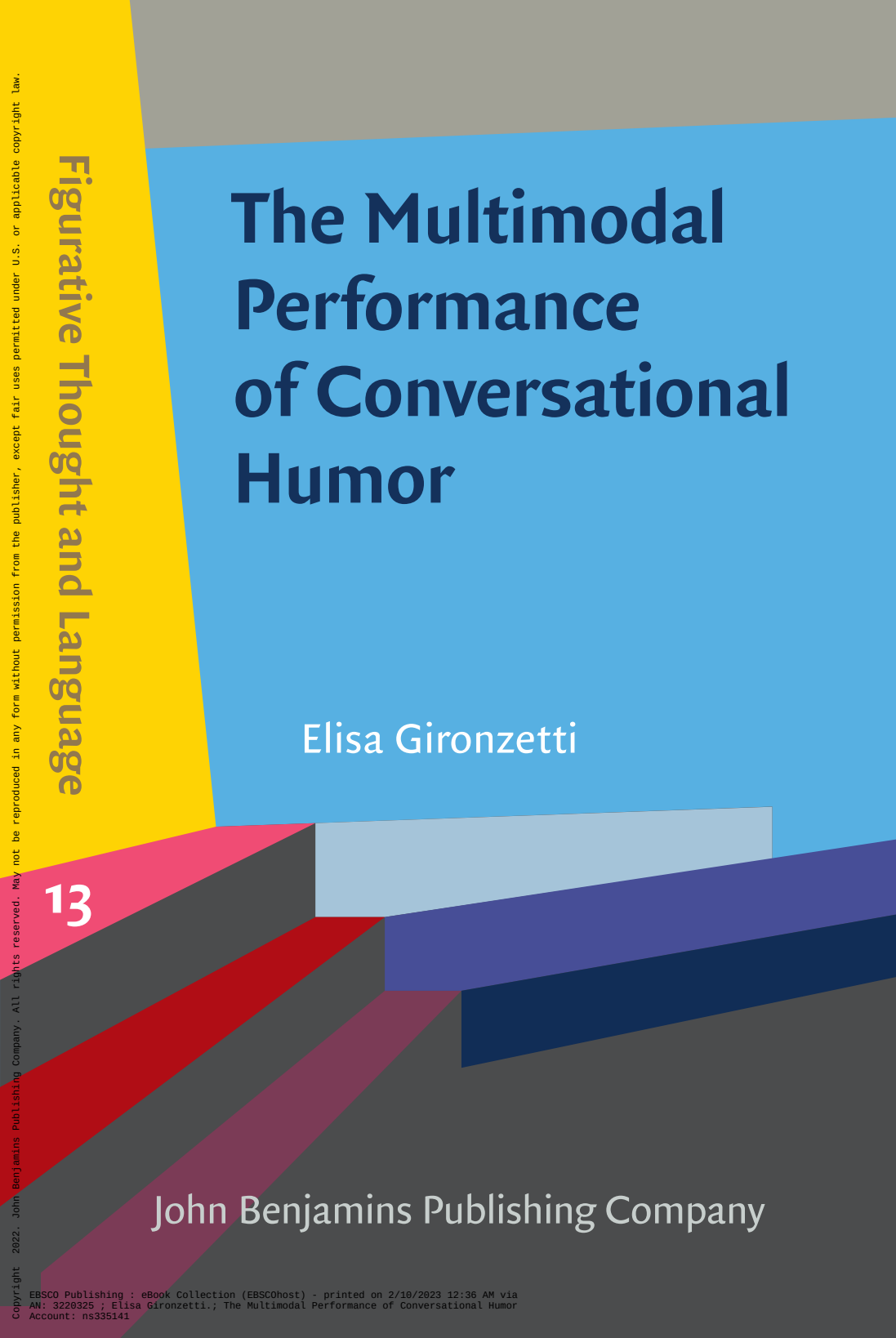

The Multimodal Performance of Conversational Humor

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Volume 13

The Multimodal Performance of Conversational Humor
by Elisa Gironzetti

The Multimodal Performance of Conversational Humor

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To Shige, our MenjoSan

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Preface

The genesis of this project can be found in a poster presentation that I gave at the *Finding Common Ground: Social, Ecological, and Cognitive Perspectives on Language Use* conference at the University of Connecticut at Storrs in 2014. At the time, I was a graduate student in the Applied Linguistics Lab at TAMUC and I was working as a research assistant on a project led by Dr. Attardo and Dr. Pickering on the multimodal markers of humor that focused on smiling and prosodic features. The work I presented at the Storrs conference was a first exploration into issues of multimodal alignment and synchronicity in conversational humor in computer-mediated conversations using data from that project. As a research assistant, I was trained to apply FACS and learned to define what counts as smiling in the context of face-to-face conversation, and I collaborated in the discussions that led to the development of the Smiling Intensity Scale, an instrument that could be used to measure and quantify changes in smiling over time.

