increase information exchange, closed-ended questions may not improve negotiated outcomes.

3.8 Future Directions

Our findings open the door to exciting avenues for future research. By studying conversational transcripts at large scale (Stokoe, 2021; Yeomans et al., 2023), more work is surely needed to understand the trade-offs that come along with asking questions across the vast array of conversational objectives people pursue (Yeomans et al., 2021). For example, contrary to previous studies on cooperative conversations, we did not observe an increase in

liking as a result of asking more open-ended questions in our data—there was no effect on liking. Prior work has theorized that question-asking may operate differently in cooperative versus competitive contexts, a hypothesis that warrants further investigation, likely at the topic or turn level of analysis, rather than thinking of conversations as wholly defined by cooperative versus competitive motives (e.g., Brooks & John, 2018).

Further, we need more data to more deeply understand what an ideal balance between influencing and learning might look like. While we observed no adverse effects of posing too many questions within the natural range of question-asking in our study (the maximum open-ended question rate was 35% of turns), it remains to be investigated how an excessive tilt towards asking questions (and a scarcity of statements) may impact negotiation outcomes.

Our results underscore the importance of differentiating between different formulations of questions. While our study focused on the fundamental distinction between open- and closed-ended questions, future research may reveal insightful negotiation strategies by investigating other or more nuanced distinctions. Should negotiators prefer "how" to "why" questions as some experts suggest (Voss & Raz, 2016)? Are indirect queries such as "tell me about..." as effective as direct ones?

The distinction between closed- and open-ended seems straightforward, but how they play out in practice hinges on many aspects of context—and how interlocutors choose to respond to them. For instance, "how" or "why" questions that may appear to be open-ended may yield a limited set of responses, while seemingly closed-ended questions like "Can you describe your priorities?" may prompt a glut of information disclosure in practice. Scholars in the field of police interviewing have proposed categories that attempt to capture these practical tendencies, for example, describing questions as appropriate versus inappropriate, or productive versus unproductive (Milne and Bull, 1999; Griffiths and Milne, 2006). Theorizing

by Griffiths (2008) suggests that productive questions typically include open-queries ("Tell me about..."), probing questions (the "5WH"), and closed-ended questions to clarify information. In contrast, unproductive questions include inappropriate closed questions (yes/no questions unrelated to information already disclosed), leading open-ended questions (those presuming the desired answer), multiple questions (asking about several topics simultaneously), and inquiries that are, in reality, statements of the interviewer's opinion. Undoubtedly, these categorizations demand more empirical examination, but they could provide a valuable roadmap for future investigations into question-asking in negotiations.

Huang et al. (2017) suggest a question typology based largely on the verbal content that precedes each question—whether the question follows up on something said previously (follow-up), mirrors a question stated before (mirror), or switches to a new topic (topic-switching). Because conversations unfold as a cascade of speaker turns, what comes *after* a question provides context and meaning for questions, too. Emerging work on "boomerasking" suggests that how questioners respond to a counterpart's response in a question-answer-response pattern influences how the counterpart views the sincerity of the original question (Brooks, Yeomans & Norton, 2022). Questioners who quickly answer their own questions seem more interested in disclosing their own views than interested in learning their counterpart's.

Indeed, moving beyond question typologies, future research can examine many aspects of question delivery—other verbal, nonverbal, and paralinguistic cues—and how these variables impact the effects of questions. For example, factors such as tone (e.g. warm or aggressive), volume (e.g. soft or loud), pace (e.g., fast or slow), eye gaze, and strategic pauses can significantly influence negotiation outcomes (Abi-Esber, Brooks & Burris, 2022; Curhan et al., 2022; Jeong et al., 2019; Di Stasi, Templeton, & Quoidbach, in press; Van Zant & Berger, 2020). The dynamic communication context is also essential to consider. For example, Muir et al. (2020) revealed that negotiators who mirror each other's communication style—particularly

in the use of interrogative phrases—achieve more substantial joint and individual gains. Though different scholarly fields use different terminology to refer to the shifting congruence between interlocutors' behaviors (e.g. accomodation, contagion, synchrony, mirroring), there is much work to be done to understand how interpersonal congruence and accommodation do and should play out during live interaction—and their impact on negotiated outcomes.

Future research should also examine the potential moderators of the benefit derived from open-ended questions in negotiations, both from individual, situational, and cultural perspectives. Do the benefits of asking open-ended questions extend equally across different demographic or personality backgrounds? To what extent does the efficacy of open-ended questions apply to various types of negotiations? And is it equally the case in Barcelona, New-York, or Tokyo? While we observed no moderating effects of the negotiation topic (resource allocation, department merger, job offer) in our initial study, it should be noted that our cases all featured integrative negotiations marked by relatively balanced power dynamics and high value-creation potential. Future investigations should assess whether more inquisitive negotiators also enjoy a negotiating advantage in other contexts, particularly those characterized by clear power asymmetries (e.g., do lower power employees who ask many questions risk antagonizing a higher-power boss?) as well as in purely distributive situations, where questions may seem more prying or interrogative more quickly (e.g., Brooks & John, 2018).

3.9 Conclusion

Our research offers novel evidence that substantiates the widely-accepted yet previously unexplored assumption that negotiators often excessively focus on influencing rather than learning. The road ahead calls for meticulous exploration into the nuance of question types, the delicate art of delivery and framing, and the identification of specific contexts in which

question-asking may be more or less advantageous. Despite these open questions, our findings unambiguously emphasize the importance of fostering an inquisitive mindset in negotiations by asking more open-ended questions, which solicit information disclosure to understand a counterpart's point of view (rather than spending excessive time asserting one's own).

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3.11 Supplemental Material

Note 1 - Web Service Case Payoffs

Options		Points	
		Business	**Government**
BATNA		100	114
Compensation Scheme	60% fixed salary, 40% bonus	10	32
	70% fixed salary, 30% bonus	16	27
	80% fixed salary, 20% bonus	23	23
	90% fixed salary, 10% bonus	29	18
	100% fixed salary, 0% bonus	35	13
Overall Leadership Plan	Promote from Business Services	18	-2
	Promote from Government Services	12	32
Transition Time	3 months	30	10
	6 months	22	11
	9 months	13	13
	12 months	4	15
	15 months	-4	16
Team Leadership Plan	0 leaders from Business Services, 4 from Government	10	32
	1 leaders from Business Services, 3 from Government	15	26
	2 leaders from Business Services, 2 from Government	19	19
	3 leaders from Business Services, 1 from Government	24	13
	4 leaders from Business Services, 0 from Government	29	6
Engineer Redundancy Plan	0 engineers removed from Business Services, 4 from Government	32	32
	1 engineers removed from Business Services, 3 from Government	30	30
	2 engineers removed from Business Services, 2 from Government	27	27
	3 engineers removed from Business Services, 1 from Government	24	24
	4 engineers removed from Business Services, 0 from Government	22	22

Note 2 - Study 1: text processing

Speech turns. The primary unit of analysis is "speech turn" which we define in the following ways. A turn is a succession of words a speaker said before their partner began talking. In a dyadic conversation, speakers alternate speech turns.

Data Structure. As illustrated in the table below our transcripts included for each turn: (i) a progress variable (Progress), (ii) the speaker identifier (Id), (iii) a start timestamp, (iv) an end timestamp, and (v) text.

Progress	Id	Time Start[5]	Time End[1]	Text
1	55	00:00:03:48	00:00:04:48	Hello.
2	32	00:00:04:61	00:00:05:61	Hello.
3	55	00:00:05:114	00:00:09:89	I'm Mr… Well, we already know. I'm Mr. Martinez.
4	32	00:00:10:07	00:00:12:99	OK. and I am Mr. Colleman.
5	55	00:00:14:52	00:00:15:91	Hello. Hello, how are you?
6	32	00:00:16:95	00:00:20:77	Fine, and you? It's good to talk to you.
7	55	00:00:21:29	00:00:25:17	Yeah, the same. How's the advertising department going?
8	32	00:00:25:106	00:00:42:85	Yeah, it's pretty good. But we can always improve something. And this is a good opportunity for a solid job, to make some improvements and to give like some impulse to our company, to our newspaper.
9	55	00:00:44:73	00:00:48:28	Yeah. I like I am liking this improvement's of this new of our new bosses.
10	32	00:00:49:62	00:00:50:62	Yes.
11	55	00:00:52:13	00:00:56:65	And I think it's good that they are letting us do these investments.

[5] The unit of measure is hh:mm:ss:fps. fps: 120 frames per second.

Note 3 - Open-Ended Questions Detector Features

Using the R package "sentimentr", we obtained the word count per turn. Then, using the R package "politeness" (Yeomans, Kantor, & Tingley, 2018), we obtained the number of question marks per turn.

Algorithm

Table S1 lists all of the features that were used for constructing the Open-Ended Questions detection model in Study 1. These features were primarily drawn from Huang, Yeomans, Brooks, Minson, & Gino (2017). We used a relatively simple algorithm. The text from each turn was tokenized into sentences delimited by a period, exclamation mark, semicolon, and question mark. Then, we detect open-ended questions when a sentence contains (1) a question mark and (2) at least one of the Open-Ended Question features (Table S1). We use the R package "*stringr*" to detect Open-Ended Question features.

One possible limitation is that some of the features can be used with other grammatical roles. For example, which can form a question or be used as a function word to introduce a relative clause (Merriam-Webster Dictionary). However, the number of false positives was very limited in our dataset (4.2% in human coded turns) such that training and testing may not be internally and externally valid. Please contact the authors for more information.

Table S1: Relative frequency and examples of open-ended formulations in Study 1.

Formulation	Relative Frequency (N observations)	Examples
What	57.8% (2441)	What's your preference? What do you think about X? What's your priority?
How	20.7% (873)	How do you assess this? How do you feel about X? How many X do you need?
Which	8.6% (361)	Which do you prefer? Which one are you thinking of? Which one is that?
Why	6.5% (273)	Why? Why do you think so? Why don’t we look at X?
Where	3.0% (128)	Where would you like to invest this money? Where should we start? Where do you see your department lacking?
Who	1.8% (78)	Who pays for X? Who would join us? Who are you hiring?
When	1.6% (67)	When? When can you increase my signing bonus to X? When is X necessary?

Note 4 - OpenAI's GPT 3.5 Turbo API to code turn-by-turn sentiment using R

We draw from the code of Rathje and colleagues (2023). Originally the prompt assigned the values 1 if positive, 2 if neutral and 3 if negative (see code below). Subsequently we recoded the values in R into 1 if positive, 0 if neutral and -1 if negative to have a more intuitive interpretation of average individual sentiment.

R Code:

```
### Install Required Packages
rm(list = ls())

library(httr)
library(tidyverse)
library('rio')
library(readr)
library(readxl)

set.seed(25)

##########################
##### GPT prompting #####
##########################

# Note: code we are using was adapted by this blog post:
https://rpubs.com/nirmal/setting_chat_gpt_R.
# We highly recommend you read over that blog post in detail if you are stuck at any of these steps
# First, you must get your ChatGPT API key from here:
https://platform.openai.com/overview

# Then, put your API key in the quotes below:
my_API <- "[INSERT YOUR API KEY]"
```

```
#The "hey_chatGPT function will help you access the API and prompt GPT
hey_chatGPT <- function(answer_my_question) {
  chat_GPT_answer <- POST(
    url = "https://api.openai.com/v1/chat/completions",
    add_headers(Authorization = paste("Bearer", my_API)),
    content_type_json(),
    encode = "json",
    body = list(
      model = "gpt-3.5-turbo-0301",
      temperature = 0,
      messages = list(
        list(
          role = "user",
          content = answer_my_question
        )
      )
    )
  )
  str_trim(content(chat_GPT_answer)$choices[[1]]$message$content)
}



# Read in your dataset
data <- read_csv("XXX.csv")

# Create a "gpt" column
data$gpt <- NA

# Run a loop over your dataset and prompt ChatGPT

for (i in 1:nrow(data)) {
```

```
  print(i)


   # prompt 1
question <- "Is the sentiment of this text positive, neutral, or negative? Answer only with a
number: 1 if positive, 2 if neutral, and 3 if negative. Here is the text:"


  text <- data[i,5]
  concat <- paste(question, text)
  concat <- str_replace_all(concat, "[\r\n]" , "")
  result <- hey_chatGPT(concat)
  while(length(result) == 0){
    result <- hey_chatGPT(concat)
    print(result)
  }
  print(result)
  data$gpt[i] <- result
}


data$gpt <- gsub(".*?([0-9]+).*", "\\1", data$gpt) # look for number in the code



#Take only the first string from gpt and convert to a numeric
data$gpt <- substr(data$gpt, 1, 1)
data$gpt <- as.numeric(data$gpt)


data["gpt"][is.na(data["gpt"])] <- 2


export(data, "XXX")
```

Note 5 - Main Effect Robustness checks

Table S2: We control for amount of words spoken by both negotiators.

	(I)		(II)		(III)		(IV)	
	β	*t-value*	β	*t-value*	β	*t-value*	β	*t-value*
Questions	1.04*	2.30						
Closed-Ended Questions			.21	.29			-.47	-.61
Open-Ended Questions					2.33**	3.23	2.5***	3.25
Marginal R^2	0.06		0.04		0.07		0.07	

Note. n = 610. Hierarchical linear modeling was applied for all the models. $^{+}$ p < .10. * p < .05. ** p < .01. *** p < .001. (All two-tailed tests). Independent variables take values from 0 to 1. Random effect for individual, role, dyads and negotiation case. Control variables are the counterpart's same variable, length of the negotiation and gender.