All the experiences, exchanges, and debates that we had at TAMUC shaped my thinking and eventually led me to choose face-to-face conversational humor as the main topic for my dissertation, and to build on the work done by Attardo and Pickering to include eye-tracking and gaze, as this seemed a natural step in the study of smiling in conversation. At that time, there was virtually no work on the relationship between conversational humor, smiling, and gaze, and very few applied linguists had ventured to using dual eye-tracking for their studies. In fact, I remember that when I started working on my literature review, only one study had been published on dual eye-tracking. Today, the situation is quite different, as several recent and cutting-edge publications are now available on each of the topics and approaches that this monograph touches upon.

The main contribution of this book is to fill a gap in the study of conversational humor and offer a new, multimodal perspective on how humor is performed in face-to-face conversations. As such, this book is meant primarily for researchers and graduate students in the field of humor studies and, more specifically, conversational humor, but may also be of interest for scholars from other fields who are working on topics such as embodied communication, behavioral alignment, social eye tracking studies, or the role of facial expressions in face-to-face conversations.

The chapters in this book are best read sequentially, as each presents findings that build on what is discussed in the previous chapters. Following this organization,

the book is meant to gradually guide the reader towards a more complex and dynamic understanding of how interlocutors engaged in face-to-face conversations negotiate the humorous frame by means of smiling and gaze. The two exceptions are Chapter 1, which can serve as a stand-alone introduction to the multimodal study of conversational humor, and Chapter 2, which can also be read as a stand-alone summary of the main findings of this study with references to where in the book each finding is discussed. The appendices complement the method section discussed in Chapter 2 and provide readers with all the necessary details to be able to replicate it (research protocol, jokes, and demographic questionnaire), as well as offering additional data on the interlocutors' smiling intensity discussed in Chapters 3 and 4.

There are many people that I would like to thank for their continuous support and help as I was writing this book. First and foremost, Salvatore Attardo. I could not have written this book without his mentorship. Every time that I think back at the day when I made the decision to go to Texas to get a second Ph. D., and every time I think about my current and future career in academia, I feel extremely grateful to have had the opportunity to work with him and learn from him. In the last year that I worked on this book, he generously offered his time, advice, and much needed humor at the weekly meetings of the *Joyous Writing with Sal* group. He read every single chapter, sometimes more than once, gave me feedback throughout the process, and kept me grounded, motivated, and focused.

I also want to thank the other members of *Joyous*, many of whom are very close friends and fellow lab-members. Above all, my dear friend and lab-mate Shige, whom I miss incredibly. Throughout the years he shared with me countless research days at the lab and passionate conversations about statistics, teaching, FACS and the TV show *Lie to me*, Japanese and Italian food, and music from the 80s and 90s. I am also grateful to Meichan, Hilal, Heather, Shelby, and Terry, the *Joyful* cohort, who kept me motivated and accountable for writing every week and who shared with me their experiences and struggles with writing, making me feel I was not alone in this! I really hope this group will keep meeting every week, indefinitely.

I am thankful to all the friends and colleagues who, at times without even knowing it, kept me going and helped me shape the ideas and arguments presented in this book: the whole group of TAMUC applied linguists and our fearless leader, Lucy Pickering; my colleagues and mentors at UMD, above all Manel Lacorte, Steve Ross, Laura Demaria, and Eyda Merediz; and then Kiki Hempelmann, Flavia Belpoliti, Béatrice Priego-Valverde, Dale Koike, "el chef" Javier Muñoz-Basols, and Irene, Niv, and Matt, who made the months of pandemic writing much more bearable. I am thankful for the colleagues who shared copies of their articles and preprints with me, including Geert Brône and Marta Dynel. I am grateful to the University of Maryland and the Department of Spanish and Portuguese for awarding me a Junior

Faculty Summer Fellowship and the Jorge Aguilar Mora Faculty Research Award, respectively, which allowed me to spend a few months focusing on this book.

Last but not least, I also want to thank my family, especially my mom and my dad who every week (every week!) for a year kept asking me about this book; my brother Riccardo who offered to read this book without knowing what he was signing up for, and my brother Roberto, for not asking to read this book (that would have been fun!). And last but not least, my life partner, Alberto Miras (a.k.a. Mirasito) for believing I could do it from day one, when I surely did not, for getting through this pandemic and book-writing together, and for accepting to work remotely from his school during the pandemic so that I would be able to write, undisturbed, at our 1-bedroom apartment in DC.