Table S3: Total open-ended questions.

	(I)		(II)		(III)		(IV)	
	β	*t-value*	β	*t-value*	β	*t-value*	β	*t-value*
Questions	.02**	2.76						
Closed-Ended Questions			.002	.22			-.01	-.89
Open-Ended Questions					.03***	3.71	.04***	3.76
Marginal R^2	0.03		0.003		0.04		0.04	

Note. n = 610. Hierarchical linear modeling was applied for all the models. $^{+}$ p < .10. * p < .05. ** p < .01. *** p < .001. (All two-tailed tests). Random effect for individual, role, dyads and negotiation case. Control variables are the counterpart's same variable, length of the negotiation and gender.

Table S4: Interaction of Open-Ended questions by case.

	Questions		Closed-Ended Questions		Open-Ended Questions	
Interaction term	β	*t-value*	β	*t-value*	β	*t-value*
Pacific	.5	.37	-.73	-.33	2.59	1.15
Mc Consult	.12	.58	.009	.53	.18	1.1
Web	-2.8	-1.29	-8*	-2.29	.28	.09
Marginal R^2	0.04		0.04		0.05	

Note. n = 610. Hierarchical linear modeling was applied for all the models. $^{+}$ p < .10. * p < .05. ** p < .01. *** p < .001. (All two-tailed tests). Random effect for individual, role, dyads and negotiation case. Control variables are the counterpart's same variable, length of the negotiation and gender.

Table S5: Cluster standard errors at individual level.

	(I)		(II)		(III)		(IV)	
	β	*t-value*	β	*t-value*	β	*t-value*	β	*t-value*
Questions	1.38**	3.01						
Closed-Ended Questions			.60	.83			-.27	-.35
Open-Ended Questions					2.84***	3.97	2.96***	3.86
Adjusted R^2	0.02		0.00		0.03		0.03	

Note. n = 610. Hierarchical linear modeling was applied for all the models. $^{+}$ p < .10. * p < .05. ** p < .01. *** p < .001. (All two-tailed tests). Random effect for individual, role, dyads and negotiation case. Control variables are the counterpart's same variable, length of the negotiation and gender.

Note 6 - Mediation Robustness Checks

Results are virtually identical without control variables (bootstrapped parallel meditation indirect effect: 95% CI [0.0051 - 0.1961], $p = .04$).

Results are robust using different proxies of length of counterpart response, such as the difference between the sum of counterpart's response word count and sum of word count of all their counterpart's responses. In addition, counterpart's average word count was negatively related to individual gains ($\beta = -0.09$, $t = -2.2$, $p = .03$). This rule out a possible alternative explanation that the association between lead word count and individual gains is driven by counterpart's average word count. Another alternative explanation is that counterpart long responses at t+1 led the negotiator to have more time to think about better arguments at t+2. However, turn length at t+2 did not mediate the link between open-ended questions and individual gains (Sobel test: $z = -1.35$, $p = .18$; bootstrapped indirect effect: $p = .13$).

Note 7 - Study 2: Online Chat Experiment Material

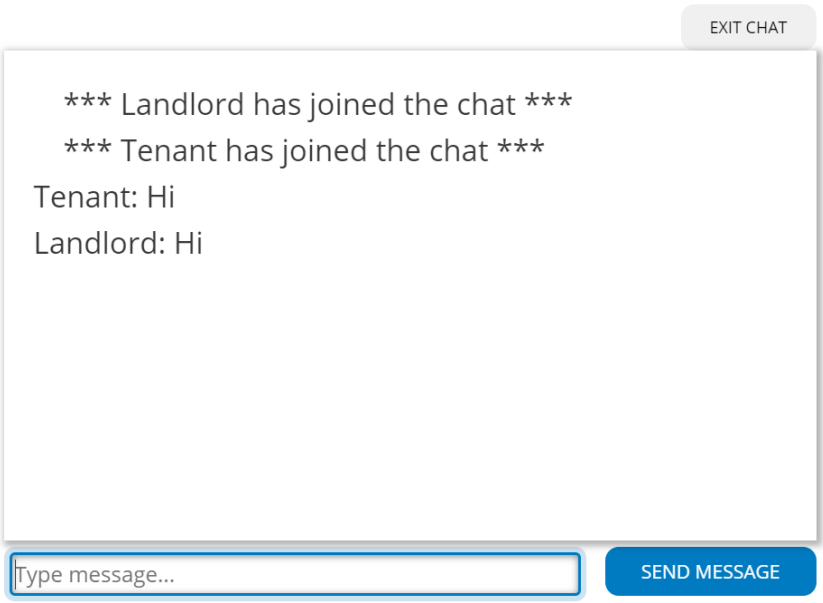
Instructions

We instructed participants that they would (1) "be assigned to the role of a tenant or a landlord in a fictional negotiation case", (2) "negotiate the case with another participant via a live chat", and (3) "be asked to enter the terms of your deal" at the end of the conversation. The fictitious case consisted of negotiating the conditions of the lease of an office in London (UK).

Table S5 - Office Rental Payoffs

	Tenant	Landlord
BATNA (points)	8	8
Parking	1. A. No space, 0 points 2. B. One space, 2 points 3. C. Two spaces, 4 points 4. D. Three spaces, 7 points 5. E. Four spaces, 10 points	6. A. No space, 4 points 7. B. One space, 3 points 8. C. Two spaces, 2 points 9. D. Three spaces, 1 points 10. E. Four spaces, 0 points
Internet Cables	● A. Old cables, 0 points ● B. High-speed cables, 3 points ● C. Optical fiber, 6 points ● D. Micro wireless, 7 points	● A. Old cables, 7 points ● B. High-speed cables, 3 points ● C. Optical fiber, 6 points ● D. Micro wireless, 0 points
Start Date	● A. Next week, 0 points ● B. Next month, 1 points ● C. Two months from now, 2 points ● D. Three months from now, 3 points ● E. Four months from now, 4 points	● A. Next week, 10 points ● B. Next month, 7 points ● C. Two months from now, 4 points ● D. Three months from now, 2 points ● E. Four months from now, 0 points

Figure S1: Example of SMARTRIQS Live Chat Interface



Note 8 - Instructions to code for information of Landlord text

“Examine the transcript from a negotiation conversation provided below. Your task is to evaluate if the speaker is disclosing personal preferences in one of the following ways: Inter-issue disclosure: Revealing the relative importance of one issue over another (e.g., 'Starting date is more crucial to me than Parking allocation'). Intra-issue disclosure: Revealing the relative importance of options within the same issue (e.g., 'I favor old cables over micro wireless'). Combined preference disclosure: Revealing intra and inter-issue preferences simultaneously (e.g., 'Starting next week is more important to me than conceding all the parking spaces you want'). Consider the preference points associated with each option in the following issues: Parking Allocation Issue: No spaces (4 points), one space (3 points), two spaces (2 points), three spaces (1 point), four spaces (0 points). Internet Cable Connection Issue: Old cables (7 points), optical fiber (6 points), high-speed cables (3 points), micro wireless (0 points). Start Date Issue: Starting next week (10 points), next month (7 points), two months from now (4 points), three months from now (2 points), and four months from now (0 points). Please note that simply making offers is not considered disclosing preferences. After examining the provided text, determine whether the speaker is revealing personal preferences. Respond with '1' if 'Yes, the speaker is disclosing preferences' or '0' if 'No, the speaker is not disclosing preferences'.”

4. Facial Emotional Dynamics in Negotiation

Abstract

In the last decades, researchers have examined the role of emotions in negotiation. Prior research focused on how inducing or confronting one negotiator with an emotion impacts negotiation outcome. However, little research investigated the role of emotions of both negotiators. In this study, we examined the consequences of the interplay of emotions of two negotiators on the achievement of negotiation outcomes. We collected 362 negotiation videos where participants simulated a negotiation in dyads. Participants' real-time display of emotion throughout the negotiation was captured by a dedicated emotion recognition software supported by an artificial neural network. We then computed for each negotiator (1) the propensity to display five discrete emotions (i.e., joy, anxiety, frustration, contempt, and surprise), and (2) the synchronization and tendency to adapt their facial display of emotion with their counterparts (as a series of within-dyad regression coefficients predicting Person A's emotions from Person B's lagged emotions). Finally, we related these measures to individual and joint gains. We do find evidence that participants that adapting with one's counterpart positive emotions obtained higher individual gains.

4.1 Introduction

Person A is negotiating with Person B to buy her car. After some offers and counteroffers, with a big smile Person A said, "the lowest I can go is $10,000. How does that sound?" Person B reacts by saying, "let me think about it" while raising her cheeks and forming "Crow's feet" around her eyes. At this moment, A and B display emotional synchrony – both smiling at each other. Subsequently, and after discussing minor details, A and B shook hands and agreed on the terms of the deal. It is easy to imagine people concluding a negotiation with happy faces. However, how would the negotiation outcome be different if B reacted with a tense face to that pivotal offer?

Research demonstrates that emotions are often an integral part of the negotiation process (see Van Kleef & Côté, 2018 for a review). Throughout a negotiation, people may, for example, experience hope that things will go as planned, anxiety when expressing what they want, anger when their request is rejected, and happiness when they finally reach an agreement. In negotiation, emotions represent a valuable source of information (Van Kleef, De Dreu, & Manstead, 2004a). Laboratory studies on dyads show that inducing or confronting a negotiator with emotions such as anger, joy, or fear can have a critical impact on the outcome of negotiation (e.g., Hideg & Van Kleef, 2017; Keltner & Buswell, 1997; Morris & Keltner, 2000; Van Kleef, De Dreu, & Manstead, 2004b). More recently, scholars studied how emotional shifts (e.g., from happiness to anger) may be beneficial to obtain concessions during negotiation (see Filipowicz et al., 2011; Sinaceur et al., 2013).

Taken together, previous studies show that the emotional state of one negotiator can impact negotiation outcomes. Emotional cues are communicated via verbal speech content, voice pitch and tone, facial expressions, gestures, as well as posture/body positions (e.g., Liebal et al., 2014). Given the centrality of facial expressions in emotion communication (Fridlund,

1992), it is surprising that little research has been dedicated to the role of facial emotion expressions in negotiation. Furthermore, people tend to reciprocate counterpart's interpersonal behavior while engaging in a negotiation (Butt et al., 2005). By exploring the role of facial emotional synchrony in negotiation, we can measure the impact on negotiation outcomes.

4.1.1 Emotional Synchrony in negotiation

Long standing research on *rhythmic synchrony* (e.g. Bernieri et al., 1988; Nowicki et al., 2013; Oullier, de Guzman, Jantzen, Lagarde & Kelso, 2008; Schmidt et al., 1990) and *behavioral matching* (e.g. Abney et al., 2014; Chartrand & Bargh, 1999; Lakin, 2013) shows that people adapt their gestures (Nowicki et al., 2013), postures (Chartrand & Bargh, 1999; Hatfield et al., 1992) language (Gonzales, Hancock & Pennebaker, 2010) and emotions (Barsade, 2002) based on the person in front of them. Individuals adapt behavior to affiliate (Lakin & Chartrand; 2003) and match interlocutor expectations (Mast & Hall, 2018). Adapting behavior may improve smoothness of interaction and subsequently produce a better impression on the counterpart (Chartrand & Bargh, 1999). Emotional synchrony is associated with stronger emotional reactions, stronger social support, and higher endorsement of social beliefs and values (Páez, Rimé, Basabe, Wlodarczyk, & Zumeta, 2015). Acting in synchrony with others strengthens social attachment among group members (Wiltermuth & Heath, 2009). It has been shown that emotional synchrony makes individuals feel more connected (Cheong et al., 2020).

Given the findings in the extant literature and the strong theoretical rationale for its importance, we aim to investigate the interplay of facial emotion expressions in negotiation. More specifically, we examine the role of facial emotional synchrony, the number of times two negotiators simultaneously display a similar emotion, as well as facial emotional adaptation, the degree of emulation of their counterpart's emotion expression. We expect that both facial emotional synchrony and facial emotional adaptation positively relate to individual and joint

negotiation outcomes. In particular, we may expect that displaying a higher level of synchrony may produce a better rapport and cooperation.

This study contributes to developing our understanding of the role of facial expressions and dyadic emotional dynamics shape negotiation outcomes. It also contributes to the research on the "interpersonal" functions of emotions in specific social contexts (Keltner & Haidt, 1999; Van Kleef, 2009; Fridlund, 1994).

4.1.2 Role of Time

In conversations time is important. First impression research shows that job candidates who starting a conversation with a strong and long handshake (Stewart, Dustin, Barrick, Darnold, 2008), talking long turns (Gifford et la., 1985) and increased gestures (Gifford et la., 1985) received a higher job interview rating. In addition, the timing of communicating information matters. For example, people prefer bad news first compared to good news as it reduces worry (Legg & Sweeny, 2014) or when manager in firm disclosure has high tone dispersion (i.e. tone words are spread evenly within a narrative) leads to higher current aggregate and disaggregated performance and future performance (Allee & DeAngelis, 2015). Finally, conversations do not end as planned. Mastroianni and colleagues (2021) showed that conversations last twice as long than a conversant desired to and conversations almost never ended when both conversants wanted them to. In sum, past research shows that in a conversation time is pivotal to form impressions and affect behavior. Surprisingly, previous research paid little attention to the role of time in negotiation. Negotiations may be divided into different phases before reaching a deal (e.g. Walton (1969) proposes a two phases model). Hence, how negotiators adapt communication style and facial expression through the negotiation is still unknown. In this study we investigate the moderating role of time in the relationship between adaptation or synchrony and negotiation outcomes.