CHAPTER 1

Approaching the multimodal study of conversational humor

1.1 Why a multimodal study of conversational humor?

This book is concerned with the study of conversational humor from a multimodal, embodied perspective. To illustrate the need for and the benefits of such an approach, consider the following exchange, extracted from a conversation between two speakers of Mexican Spanish that is part of the corpus of semi-naturalistic,[1] face-to-face dyadic conversations analyzed in this volume (the corpus will be presented in detail in Chapter 2).

Hans: este es un pueblo [de pri]mera, sií
Andy: [sí]
Hans: porque si metes segunda te pasas del pueblo
Andy si ya me l has contado (laugh)
Hans (laugh)

In this excerpt, Hans talks about the town in which both speakers are currently living and says it is a "first-class town" (*de primera* in Spanish). The expression *de primera* is ambiguous as it could both mean first-class, but also anything that belong to or is related to the first element of a series. This ambiguity is exploited by Hans in the next line of the exchange, when he clarifies that it is *de primera* not with the meaning of first-class, but quite the opposite. From his second line, it becomes clear that he used *de primera* to refer to the car gear needed to drive through the town, implying the town is really small, because if you switch to second gear you are already out of the town (*si metes segunda te pasas del pueblo*).

---

1. The term semi-naturalistic is employed here to refer to conversations that retain many of the features of naturalistic conversations but were nonetheless not spontaneous. Despite having created a least intrusive setting for the data collection, these conversations were recorded, humor was primed by the use of jokes as icebreakers, and participants were placed in a room with recording equipment. Therefore, it is possible the whole setting may have affected their gaze, movement flexibility, and spontaneity. A more nuanced discussion of the setting can be found in Chapter 2. I am grateful to the reviewers of this manuscript for pointing out the need to explain the use of the term.

What is happening in this exchange is an example of conversational humor, as Hans decided to retell a joke he had heard before and apparently also told before, as pointed out by Andy when he says *ya me lo has contado* (you already told me this one). In this case, Hans modified the target of the joke to be the town where both interlocutors lived at the time, which was the topic of the conversation at that moment. However, no one in this exchange explicitly said that this comment was interpreted or intended as a humorous one. How did Hans and Andy know and communicate to each other that they both interpreted this exchange as a humorous one? Conversational humor is a *negotiated* activity (Davies, 1984, see Section 1.3 in this chapter for a discussion of the term) that requires interlocutors to jointly participate in the co-construction of a humorous frame, a humorous interpretation of what has been said, during an interaction. To go back to the example involving Hans and Andy, we can rephrase our question to ask how did they negotiate the humorous framing of this specific example? The first element one would notice is probably laughter, which occurs right after the delivery of the punchline and is typically associated with humor. While in this case both interlocutors are laughing and, by means of doing so, they are both displaying their enjoyment and appreciation of what Hans said, it should be noted that this is not always the case, as often conversational humor is not accompanied by laughter. Thus, we may find instances of humor where only one person laughs or no one laughs, and also instances of laughter that accompany non-humorous utterances. As an example, in the case of conversational humor in Peninsular Spanish, Ruíz Gurillo (2021) reports laughter in only 13.64% of all humor instances in her corpus.

Besides laughter, speakers have at their disposal a much wider array of resources that they can mobilize to negotiate conversational humor. Some of these may be verbal, such as explicit comments and appreciations (e.g., this is funny, let me tell you a joke, etc.), while others are not, as for example facial expressions, gestures, and body posture. In order to be able to understand how speakers do humor in conversation, then, it is necessary to move past a linguocentric approach to communication (Erickson, 2004) that only looks at verbal language to consider all the semiotic resources that speakers (can) mobilize, including but not limited to laughter. Embodied theories of cognition look at relationship between the mind and the body challenging traditional views that did not, or only marginally considered the body and its sensory-motor apparats in the study of human cognition. An embodied approach to communication such as the one adopted in this book, then, provides a theoretical framework and the analytical tools to study the multimodal performance of conversational humor. Such an embodied approach allows us to move past this linguocentric view to consider the role of the body in the process of language comprehension and verbal communication and understand how speakers mobilize non-verbal resources to negotiate the humorous framing of an utterance.

The following quote by Gibbs (1999) exemplifies what for a long time was (and still is) believed with respect to humor: that humor ought to be delivered "with bells and whistles" (Chafe, 1994, p. 131), that is to say, marked by means of intonation or laughter, or accompanied by smiling as a cue to express nonserious feelings (Chafe, 2007, pp. 51–57).