4.1.3 Individual and joint gains

Negotiation outcomes encompass a multitude of dimensions, with individual gains standing out as a pivotal metric, reflecting the extent to which a negotiator can secure financial advantages or concessions in a given negotiation scenario. While in negotiation research individual gains undoubtedly occupy a central place in the assessment of negotiation success (e.g. e.g., Loschelder et al., 2016; Lee & Ames, 2017; Lee et al., 2018; Thompson, 1991), scholars and practitioners have increasingly turned their attention to the broader spectrum of outcomes encapsulated by the efficiency of the negotiated deal (e.g. Curhan et al., 2022; Hyder et al., 2000; Tripp & Sondak, 1992). This dimension delves into the collective or pooled value that is generated as a result of the negotiation process, transcending the solitary focus on individual accomplishments. In this research endeavor, we embark on a comprehensive examination of the negotiation landscape, meticulously dissecting and evaluating the dual facets of individual gains, concerning the financial gains accrued by each negotiator, and the aggregate or joint gains derived from the totality of concessions and benefits secured by all parties involved. By scrutinizing both individual and joint gains, our study strives to provide a more nuanced understanding of negotiation dynamics and outcomes, shedding light on the intricate interplay between personal achievements and the overarching collaborative benefits of negotiations.

4.2 Methodology

We conducted an empirical study in which 392 participants were asked to negotiate a case in dyads. Each participant completed an average of 1.84 negotiations, providing a total of 362 negotiation videos of both distributive (n = 140) and integrative[6] (n = 222) negotiation cases. Participants' real-time display of emotion throughout the negotiation was captured via

[6] A firm resources allocation case (2 distributive, 2 integrative, and 1 compatible issue) and a job offer case (1 distributive and 4 integrative).

dedicated emotion recognition software that incorporated a residual convolutional neural network (R-CNN), a subtype of artificial neural networks particularly suited to classifying images based on subtle differences. Each participant was recorded simultaneously and the software captured the simultaneous emotional display at half-second intervals. Average negotiation length was about 28 minutes. This led to a final sample of 2'494'398 emotion data points (1'247'199 at dyadic level).

The software identified the participant's faces, and then classified a cropped image of those faces as one (or none) of the following five emotion categories: anger, disgust, fear, happiness, sadness. These particular categories have both theoretical and empirical significance. First, the displays of these emotional states are relatively common and have been identified characterizing our everyday emotional life (Ekman, 1999; Trampe, Quoidbach & Taquet, 2015). Likewise, these expressions have a long history of careful empirical investigation in the field of facial expressions of emotion (e.g., Keltner & Ekman 2000). Furthermore, although the function and meaning of facial expressions is highly contextual (Fridlund, 1992), the higher base rate of these particular emotional expressions, allows for more generalized social functions to be assumed by most people. Research by Crivelli and Fridlund (2018) show that anger is most often associated with the social function of evoking submission, disgust with rejection, fear with deflecting attack, happiness with affiliation or engagement, and sadness with recruiting favor or protection. Unsurprisingly, these social functions of emotional displays are also likely to be important in the negotiation context (e.g. Van Kleef & Côté, 2018).

4.2.1 Measures of Synchrony and Adaptation

The software's resulting output is a database with negotiator emotions in the columns and chronological time in the rows. For each timepoint, a given emotion can be a value from 0

to 1, which represents the probability for the observer to interpret that particular emotion. There are 233'429 rows where all emotions are 0. This can be interpreted as a neutral face. Synchrony for each emotion in a negotiation was represented by the % of times both negotiators were displaying the same emotion on the overall times one of the two was displaying that emotion. Adaptability was represented by the lagged logistic regression coefficient of the counterpart's behavior at t-1 on the negotiator behavior at t, controlling for the negotiator behavior at t-1. Data was analyzed at individual level.

$$ln(\frac{P}{1-P}) = \beta_0 + \beta_1 EmotionB_{t-1} + \beta_2 EmotionA_{t-1}$$

The adaptability for each speaker (A) is the counterpart's coefficient (β_1). It is important to control for the previous emotion of the focal negotiator to guarantee that the metric measures only when a speaker adapts to counterpart's emotion.

We used hierarchical linear modeling to estimate how emotions and adaptation were related with outcome. Specifically, we use multi-level linear models with random intercepts for negotiators, case, and dyad.

4.3 Results

4.3.1 Descriptive

As depicted in Figure 8, anger (55%) is the emotion most predominant in a negotiation. In fact, the conflictual structure of the conversation may lead to more anger for not finding a desired outcome. Then happiness (22%), it is the second emotion most displayed. The other three emotions represent less than 23% of time. In particular, fear is little displayed.

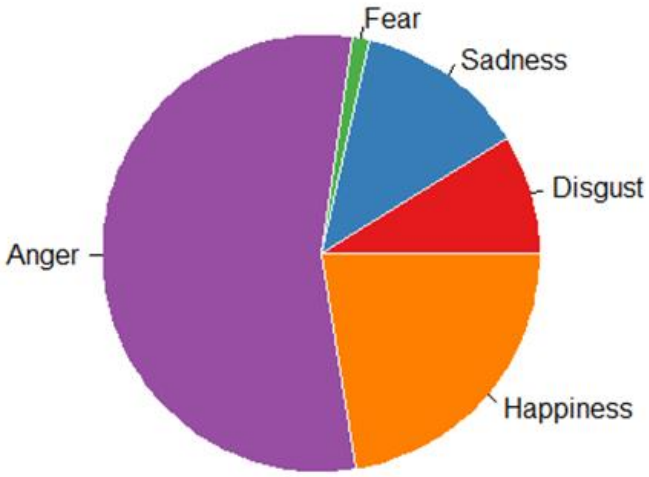


Figure 8. Proportion of emotions.

Then, we look at the level of emotional synchrony and adaptation (Table 5). We find that on average people tend to be synchronized on Anger (31% of time) and Happiness (12% of time).

Table 5. Emotion synchrony and adaptation descriptive statistics at dyadic level

	Synchrony					Adaptation				
Variable	n	mean	sd	min	max	n	mean	sd	min	max
Happiness	362	12.46	8.60	0.00	78.2	360	0.37	0.41	-0.82	2.2
Anger	362	31.86	15.40	0.00	73.7	362	0.04	0.86	-13.8	1.5
Fear	350	0.15	0.49	0.00	3.9	281	-10.3	4.20	-14.6	2.4
Sadness	362	4.20	5.11	0.00	62.9	357	-1.0	3.40	-15.6	15.4
Disgust	362	2.82	3.20	0.00	21.1	359	-2.0	4.40	-15.4	1.3

4.3.2 Individual and joint gains

Firstly, we collapsed at individual level the emotions and the coefficient of adaptation and synchrony. We related adaptation to the same emotion to individual gains (Table 1). We do not find significant relationships for displaying single emotions, however those who adapted

to smile faces obtained significantly better results (p = .04). When we look at dyadic level (Table 2), the level of synchrony and adaptation (the average of the two negotiators), we find that negotiators that adapted to the counterpart happy faces reached higher joint gains (p = .006). This does not apply for synchrony.

Table 6. Emotion Adaptation and individual gains.

	Adaptation
Happiness	0.14*
Anger	-0.03
Fear	-0.00
Sadness	0.01
Disgust	-0.00
Controlling for emotions	Yes
N	642
Marginal R^2	.02

*p < 0.10, **p < 0.05, ***p < 0.01

Table 7. Emotion synchrony and adaptation on joint gains.

	Synchrony	Adaptation
Happiness	0.01	0.56**
Anger	-0.01	0.01
Fear	0.02	0.00
Sadness	0.03	0.04
Disgust	-0.01	-0.01
Controlling for emotions	Yes	Yes
N	349	280
Marginal R^2	.02	.06

*p < 0.10, **p < 0.05, ***p < 0.01

4.3.3 Moderating role of time

Facial displays of emotions change throughout the negotiation. As depicted in Figure 9, we simply split the dataset into high and low joint gains (High: Joint gains > Median; Low: Joint gains > Median) and took the average display of emotion for % time of negotiation. Firstly, it is possible to observe that the emotion level for each emotion fluctuates throughout the negotiation. Secondly, emotion patterns of dyads that obtain high joint gains may differ with low joint gains. Consistent with previous research, happiness and anger tend to have opposite patterns.

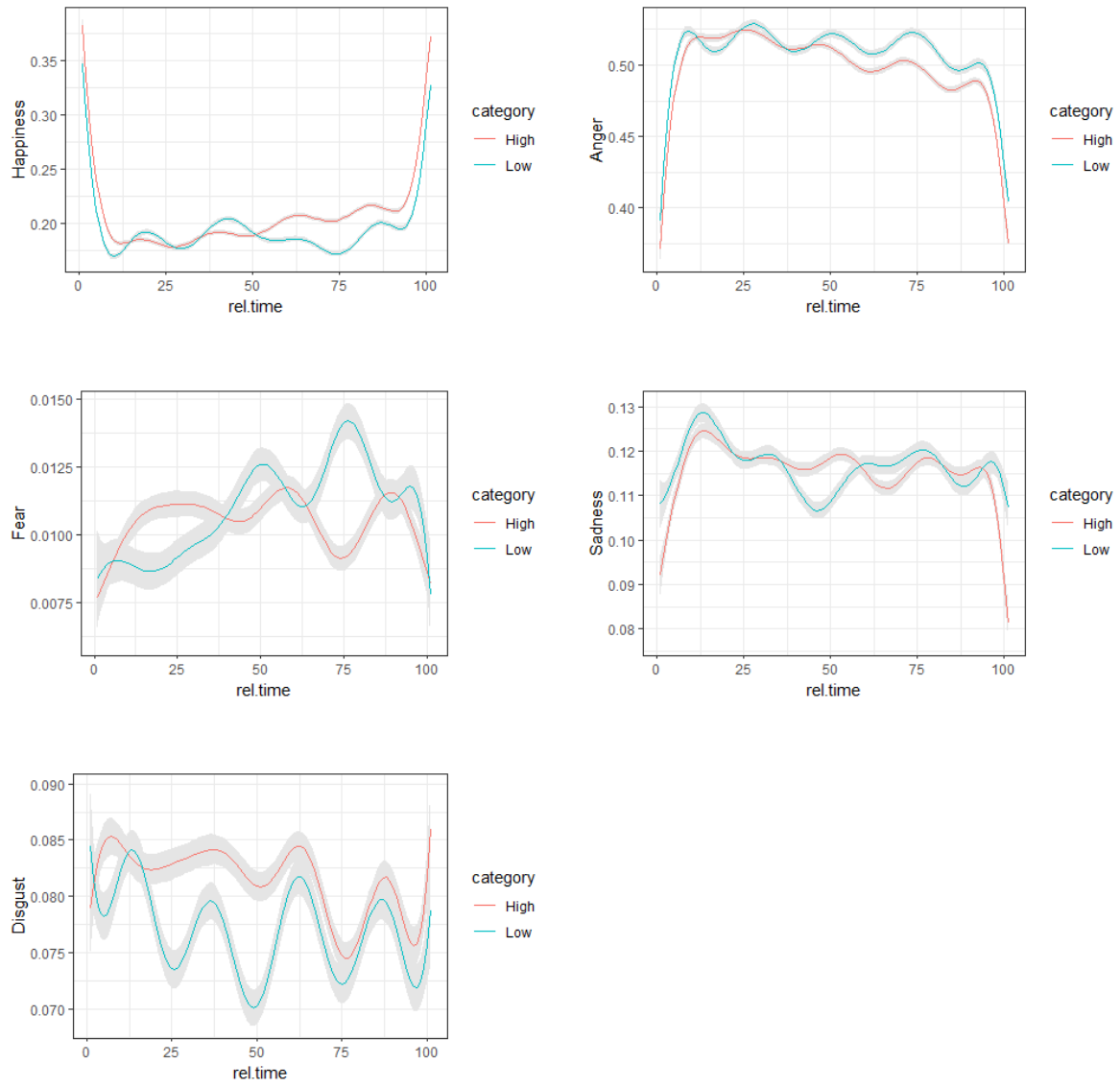


Figure 9. Emotion expression for high and low joint gains thought negotiation.

Because of this variance in display of emotion through the negotiation, we investigated the moderating role of time. Drawing from Simonsohn (2023), we tested the interaction of time with each emotion following a quadratic formula

$$y=a+bx+cz+d\,x{\cdot}z+ex2+fz2+\varepsilon.$$

Participants who started higher in synchrony of positive emotions and then decreased as time went by obtained better deals ($\beta_{\text{happiness x time}}$ = 4.30e-4, t = 3.72, p < .001). In contrast,

participants who started higher in negative emotions and then decreased as time went by obtained lower gains ($\beta_{anger\ x\ time}$ = -9.34e-4, t = -9.55, p < .001). Thus, time impacts the effect of facial emotion display on negotiation outcomes. However, these findings may be the outcomes of initial negotiation decisions. In fact, if the two negotiations reach a good agreement, they will be happier and less assertive in the second half of the negotiation. Thus, we investigate the average display of an emotion in the first five minutes (or 300 sec.). We find did not find that negotiators who display higher levels of adaptation in the first five minutes reach higher individual gains (β = .02, t = 1.82, p = .07) nor joint gains (β = .03, t = 1.51, p = .13). Further, we investigate the average display of an emotion in the first five minutes (300 sec.). We take the average display of an emotion for a bin of 5 seconds (from 0 to sec 5, from 5 to 10 sec, etc.) and we regress the average emotion on final joint gains. We took the coefficient and we fed a GAM model. As displayed in Figure 10, individuals who displayed an average higher level of affiliation just at the beginning of the negotiation, obtained better joint gains while the effect slowly disappeared (GAM: p = .09). On the other hand, anger seems to have a reverse U shape. Negotiators that start low in anger and then build it up after some talking obtain higher joint gains (GAM: p = .009). Interestingly, when individuals start low in fear and sadness obtained better deals (GAM: p < .001 and p = .02). Finally disgust seems not to play any particular role in relating with the final joint outcomes. When we look at individual emotions on individual gains, only happiness and fear are significant and follow the same pattern of joint gains (p < .001 for both) (Figure 11).

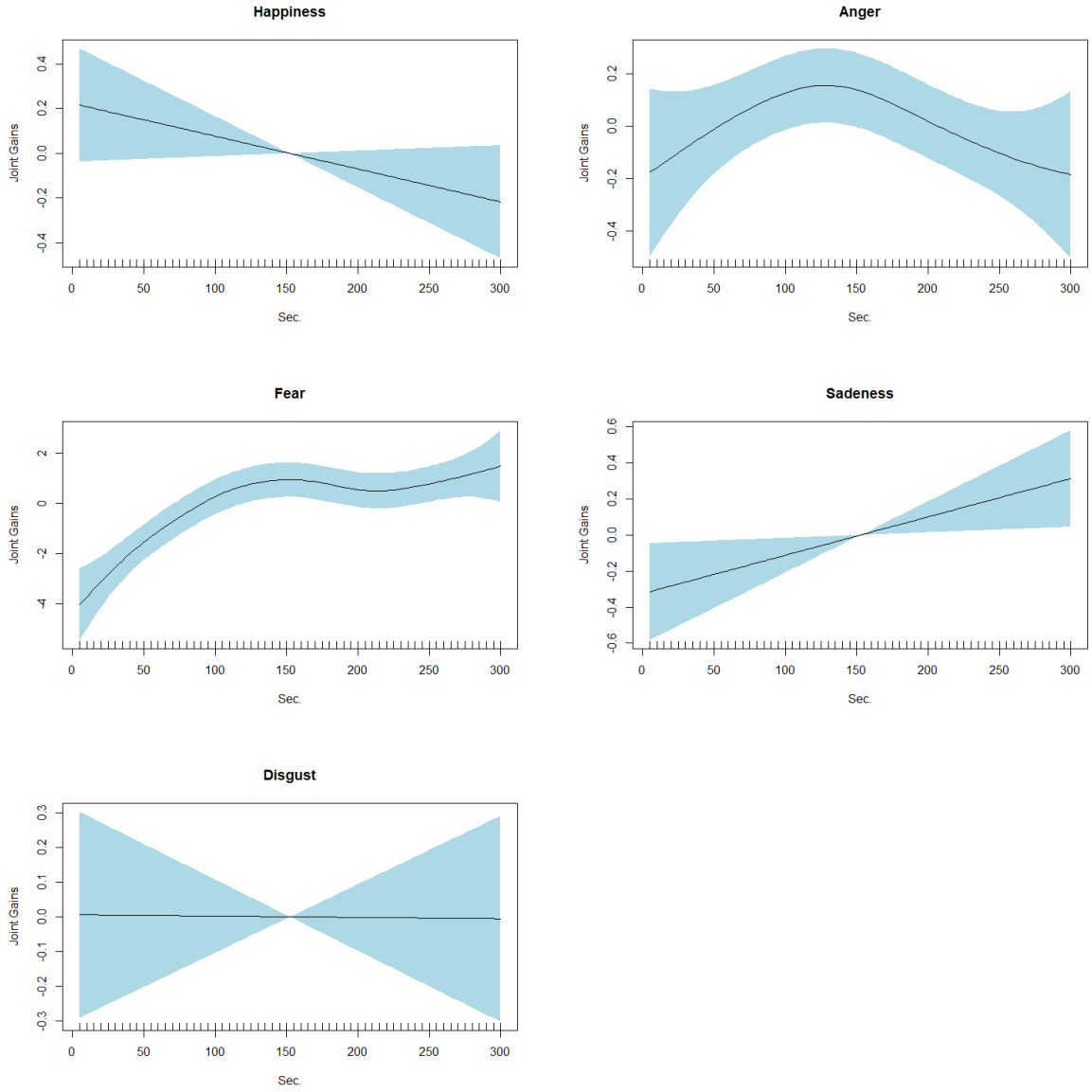


Figure 10. *Joint gains in the first 5 minutes.*

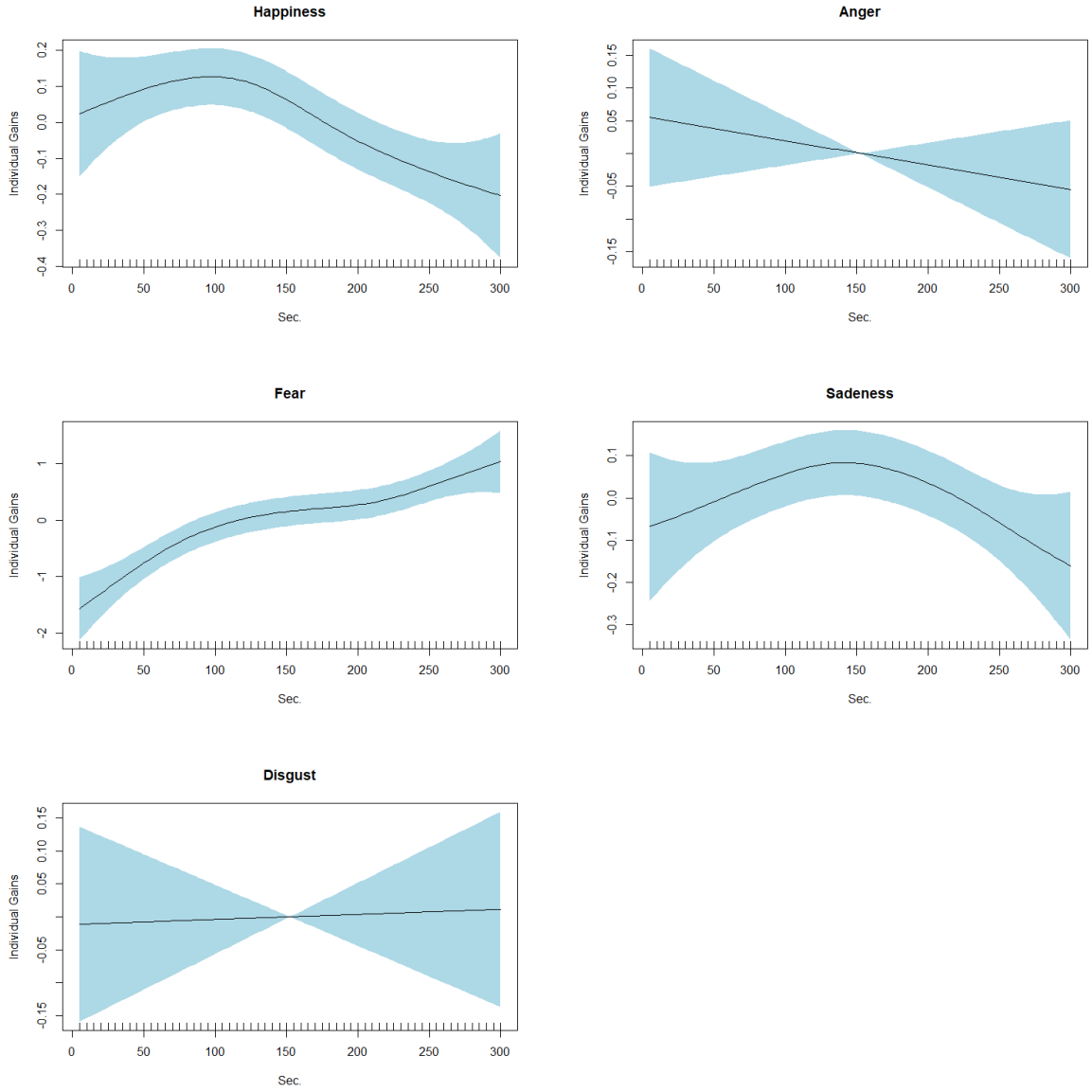


Figure 11. Individual gains, in the first 5 minutes

4.4 Discussion

The theoretical contribution of the study extends the literature on the effect of non-verbal emotions. From our knowledge, this is the first study where systematically analyzed facial emotional dynamics in negotiation. Our study also has practical implications for negotiators. For example, knowing whether to smile back to the counterpart may facilitate claiming and creating value.

The results of this study provide evidence that negotiators who adapt to their counterpart's happy faces achieve higher joint gains. There are several potential explanations for this finding. First, adapting to positive emotions such as happiness may foster a cooperative and positive atmosphere during negotiations (Van Kleef, De Dreu, & Manstead, 2010), promoting open communication and a willingness to explore mutually beneficial solutions (Fisher, Ury, & Patton, 2011). Second, recognizing and responding to happy faces may establish rapport and trust between negotiators, facilitating more favorable outcomes (Neale & Bazerman, 1992; Thompson, 2006). Third, adaptive negotiators may be more skilled at identifying underlying interests and leveraging emotional cues to create value.

Contrary to a vast literature, we did not find strong evidence to support for angry facial expression to be beneficial to gain individual outcomes (see Van Kleef & Côté, 2018). However, we find support for the idea that positive emotions are beneficial to negotiation outcomes (e.g. Kong, Tuncel, & McLean Parks, 2011; Kopelman, Rosette, & Thompson, 2006; Potworowski & Kopelman, 2008). For other emotions, our results are complementary with existing literature. For example, Sinaceur and colleagues (2015) claimed that sadness was influential only when the expresser was lower in power. In our study we did not find a significant relationship between sadness and negotiation outcomes.

Additionally, we find that emotions may not affect the final outcome in the same way through the negotiation. Negotiators who displayed happy faces just at the beginning of the negotiation obtained better individual gains. Negotiations where angry emotions started appearing immediately after the initial chats (minute 2), obtained higher joint gains. Same applies for displaying fearful faces.

The results of this study highlight the complex interrelationship between emotions, time and negotiation outcome. Previous research focused on one emotion from one negotiator. Results are consistent with Filipowicz and colleagues (2011) for which different emotions are relevant at different times. However, the interaction reveals a positive effect of emotion for which negotiators who started with angry faces and moved to happy ones obtain higher joint gains. In this study, we show that the emotions of two negotiators may affect the final outcome. In addition, we focus only on the facial expression aspect.

The findings also have practical implications for negotiators and organizations. Developing the ability to adapt to counterpart emotions, particularly positive emotions, can enhance negotiation outcomes and contribute to long-term relationships. Negotiation training programs should emphasize the importance of emotional intelligence and provide strategies for recognizing and responding to emotional cues. Additionally, organizations can create supportive negotiation environments that encourage adaptive behavior and emotional awareness among negotiators.

Nevertheless, it is imperative to acknowledge the limitations of this study. Firstly, the study used simulations, which may not fully capture the complexity of real-world negotiations. Future research could replicate the study in more realistic settings, such as business negotiations or diplomatic discussions. Secondly, the focus was limited to adaptation of the same emotion, and other emotions were not explored. Investigating the impact of reacting to

other emotions would provide a more comprehensive understanding of emotional dynamics in negotiation. Then, the study primarily examined the impact of adaptive negotiation on joint gains, and other negotiation outcomes such as individual satisfaction or long-term relationships were not extensively investigated. Lastly, the study is observational leaving out any causal claim. In fact, unobservable variables may confound the relationship. For example, happy faces may be the outcome of verbal tactics which may affect the final outcome. Future research may manipulate in an experimental setting the adaptability of different facial expressions. In conclusion, emotions play an important role in negotiation, not only emotions displayed by one negotiator but the interplay of the two.

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5. Prevalence of Negotiation

Abstract

The present study examines three widely-held assumptions about negotiation that have never been tested outside the confines of a laboratory: (1) it's a daily activity, (2) it's generally unpleasant, and yet (3) it leads to happier lives. Leveraging an app-based experience-sampling methodology, we found that 25% of daily interactions involve negotiation, often resulting in a short-term dip in happiness. However, frequent negotiators reported higher overall happiness, underscoring the long-term benefits of this skill. The most common negotiation activities involved 'reaching an agreement' and 'making a joint decision', while formal 'bargaining' was less frequently used. We found negotiation to be more prevalent in professional interactions than in personal relationships. Additionally, our data revealed no significant gender or age differences in negotiation frequency, challenging traditional stereotypes.