> Our tacit understandings of talk include the assumptions that what is being said is the speaker's position, that the speaker is committed to his or her words, and that the speaker believes what is being said, such that evidence to the contrary is expected to be explicitly marked (e.g., by explicitly framing a statement as a joke).
> (Gibbs, 1999, pp. 64–65)

The idea that humor is marked in a specific way to make it stand out from non-humorous talk is referred to as *folk theories of humor performance*. This term, folk theories of humor, refers to a set of beliefs about how humor is performed (by non-professional and also professional comedians) that are often discussed in non-academic publications aimed at people who, for example, are interested in using humor in public speaking or want to become stand-up comedians, but have also found their way into academic discourse (for a review, see Attardo & Pickering, 2011). Folk theories of humor performance include the following hypotheses regarding how humor is marked, as summarized by Attardo and Pickering (2011, p. 238): there is a pause before the punchline; punchlines are delivered faster, more clipped, and with bells and whistles than non-punch lines, and there is a shift in voice quality (pitch) and volume at the punch line.

Such a marking would serve to minimize the chances for failed humor and maximize the chances of obtaining the desired humorous effect, often equated with laughter from the audience. However, while this kind of marking has been shown to be employed in the case of staged or professional humor, such as stand-up comedy or sit-coms (see Urios-Aparisi & Wagner, 2011), it is not necessarily used in the case of conversational humor, which occurs in real, unstaged conversational settings among people who are not professional joke-tellers. Recent empirical studies demonstrated that humorous narratives and conversational humor, including prepared and spontaneous jokes, are not reliably marked by higher pitch, higher volume, faster or slower speech rate, or pauses, and are accompanied by laughter just about 50% or less of the time (Pickering et al., 2009; Attardo & Pickering, 2011; Attardo et al., 2011a). Therefore, it is unclear how conversational humor is marked, that is, what mechanisms people employ to mark an utterance as humorous.

It is within this framework that this volume contributes to the study of conversational humor by looking at how humor is performed in a face-to-face conversation. In my work, I build on the notion of *framing* (Goffman, 1974) or *keying* (Hymes, 1972) to study how interlocutors negotiate the interpretation they attach to

a humorous utterance, and on the concept of *speakers' repertoire* (Gumperz, 1964) as I discuss the available semiotic resources that speakers have at their disposal to frame utterances as humorous.

The study discussed in this book employs a multimodal discourse analysis approach to analyze a corpus of six dyadic conversations involving 48 humorous exchanges. Through the integration of eye-tracking data and the analysis of participants' facial expressions and joint non-verbal behaviors, this volume paints a rich picture of how speakers negotiate the humorous framing of utterances and offers a data-driven discussion of conversational humor. These data are discussed in light of recent theories of embodied and social cognition (e.g., McIntosh, 1996; Fusaroli et al., 2014; Scarantino, 2017; Wilson & Foglia, 2017), introduced in Chapter 4 before the analysis of the dyad smiling behavior, to explain and illustrate the synergic relationship between verbal and non-verbal behaviors that contribute to conversational humor.

This book focuses specifically on three sets of multimodal resources – smiling, behavioral alignment, and gaze patterns – that have been previously recognized as co-occurring with humor (such as smiling) or are key for people to understand each other (such as behavioral alignment and gaze patterns), and looks at how these are mobilized in humorous conversations. Their study, including their functions and use, with respect to specialized types of discourse has recently attracted a lot of attention due, in part, to recent technological advancements that allow scholars to tackle these issues more precisely and from different methodological perspectives (see Brône & Oben, 2018). The number of studies that employ eye trackers, for example, has increased exponentially in several fields, including applied linguistics (Godfroid, 2019), thanks to the ease of use of modern eye tracking devices, allowing for the study of gaze patterns in novel settings such as social and multiparty interactions (see Attardo & Pickering, 2022). The study of facial expressions and behavioral alignment has also been partially automatized to reduce the amount of time, expenses, and training needed to do it manually through the use of software such as *Openface* (Baltrušaitis et al., 2018) and HMAD (https://github.com/srauzy/HMAD). *Openface* uses video to perform head tracking, facial landmark detection, head pose estimation, facial action unit recognition, and eye-gaze estimation, while HMAD is an R script for the automatic detection of internal facial movements and head movements from a video record that includes the *SMAD* script based on the Smiling Intensity Scale (Gironzetti et al., 2016b; see a discussion of more tools in Brône & Oben, 2018). The integrative perspective offered in this book considers all three types of semiotic resources–smiling, behavioral alignment, and gaze patterns–in the study of a complex and multifaceted phenomenon such as conversational humor. The identification and comparison of how these resources are mobilized across humorous and non-humorous parts of conversation, as well as across types

of humor (e.g., punchlines or irony), sheds light on the meaning making process, highlighting how speakers rely on the interaction and integration of verbal and non-verbal resources to achieve their communicative goals, namely, to perform conversational humor.