5.1 Introduction

Hundreds of papers in management, psychology, law, economics, political science, and many other fields begin by asserting that negotiation is an integral, often dreaded, yet crucial aspect of human interactions. But while most journal articles and textbooks highlight the ubiquity and importance of negotiation in our lives, its prevalence, emotional impact, and consequences for overall well-being in everyday life remain largely unknown. How often do people try to shape agreements, convince others to think or act a certain way, navigate conflict, or bargain every day? How do people feel when they negotiate? And does it matter for their overall happiness? The present study examines three widely-held assumptions about negotiation that have actually never been tested outside the confines of a laboratory: (1) it's a daily activity, (2) it's generally unpleasant, and yet (3) it leads to happier lives. We use an app-based experience-sampling methodology, where participants log and rate their negotiations and emotions as they occur in real-time to provide the first comprehensive examination of negotiation in everyday life and its implications for both short and longer-term well-being.

5.1.1 "We negotiate every day"

Negotiations, defined as social interactions aimed at reaching an agreement that improves the status quo (Carnevale & Pruitt, 1992), exhibit distinct characteristics that set them apart from other forms of interactions. These unique features encompass their goal-driven nature (Galinsky & Mussweiler, 2001), the existence of diverging interests (Pruitt, 1998), and the requirement for strategic communication to achieve desired outcomes (e.g., Bowles & Babcock, 2013; Lee & Ames, 2017; Schaerer, Schweinsberg, Thornley, & Swaab, 2020; Trotschel et al., 2015). Just as conversations may serve a variety of objectives– such as creating mutual understanding, cultivating a positive impression, or merely providing entertainment (Yeomans, Schweitzer, Brooks, 2022)–negotiations too can exhibit a spectrum of objectives that span from persuasion to navigating conflict. Existing scholarship, however, lacks a

comprehensive taxonomy of the different types of interactions that fall under the negotiation umbrella. Here, we propose a framework of eight non-mutually exclusive dimensions that encapsulate a wide spectrum of interpersonal interactions where negotiation plays a pivotal role (see Table 8).

Table 8. Negotiation Dimensions.

Negotiation Dimensions	**Definition**	**Example Studies**
1. Reach an agreement	Finding common ground and establishing mutually beneficial terms among parties.	Fisher, Ury & Patton (2006), Raiffa (1982)
2. Resolve an issue in a way that's acceptable for all	Addressing the needs and concerns of all parties, achieving a satisfactory resolution.	Pruitt & Carnevale (1993), Walton & McKersie (1965)
3. Convince someone to do something	Persuading and influencing others to take a specific course of action.	Cialdini (2001), Petty & Cacioppo (1986)
4. Convince someone to see things differently	Presenting one's perspective and reasoning compellingly to shift others' views.	Hovland et al. (1953), Chaiken (1980)
5. Navigate a conflict	Addressing conflicts and working towards a resolution that promotes harmony.	Deutsch (1973), Thomas (1992)
6. Make a joint decision that considers others' preferences	Integrating differing preferences to reach a consensus acceptable to everyone.	Bazerman et al. (2000), Lax & Sebenius (1986)
7. Bargain over something	Exchanging offers and counteroffers to arrive at an agreement that optimizes benefits.	Nash (1950), Rubinstein (1982)
8. Act as a mediator	Facilitating communication and understanding between disputing parties as a neutral third party.	Moore (2003), Bercovitch & Jackson (2009)

Research on the prevalence of negotiation behavior has primarily focused on the factors influencing individuals' propensity to initiate negotiations in laboratory or hypothetical vignette studies. For instance, researchers have examined the impact of emotions (Kapoutsis et al., 2017; Kong et al., 2011), social incentives (Bowles et al., 2007), power dynamics and legitimacy (Lammers et al., 2008; Magee et al., 2007), and skills (Volkema et al., 2013) on negotiation tendencies. Individual differences such as personality traits (Volkema & Fleck, 2012), risk aversion (Marks & Harold, 2011), attitudes toward bargaining (Lee, 2000), and cultural differences (Lee, 2000; Volkema & Fleck, 2012) have also been linked to people's self-reported propensity to negotiate.

Very few studies provide insights into the prevalence of negotiation in real-life, and existing research focuses on highly specific situations, such as job offers and home, car, or souvenir purchases. For instance, two studies have examined the propensity of recent college graduates to negotiate their job offers and found that negotiation was relatively frequent (20% to 25% of participants negotiated) with situational factors such as the attractiveness of initial offers, the number of available alternatives, and prior work experience affecting negotiation initiation (Gerhart & Rynes, 1991; O'Shea & Bush, 2002). Likewise, analyses of residential property transactions in England show that negotiation is common: two-thirds of potential buyers who have their first offer turned down continue negotiating with the seller (Merlo & Ortalo-Magne, 2004). Finally, price negotiation is also extremely frequent among tourists, especially in destinations with loose market regulations (Kozak et al., 2015; Zhang et al., 2017).

While these studies suggest that negotiation behavior–especially bargaining–is commonplace in clearly-defined contexts, the extent to which people negotiate every day and which negotiation dimensions are more prevalent remains unknown. Besides, there is an important distinction between initiating negotiations and being involved in them. You may find yourself routinely – and reluctantly – caught up in negotiations with friends or colleagues, even

though you never intended to engage in such challenging conversations. By exploring the frequency and dimensions of negotiation that individuals experience daily, we can uncover a more realistic perspective on the negotiation landscape.

5.1.2 "Most people dislike negotiating"

Negotiation is commonly portrayed as a dreaded, unpleasant emotional experience for most people. And there is indeed a lot of indirect evidence to suggest that engaging in negotiation can have a negative impact on our short-term well-being. Negotiation, by its nature, sometimes involves actual conflict and confrontation, which can elicit discomfort, anger, and anxiety in the short term (see Lindner, 2006 for review). It also often involves perceived conflict. People often view negotiations as zero-sum, seeing one party's gains as offset by other parties' losses (Bazerman & Neale, 1983; Johnson, Zhang, & Keil, 2021; Różycka-Tran, Boski, & Wojciszke, 2015) and the more they hold these zero-sum beliefs, the more they worried that negotiations lead to harmful interactions and the more the avoid them (Davidai, White, & Gregorich, 2022). These negative emotions can make the act of negotiating momentarily unpleasant for individuals. In fact, anticipating reduced levels of happiness during the negotiation process leads people to avoid negotiating (Kong, Tuncel, & Parks, 2011), and feelings of nervousness increase the likelihood that people will exit a negotiation soon after it starts (Wood & Schweitzer, 2011).

Many people also dread the prospect of asking. Individuals often worry about imposing on others, appearing overly aggressive, revealing their own shortcomings, and the possibility of rejection (DePaulo & Fisher, 1980; Milgram & Sabini, 1978). This fear is exacerbated by common misperceptions: individuals tend to underestimate the positive regard their negotiation counterparts may have for them (Ames & Wazlawek, 2014) and overestimate the inconvenience they impose on others when making requests (Zhao & Epley, 2022).

Despite the wealth of indirect evidence suggesting a general dislike of negotiation, there is a striking lack of direct empirical evidence examining this notion within the context of everyday life. Much of the existing research has been conducted in controlled laboratory settings, where participants were asked to negotiate or make requests of strangers. Therefore, whether the statement "most people dislike negotiating" holds true beyond the confines of a laboratory remains an open question.

5.1.3 “Negotiating leads to happier lives”

While the act of negotiation may carry short-term affective costs, there are compelling reasons to believe that individuals who negotiate more often may reap long-term benefits that contribute to happier lives.

One of the key reasons lies in the positive impact of negotiation on social relationships (Delatorre & Wagner, 2019; Kurdek, 1995). The quantity and quality of social relationships is probably the most important contributor to happiness under people’s control (Quoidbach et al, 2019). As individuals negotiate more frequently, they may become more adept at handling conflict, understanding others' perspectives, and finding a mutually satisfactory resolution (see Movius, 2008). These skills, honed through repeated practice, are invaluable in fostering healthier and more satisfying relationships. Providing indirect evidence for the idea that negotiation leads to a happier life, studies indicate that passive responses to interpersonal conflicts, such as avoidance, can lead to increased stress and strain, and even exacerbate depressive symptoms (Dijkstra, De Dreu, Evers, & Van Dierendonck, 2009; Pettit & Joiner, 2006; Marchand & Hock, 2000). Frequent negotiators, with their proactive approach to conflict resolution, are potentially less prone to these negative emotional outcomes and may enjoy more satisfying social interactions and higher well-being.

Another important factor could be the role of negotiation in enhancing self-esteem and efficacy. Each successful negotiation serves as a testament to an individual's capability to advocate for themselves and navigate through intricate situations. This self-efficacy is not merely a transient feeling; research indicates it can have lasting impacts. For instance, a study by Curhan, Elfenbein, and Kilduff (2009) found that individuals' self-perceptions during job offer negotiations significantly predicted their job satisfaction, compensation satisfaction, and turnover intentions one year after the negotiations had concluded. In essence, the confidence derived from successful negotiations can contribute to increased self-esteem, which in turn can boost people's happiness and buffer against depression (Baumeister, Campbell, Krueger, & Vohs, 2003; Cheng & Furnham, 2003). Conversely, in the long run, habitual avoidance of negotiation could contribute to feelings of helplessness, stagnation, and even depression, as individuals fail to address conflicts and fulfill their needs (e.g., Abramson et al., 1989; Hayes et al., 1996; Kashdan et al., 2008).

Lastly, frequent negotiation can be instrumental in improving life outcomes. Frequent negotiators are more likely to advocate for better salaries, secure promotions, and steer their career paths in alignment with their personal aspirations. Such control over one's life circumstances, along with the tangible benefits that negotiation can yield (Babcock & Lasch-ever, 2003), can contribute to a sense of fulfillment and happiness.

The connections between negotiation, better social relationships, self-esteem, and improved life outcomes make a persuasive argument for the idea that individuals who negotiate more frequently may lead happier lives However, the empirical validation of this hypothesis has yet to be undertaken.

5.1.4 Demographic Differences

Beyond testing negotiation adages with solid data, it's important to assess their universal applicability. Evaluating how frequently different demographic groups negotiate and the emotional impacts of these negotiations could inform the creation of negotiation training programs tailored to specific needs and challenges.

One of the most widely examined and debated individual differences in negotiation research is gender (Kray & Babcock et al., 2006; Small et al., 2007), giving rise to the notion that "women don't ask." Some studies find evidence that men initiate salary (Kugler et al., 2014), promotion (Crothers et al, 2010), or car price negotiations (Chandra, Gulati, & Sallee, 2017) more than women, particularly when the opportunity isn't explicitly presented (Leibbrandt & List, 2015). However, other studies contest these findings (Säve-Söderbergh, 2019).

The role of age in negotiation, especially concerning interpersonal conflict, has also been examined. Older adults tend to use passive strategies, like waiting for issues to resolve themselves, in response to interpersonal conflicts (Davis et al., 2009). Conversely, younger individuals are more likely to vocalize their dissatisfaction. This age difference is also seen in car buying negotiations, where older customers often pay more than younger ones for the same car (Chandra et al., 2017).

However, these studies are often context-specific or conducted in lab environments. The extent to which these gender and age differences occur in broader, real-world negotiation scenarios remains largely uninvestigated.

5.1.5 The Present Study

This study seeks to enrich our understanding of negotiation in everyday life. We leverage an experience-sampling design to overcome traditional constraints, such as social desirability

and recall biases, which have plagued previous research on negotiation (Galinsky & Mussweiler, 2001; Kwon & Weingart, 2004), and examine the complex interplay between negotiation frequency and well-being.

5.2 Methods

5.2.1 Participants

A total of 350 participants were recruited via the Prolific online platform (see the advertisement in Supplementary Note 1). Inclusion criteria required participants to be at least 18 years old, from the U.K. or U.S., and possess a smartphone compatible with the MindSampler app (iPhone or Android). Participants provided informed consent and received a 1£ compensation for installing MindSampler and completing an initial sign-up survey on the app (demographics and well-being). Participants were then paid 0.15£ per experience-sampling survey completed over the next seven days (paid as a single bonus at the end of the study).

Additionally, a bonus of £10 was awarded to the three participants with the most surveys completed, with a random draw in case of a tie. The final sample comprised 302 participants who completed at least one experience-sampling survey (105 females, 194 males, 3 other/prefer not to say, with a mean age of 25.1 years (SD = 11.4). On average, participants completed 17.5 (S.D. = 15.1) experience-sampling surveys ($N_{surveys}$ = 5286)

5.2.2 Procedure

Upon recruitment, participants were instructed to download the MindSampler app onto their smartphones (www.mindsampler.com) and to enter the study code. The app then sent push notifications to participants at random times throughout the day, prompting them to complete a brief questionnaire designed in Qualtrics and displayed seamlessly within the app. Participants were required to complete these questionnaires within 15 minutes of receiving the notification to ensure the accuracy and relevance of their responses (Kuppens, 2021).

Questionnaires completed after 15 minutes of receiving notifications did not count toward participants' compensation.

Participants could set their preferred number of daily notifications (from 1 to 12) and time window in the app's settings. The default was 3 notifications a day, all seven days of the week from 8 AM to 10 PM.

5.2.3 Measures

Current Happiness. Participants began each survey by rating their current affect on a two-dimensional 5-point graphic slider measuring valence and arousal (see Figure 12a). As pre-registered, the present study focuses on happiness (i.e., the valence dimension). We report exploratory analyses of the arousal item in Supplementary Materials Note 3. Spoiler alert: We found no significant relationship between negotiation behavior and this dimension of affect.

Current Activity. Next, participants were asked to pick what best described their main activity before answering the survey using three mutually exclusive categories: work, maintenance, and leisure (see Figure 12b). Various classification systems for human activity have been developed by research bodies and governments worldwide, reflecting regional and cultural specificities (e.g., American Time Use Survey; Harmonised European Time Use Surveys). We chose to focus on these three fundamental categories because they are easy to understand for participants, consistently emerge across systems, and align with classical economic and sociological theories of time allocation (Becker, 1965; Bianchi et al., 2000; Aguiar & Hurst, 2007). Work refers to professional or income-generating activities. Maintenance refers to tasks necessary for the sustenance of daily life and households, including self-care and childcare. Leisure refers to discretionary activities performed for enjoyment, relaxation, or personal enrichment. These different elements were illustrated with pictograms.

Recent Social Interactions. Participants were then asked to report the time elapsed since their last interaction with someone using one of six response options: “now,” “less than 15 min ago,” “less than 30 min ago,” “less than 1 hour ago,” “less than 2 hours ago,” “over 2 hours ago.” If participants reported an interaction within the last two hours, they were further asked to rate how close they felt to the person or people involved on a 4-point scale, ranging from 1 (not close at all) to 4 (very close) and to select the main social category they belonged to from nine non-mutually exclusive options: parent, partner, kid, coworker, stranger, acquaintance, friend, relative, and other (see Figure 12c). Our choice to ask participants about the time elapsed since their last interaction instead of whether they are currently engaged in one, as often done in experience-sampling studies (e.g., Quoidbach et al., 2019), was primarily driven by concerns that participants might not respond to notifications while in the midst of intense negotiations. By asking about the time since the last interaction, we aim to mitigate potential response bias and provide a more accurate representation of the frequency and pattern of negotiations in everyday life. Furthermore, by using a two-hour window maximum window, we aim to strike a balance between capturing more interactions and ensuring the accuracy of the reported information. A two-hour window minimizes recall bias, as research on memory and recall (e.g., Ebbinghaus's forgetting curve) indicates that memory decay occurs rapidly within the first few hours after an event.

Negotiation dimensions. Last, participants were asked to evaluate whether their last interaction (if it happened less than two hours ago) involved any of the following eight negotiation dimensions: (1) reach an agreement, (2) resolve an issue in a way that's acceptable for all, (3) convince someone to do something, (4) convince someone to see things my way, (5) navigate a conflict, (6) make a joint decision that considers others' preferences, (7) bargain over something, and (8) act as a mediator. Participants could select multiple dimensions if applicable (see Figure 12d).

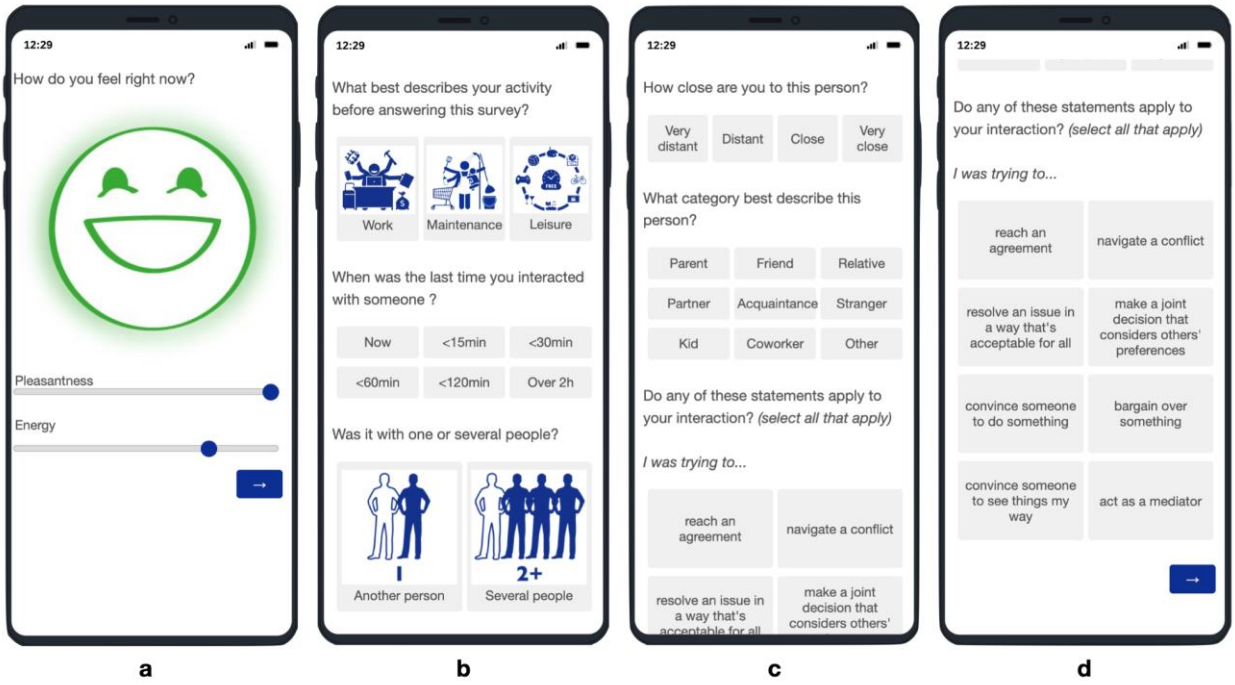

Figure 12. Visuals of the experience-sampling items.

5.2.4 Pre-registered analyses and exclusion rules

All our data, code, and pre-registration can be found at https://researchbox.org/ (#1428). We note one deviation from our pre-registration: We originally aimed to recruit 200 participants on Prolific and 50 MBA students. However, we did not manage to recruit MBA students as planned. Therefore, we recruited additional participants on Prolific (total N = 302) and did not explore the differences between the two populations as mentioned in the secondary analyses section of our pre-registration.

Frequency of negotiation in everyday life. To estimate the population-level frequency of negotiation in everyday life, we examined all the reported social interactions (N = 4384) and fitted multilevel logistic regression models using the lme4 package for R (Bates, Mächler, Bolker, & Walker, 2015) with a random intercept to accommodate varying numbers of observations provided by each participant and calculated the average probability of negotiation occurrence for the entire population, along with its 95% confidence interval. We ran one overall

model predicting the probability that a social interaction includes any negotiation dimension and eight specific models for each of the dimensions, respectively.

Negotiation and short-term happiness. To evaluate the relationship between negotiation and short-term changes in happiness, we followed procedures outlined by Taquet and colleagues (2016). We first created lagged pairs of observations (t-1 and t) for each participant, focusing on pairs of observations during which the participant reported involvement in social interaction between the two measurement times ($t\text{-}1 < \text{interaction} \leq t$). Imagine, for instance, a participant who completed four questionnaires. On the first questionnaire (10:00 AM), she reports interacting now. On the second questionnaire (2:00 PM), she reports having interacted less than an hour ago. On the third questionnaire (3:30 PM), she reports having interacted over 2 hours ago. Finally, on the fourth questionnaire (6:00 PM), she reports having interacted less than 30 min ago. In this case, we would create a first pair of observations for this participant in which Questionnaire 1 (10:00 AM) is labeled t-1 and Questionnaire 2 (2:00 PM) is labeled t, since an interaction happened in between (around 1:30 PM). We would not create a pair of observations between Questionnaires 2 and 3 since an interaction did not occur between the two measurement points. We would, however, create a second pair of observations for this participant in which Questionnaire 3 (3:30 PM) is labeled t-1 and Questionnaire 4 (6:00 PM) is labeled t, since an interaction happened in between (around 5:45 PM).

Next, we computed the mean difference in past and current happiness ($\Delta H = Ht - Ht\text{-}1$) for each pair of observations and used these change scores as our dependent variable in multilevel regression. Our main predictor was whether participants reported any negotiation dimensions during the interaction (0 = no; 1 = yes), and our control variables included the time of day, categorized into twelve 2-hour periods (ranging from 0:00:00 a.m.–1:59:59 a.m. to 10:00:00 p.m.–11:59:59 p.m.), the day of the week (distinguishing between weekdays and

weekends), the social categories of people involved in the interaction (one dummy variable of each of the nine categories), the current activity reported by the participant, and latency effects. The latter accounts for the fact that interactions can span multiple measurement points and controls for the social interaction (nine dummy social category variables) and negotiation participants may have been involved in at the previous time point (t-1). Our model included a random intercept to account for the nested structure of the data, with participants each providing multiple pairs of observations.

Negotiation and longer-term happiness. To evaluate the relationship between negotiation and longer-term well-being, we computed the average frequency of negotiation for each participant across their reported social interactions. We then used this metric to predict happiness and depression on the WHO-5 and PHQ-9 scales, respectively. To ensure that the relationship between one's propensity to negotiate and well-being is not confounded by obvious individual differences, we control for age, gender, the average frequency of interactions across different partner categories (Parent, Partner, Kid, Coworker, Stranger, Acquaintance, Friend, Relative, Other), the average closeness ratings attributed to these interactions, and the average frequency of daily activities (maintenance, work, and leisure). Additionally, to ensure the integrity of our measures of well-being, we excluded participants who omitted more than one item on the WHO-5 and PHQ-9 scales.

5.3 Results

5.3.1 Frequency of negotiation in everyday life

Our analyses revealed that 25.7% (95% CI [21.5% - 30.4%]) of all reported interactions involved at least one element of negotiation. The frequency of each negotiation dimension is depicted in Figure 13. There were no significant gender and age differences in the overall and specific prevalence of negotiation dimensions (see Supplementary Materials - Note 2).

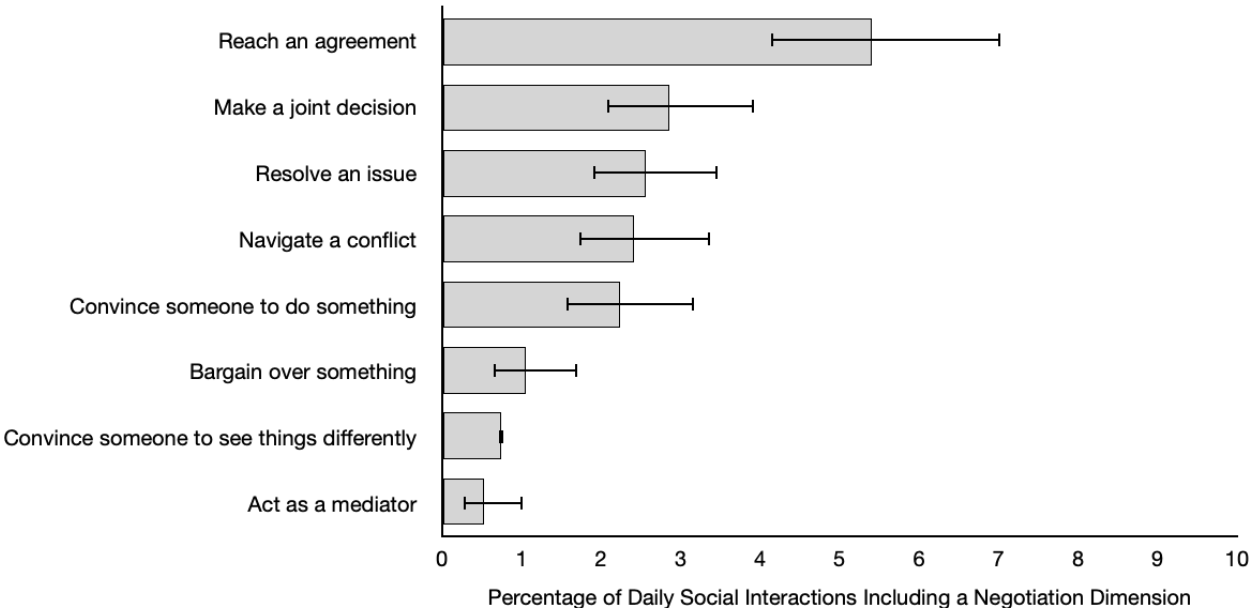

Figure 13. Frequency of Negotiation in Daily Interaction.

As exploratory analyses, we examined how the frequency of negotiation varied across interaction partners by adding a dummy variable for each social category in our regression model. Interactions with friends were less likely to involve negotiation dimensions (b = -0.57, p = .003). So were interactions with romantic partners (b = -0.46, p = .002) and parents (b = -0.48, p = .01). In contrast, interactions with coworkers were more likely to involve negotiation (b = 1.33, p < .001). Other social categories did not relate to negotiation (all ps >. 09).

5.3.2 Negotiation and short-term well-being.

Results from our time-lagged multilevel linear regression revealed that compared to social interactions that did not involve negotiation, interactions that included at least one negotiation dimension were associated with a decrease in momentary happiness (b = -0.18, t = -5.442, p < .001). This effect was not moderated by gender ($b_{negotiating*gender}$ = 0.042, p = .50) or age ($b_{negotiating*age}$ = -0.003, p = 0.20).

5.3.3 Negotiation and longer-term well-being

Our results suggest that engaging in a negotiation has a short-term affective cost. But does it pay off in the long run? Results from our regression models provide some evidence for this idea. Participants' overall frequency of negotiation across their social interactions predicted general happiness ($b = 0.47$, $t = 2.01$, $p = 0.046$), over and above age, gender, the average frequency of interactions across different partner categories, the average closeness ratings attributed to these interactions, and the average frequency of daily activities. Although directionally consistent, the overall frequency of negotiation did not significantly predict lower depression symptoms ($b = -0.21$, $t = 1.58$, $p = 0.12$). Again, none of these relationships were moderated by gender (happiness: $b_{negotiation*gender} = 0.53$, $p = .30$; depression: $b_{negotiation*gender} = -0.29$, $p = .30$) or age (happiness: $b_{negotiation*age} = 0.011$, $p = .62$; depression: $b_{negotiation*age} = -0.001$, $p = .91$).

5.4 Discussion

In this study, we harnessed an app-based experience-sampling methodology to empirically test three widely-held assumptions about negotiation: (1) we negotiate every day, (2) people generally dislike it, yet (3) engaging in negotiation leads to happier lives. Our results, based on ecologically-valid data gathered beyond the confines of a laboratory, corroborate these three ideas. First, we found that negotiation is indeed woven into the fabric of everyday life, with nearly a quarter of all interactions involving some form of negotiation. Second, we confirmed that negotiation carries an emotional toll. Finally, despite its challenges, our data revealed that negotiation shouldn't be avoided. Those who negotiated more often reported higher overall happiness. These findings reaffirm that negotiation, while sometimes daunting, is a fundamental part of our social landscape and a crucial life skill with benefits that extend beyond the boardroom and contribute to overall well-being.

Our analyses further examine the distribution of negotiation across social categories and dimensions, providing a richer understanding of negotiation's role in daily life. We found that 'reaching an agreement' was the most common negotiation activity, transpiring in about 5.4% of interactions. This finding underscores previous research emphasizing the ubiquity of these negotiation tasks, which span from routine decisions to more intricate disputes (Pruitt & Carnevale, 1993). In contrast, 'bargaining over something' and 'acting as a mediator' were less common, appearing in only 1.1% and 0.5% of interactions, respectively. This discrepancy suggests that these formal negotiation tactics may be consigned to specific contexts or situations, a notion consistent with the understanding that negotiation strategies should adapt to the context (Fisher, Ury, & Patton, 2011). As for social categories, negotiation was a more prominent feature of interactions with coworkers, echoing past research on the significant role negotiation plays in professional contexts (Bazerman & Neale, 1983). Yet negotiation was less common in personal relationships, such as with friends, romantic partners, and parents. This observation doesn't diminish the role of negotiation skills in these domains, but rather points to the need for a nuanced understanding and application of negotiation strategies—ones that respect and preserve the unique emotional bonds and dynamics inherent to these relationships (Curhan, Elfenbein, & Xu, 2006).

An additional noteworthy aspect of our findings pertains to the lack of significant gender and age differences in the prevalence of negotiation dimensions. This suggests that negotiation permeates the fabric of human interactions universally, irrespective of gender or age. Our data did not support common stereotypes, such as men negotiating more frequently than women or negotiation frequency varying significantly with age. These findings align with recent scholarship challenging traditional assumptions about gender and age in negotiation (Kray & Thompson, 2005; Amanatullah & Morris, 2010). They underscore that while gender and age can shape our experiences in myriad ways, they do not appear to influence the overall frequency

of negotiation in everyday life substantially. These results contribute to a growing body of literature emphasizing the need to move beyond simplistic categorizations based on gender and age when examining complex social behaviors like negotiation.

Despite the commonality of negotiation in our social interactions, our findings suggest that negotiation carries a short-term affective cost, as evidenced by the decrease in momentary happiness following interactions involving negotiation. This is consistent with the literature highlighting the stress and cognitive load associated with negotiation (Curhan, Elfenbein, & Kilduff, 2009), as well as the potential negative affect induced by conflict, competition, or perceived inequities during negotiation processes (Fisher, Ury, & Patton, 2011).

However, despite this short-term affective cost, our findings revealed a silver lining. Frequent engagement in negotiation predicted greater general happiness, which aligns with theories suggesting that successful negotiation can lead to feelings of self-efficacy, accomplishment, and control, which are associated with psychological well-being (Bandura, 1997; Locke & Latham, 2002). It may be that the short-term stress of negotiation is offset by the long-term benefits of better outcomes, enhanced relationships, and improved personal and professional circumstances. Nonetheless, negotiation did not significantly predict lower depression symptoms, suggesting that the psychological benefits of negotiation may be specific to positive aspects of well-being, rather than a reduction in negative mental health symptoms. This is an important distinction and suggests that negotiation skills may be more closely aligned with the promotion of positive psychological states rather than the mitigation of negative ones. The present study provides important groundwork for further research into the real-world implications of negotiation. Future research might delve into the specific mechanisms that underlie the long-term happiness benefits of negotiation, as well as the factors that might help individuals better manage short-term affective costs. Moreover, it would be insightful to explore how different negotiation styles, strategies, and techniques might differentially affect

well-being outcomes. Such an investigation could guide the development of more effective negotiation training programs, with the dual aims of enhancing negotiation outcomes and promoting psychological well-being. Despite its contributions, this study has some limitations. First, our sample was recruited from the Prolific platform, which may not be fully representative of the general population. Future research could examine the negotiation experiences of more diverse samples, including individuals from different cultural and professional backgrounds. Second, our study focused on the self-reported negotiation experiences of participants. Future research could complement this approach with more objective measures of negotiation, such as behavioral observations or third-party evaluations. Finally, our study employed cross-sectional and longitudinal designs, which precludes causal inferences. Future research could employ experimental designs to establish better the causal relationships between negotiation dimensions and happiness.

In conclusion, our study underscores the salience of negotiation in everyday life and its implications for well-being. While negotiation might have a short-term emotional cost, its long-term benefits for general happiness suggest its important role in our social fabric. It may be that becoming more adept negotiators not only helps us navigate our social and professional landscapes more effectively but also contributes to our broader happiness and well-being.

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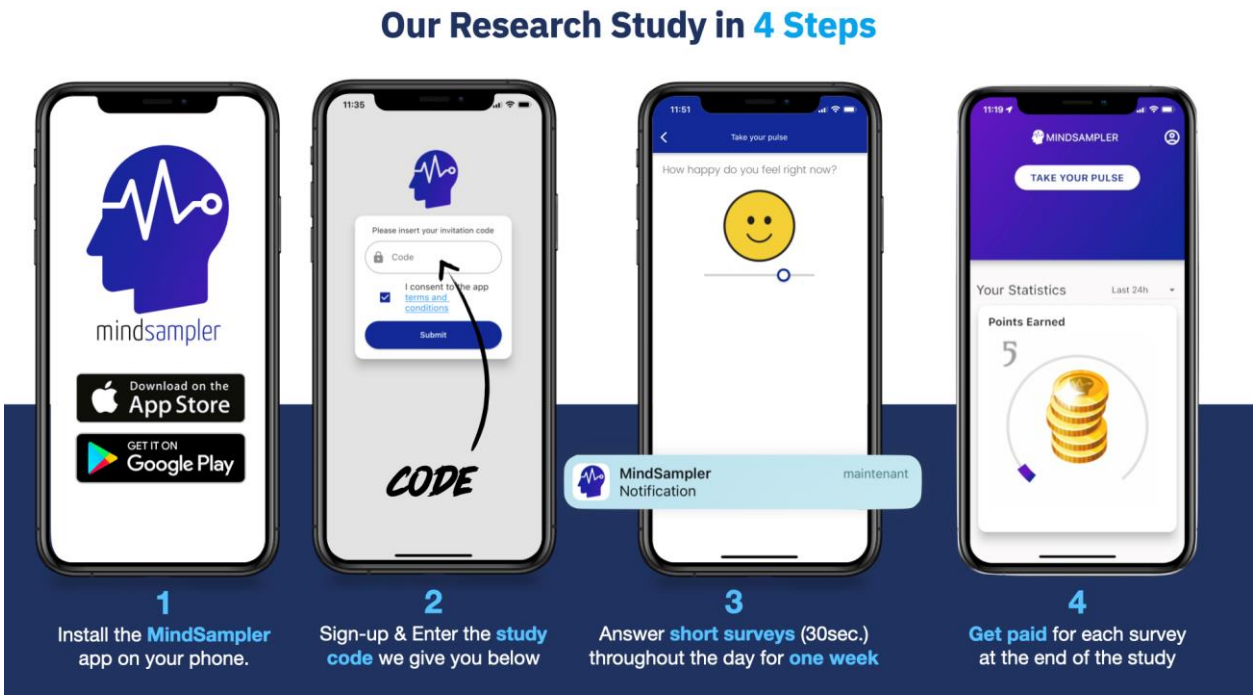
5.6 Supplementary Materials

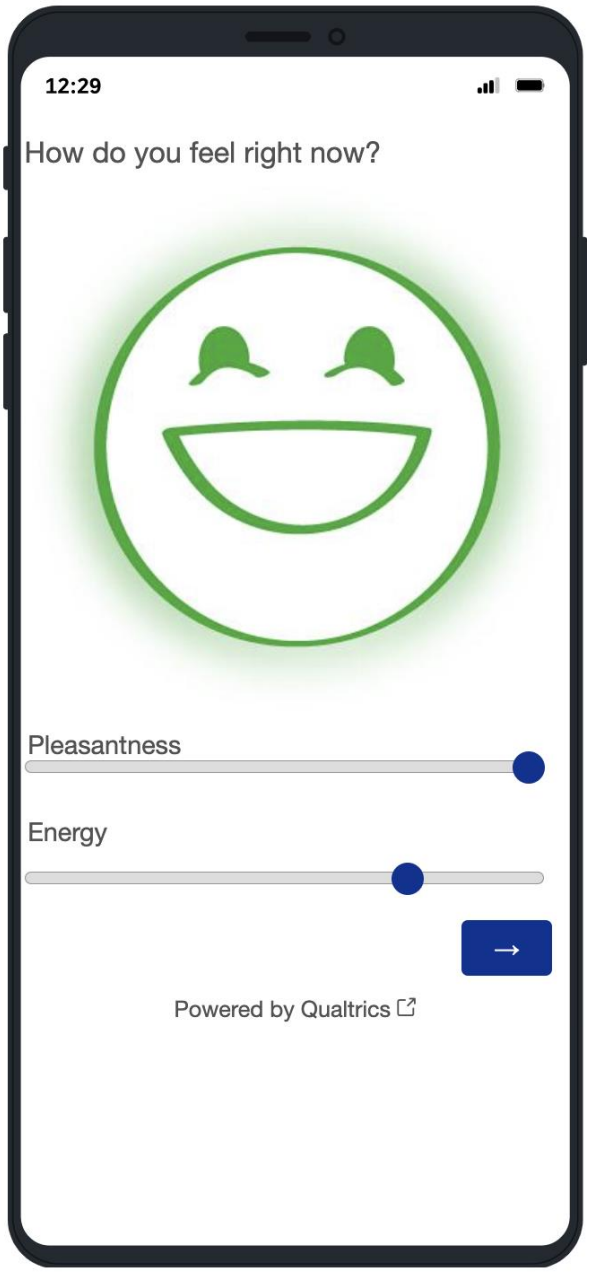
Note 1: MindSampler App & Experience-Sampling Items

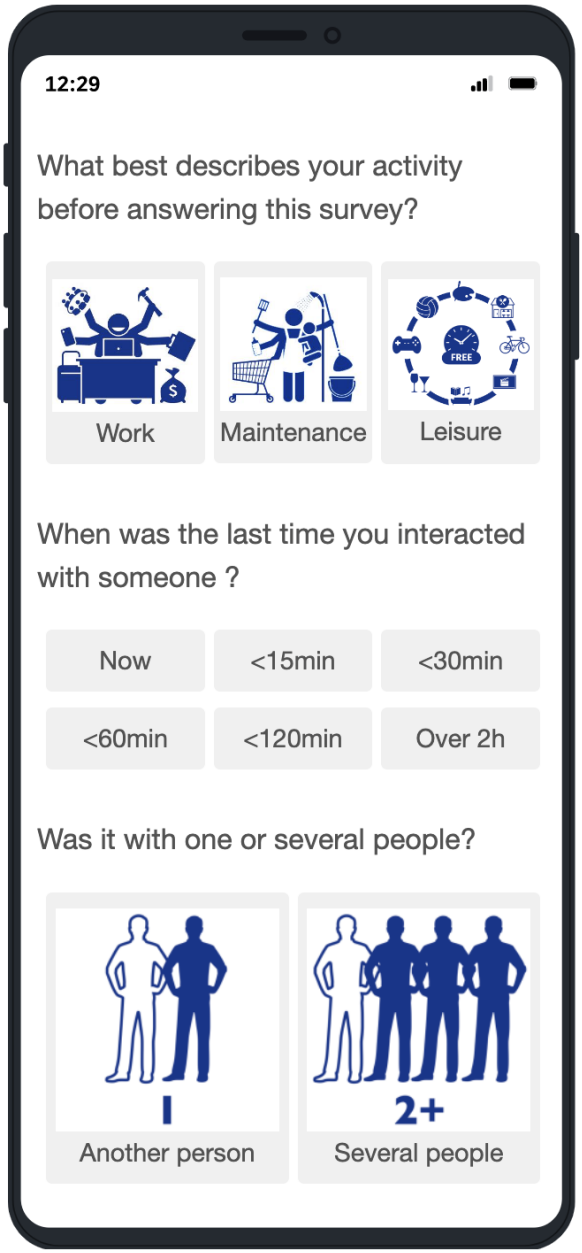
Participants were recruited on Prolific and presented with the following infographic upon accepting the task.



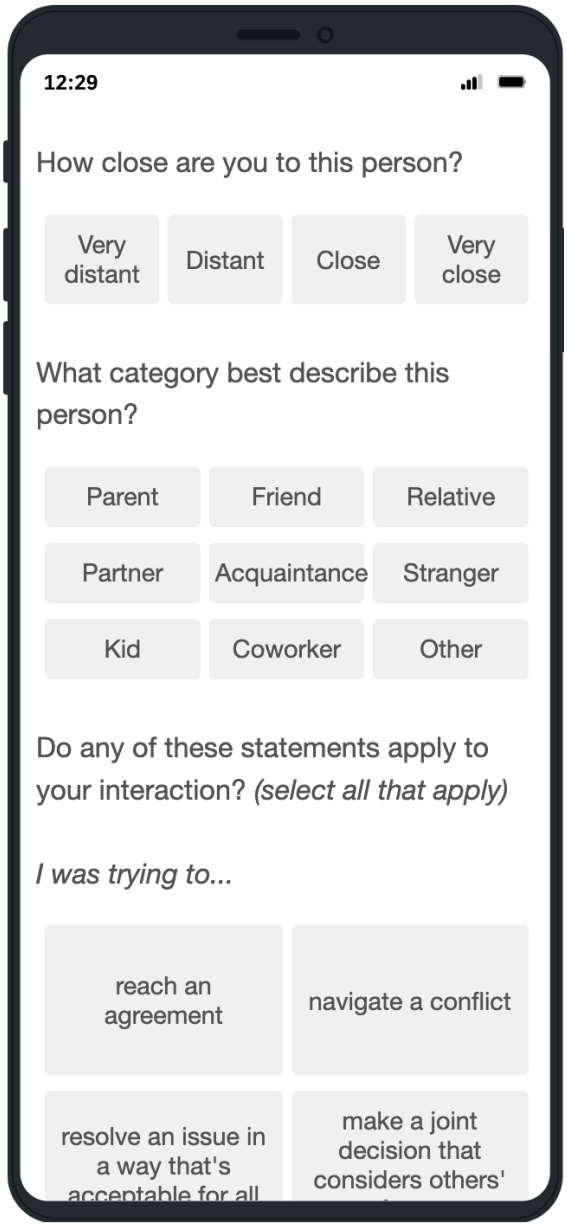
Experience-Sampling Items

Once participants installed the app, they started receiving push notifications. If they clicked on a push notification, they were first asked to report their current affect using dynamic valence and arousal 5-point graphic sliders. They were then asked about their current activity and latest interaction.


12:29
How do you feel right now?
Pleasantness
Energy
→
Powered by Qualtrics

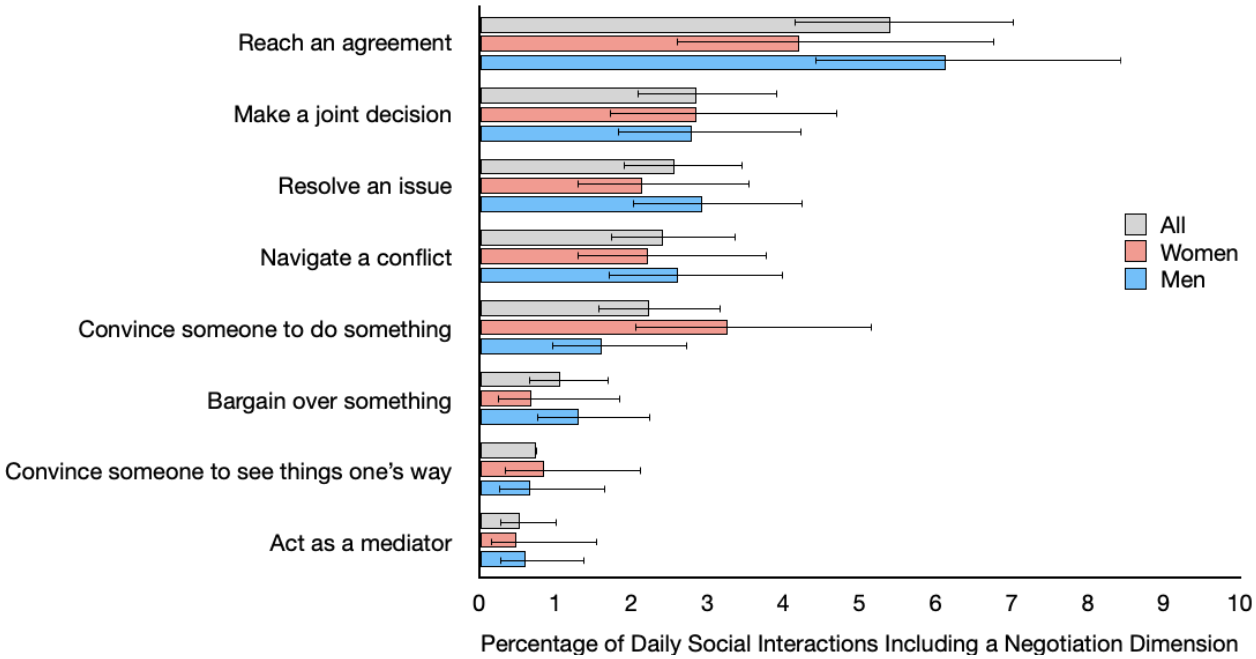


If participants reported having been engaged in social interaction within the last 2 hours (i.e., selected any option but “over 2h”), they were presented with a third screen inquiring about how close they felt to their interaction partner(s), the social category best describing their interaction partner(s), and negotiation dimensions.


12:29
How close are you to this person?
Very distant
Distant
Close
Very close
What category best describe this person?
Parent
Friend
Relative
Partner
Acquaintance
Stranger
Kid
Coworker
Other
Do any of these statements apply to your interaction? (select all that apply)
I was trying to...
reach an agreement
navigate a conflict
resolve an issue in a way that's acceptable for all
make a joint decision that considers others'


12:29
Do any of these statements apply to your interaction? (select all that apply)
I was trying to...
reach an agreement
navigate a conflict
resolve an issue in a way that's acceptable for all
make a joint decision that considers others' preferences
convince someone to do something
bargain over something
convince someone to see things my way
act as a mediator
→
Powered by Qualtrics

Note 2: Prevalences of negotiation dimensions by gender



6. Conclusions

6.1 Concluding remarks

This thesis takes a data-driven approach to weed out unfounded popular negotiation advice from solid strategies that negotiators can use to create more value on a sustainable basis. The thesis contributes to a growing research interest on conversation behaviors in negotiations (e.g. Curhan et al., 2022; Jeong et al., 2019; Minson et al., 2017; Templeton et al., 2022, 2023). The findings offer several applied implications for managers and individuals.

Zooming Out on Bargaining Tables

This thesis offers a new theoretical framework to study conversation dynamics. Using a dataset of 38,564 conversation turns from 239 negotiations, I derived a large set of conversation dynamics metrics from the basic succession of moments of speech and silence between two negotiators. These measures pertain to seven broad dimensions: speaking time, turn length, response time, speech rate, pauses, interruptions, and backchannels. I find that negotiators who speak more, faster, and with fewer pauses get better objective outcomes, and that negotiators who frequently interrupt others get poorer relational outcomes. Negotiations—like any conversation—involve thousands of repeated decisions about how and when to speak, listen, and produce timely responses to your counterparts' utterances. These processes are so finely coordinated in human communication that negotiators rarely stop to think about the impact of conversation dynamics on their prospect of success. My results suggest that beyond "what people say" in a negotiation, the way that negotiators talk, pause, and coordinate their speech turns can make or break a deal.

Zooming In on Negotiators' Behaviors

This thesis offers new insights into how to use questions in a negotiation conversation. For the first time, I measure how frequently and the impact of different types of questions in a negotiation setting. In a first study, I developed a Natural Language Processing algorithm to

detect and classify question-asking behavior in a corpus of 53,612 speech turns from 305 dyadic negotiations. I find that, on average, less than 9% of negotiators' speech turns contain an open-ended question. Yet, I also find a robust positive linear association between negotiators' propensity to ask open-ended questions and individual negotiation gains. In contrast, asking closed-ended questions and making statements are unrelated to gains. At the turn level, open-ended questions elicit responses that are twice as long compared to close-ended questions and statements—an information advantage explains why inquisitive negotiators gain more. Providing experimental evidence via an interactive live chat, I find, in a second study, that participants who I instructed to prepare three open-ended questions get significantly higher individual gains (+23%) than control participants instructed to prepare three statements.

Third, I look at how facial expressions are relevant in negotiation, mostly showing that the dynamics are important. I do not find evidence that participants that display more emotion (of any type) affects negotiation outcomes. On the contrary adapting on positive emotions with one's counterpart relates to higher individual gains. While non-verbal behaviors encompass a lot more than the mere facial expression of basic emotions, our results suggest that there might be strategic value into mimicking your counterparts' smiles.

Finally, I showed that negotiation is an integral part of our daily life. I found that 25% of daily interactions involve negotiation, often resulting in a short-term dip in happiness. However, despite its challenges, the data revealed that negotiation shouldn't be avoided. Those who negotiated more often reported higher overall happiness. These findings reaffirm that negotiation, while sometimes daunting, is a fundamental part of our social landscape and a crucial life skill with benefits that extend beyond the boardroom and contribute to overall well-being.

6.2 Limitations and future research

Despite the important insights provided in this thesis, it is essential to acknowledge its limitations. This section outlines the areas where the research may be constrained and suggests potential avenues for future investigations to address these limitations.

The field of conversation analysis is continuously evolving. As highlighted in the second chapter, the dimensions of conversational analysis are subject to ongoing progress. The dynamic nature of the field suggests that new techniques may emerge, enabling more precise measurement and extraction of conversational metrics with higher accuracy in the future. Therefore, future studies should be mindful of adopting the latest advancements in conversation analysis methodologies to enhance the depth and accuracy of findings.

While the findings of chapter 2 contribute valuable insights to the understanding of conversational dynamics, generalizability to the entire population may be compromised. The reliance on negotiations from MBA dataset, though comprehensive, may not be fully representative of all conversational scenarios. It is crucial to recognize that various factors, such as cultural, demographic, and contextual differences, may influence conversation dynamics in diverse settings. To improve generalizability, future studies should consider incorporating broader and more diverse participants.

Data for all studies (Ch. 2, 3, 4 & 5) were collected through zoom calls or chat text, lacking face-to-face interaction between participants. This approach may impact the dynamics and quality of conversations, as face-to-face interactions offer richer nonverbal cues (Purdy, Nye & Balakrishnan, 2000) and emotional nuances that could influence the overall conversation experience. Future research could explore incorporating face-to-face interactions to examine how the physical presence of participants influences conversational dynamics differently.

The thesis primarily focused on analyzing entire conversations, potentially overlooking the significance of initial impressions in shaping subsequent interactions (Yeomans et al,. 2021). Future research should consider investigating the role of first impressions and their lasting effects. Understanding the impact of initial moments in conversations can lead to valuable insights into how interactions unfold over time.

Future studies could investigate into specific conversational dynamics, such as turn-taking patterns, interruptions, or backchannels. This focus will allow for a more nuanced understanding of these specific aspects and their influence on overall conversation quality and outcomes.

Investigating the semantic of questions in negotiation scenarios can offer valuable insights into the strategic use of language and its impact on shaping outcomes. Analyzing the question phrasing and their effects on negotiation outcomes can provide a deeper understanding of which type of questions are the most effective.

Conversations involve various communication channels, including verbal, nonverbal, and paraverbal cues. Future research should explore how these different communication modes interact and influence each other during conversations. This exploration will contribute to a more comprehensive understanding of the intricacies of human interaction.

Overall, this thesis contributes to our understanding of negotiation through a rigorous, data-driven approach that seeks to bridge the gap between negotiation scientific literature and practitioner wisdom. By delving into the complexities of negotiation dynamics, I have not only tested decades of practitioner wisdom but also identified new nuances within the field. For example, contrary to general wisdom, leaving the floor to the opponent may not be a good tactic in negotiation or asking any kind of question may be an imprecise recommendation. The findings of this thesis highlight the importance of conversation dynamics, asking open

questions, and adapting facial expressions in the negotiation processes. In doing so, I have provided valuable insights that can inform practitioners, educators, and scholars, by quantifying the frequency and effectiveness of widespread communication negotiation tactics.

Negotiation represents an intricate ballet of human interaction, and its outcome is influenced significantly by "what" and "how" communication is conveyed. The empirical evidence in this thesis represents a starting point for future research that not only aims to test common wisdom, but also analyze large datasets and apply new rigorous methodological approaches to conversational data. Overall, I hope my thesis can help people have more satisfying interactions and achieve better results at the bargaining table and beyond.

6.3 References

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