The main goal of this volume, thus, is twofold. First, it contributes a novel research protocol and empirical data to answer a long-standing question in the field of humor studies: how do people *know, decide*, or *negotiate* what is humorous in a conversation, and more so when the humorous intention is not clearly signaled by means of metalinguistic cues? In other words, when people are engaged in a conversation, how do they know what is humorous and what is not if nobody explicitly says, "this is a joke" or "this is meant to be funny?" How do speakers *perform* humor during conversation? Second, this volume presents arguments in favor of a non-linguocentric (Erickson, 2004), embodied approach that accounts for the key role of multimodal, non-verbal resources in face-to-face communication (Holler et al., 2018). In a conversation, interlocutors have at their disposal a wide variety of resources beyond verbal language, which include multimodal signals such as facial displays (e. g., smiling), gestures, and gaze (Davitti & Pasquandrea, 2017). For example, an instance of conversational verbal humor, such as the humorous exchange between Hans and Andy discussed above, illustrates how smiling, gaze, and behavioral alignment are crucial to the dialogic co-construction of humorous framing and contributes to shed light on the embodied social aspects of dialogue.

Throughout this volume, the analysis and discussion of empirical multimodal data show how smiling functions as an emotional expression analog to a speech act (Scarantino, 2017). As such, smiling conveys emotional as well as socially relevant information that affects the conversational dynamic and how speakers behave in response to each other. Because smiling is associated with exhilaration and mirth, as well as with feelings of affiliation and willingness to communicate (Cappella, 1997; Heerey & Crossley 2013; Heerey & Kring, 2007), conversational partners rely on smiling synchronic behaviors to jointly negotiate the framing of conversational humor. Moreover, because this negotiation happens by means of visual cues (i.e., smiling), interlocutors also modify their gaze patterns and the way they look at each other's mouth and eyes. Given the complex topic that we are about to explore, this brief introduction, this chapter comprises three central subsections to provide the reader with a basic understanding of the field of humor studies, conversational humor, and humor markers, and concludes with an overview of the content of the whole volume.

1.2 The field of humor studies

The study of humor has been a topic of interest for centuries, as demonstrated by the first theories of humor that date back to the works of Plato and Aristotle, which informed some of the humor theories that scholars employ nowadays (for a more detailed review of the history of the field, see Attardo, 1994; Larkin-Galiñanes, 2017). However, it was only in the 1970s that the study of humor began to consolidate as an autonomous research field, thanks to the efforts of several scholars that culminated with the publication of a wide-ranging edited volume (Goldstein & McGhee, 1972), the organization of the first specialized conference in 1976,[2] and the publication of their proceedings (Chapman & Foot, 1977). Several other significant events followed (see Attardo, 2021, p. 21–22) until when, in 1989, the *International Society for Humor Studies* (www.humorstudies.org) was founded and with it the Society's journal, *HUMOR, International Journal of Humor Research* (https://www.degruyter.com/view/j/humr), the first of several academic journals and book series devoted to the study of humor from a variety of disciplinary and methodological perspectives.[3]

Nowadays, the field of humor studies counts with a substantial and growing body of academic publications in the form of conference presentations, articles, book chapters, as well as monographic and edited volumes, and consolidated itself as highly interdisciplinary. The interdisciplinarity and breadth of scope that has characterized the field since its beginnings is represented in the areas and topics covered in the two-volume *Encyclopedia of Humor Studies* (Attardo, 2015), but was already recognized as a characteristic of the field early on, as discussed by Raskin in the introductory chapter of *The Primer of Humor Research* (2008), a publication that aimed at serving "as a first-line defense against, and a helpful tool for, the first-timers in humor research, those who venture into humor from their disciplinary perch" (p. 1).

Humor scholars come from very different disciplines including anthropology, cultural studies, philosophy, and neuroscience. However, among the disciplines that had the most significant impact in the field throughout the years are psychology, as reflected in the reference publications by Martin (2007, see Martin & Ford,

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2. The first *International Conference of Humor and Laughter* was celebrated in Cardiff, Wales, in 1976.

3. Among current journals, are *The European Journal of Humor Research*, *Studies in American Humor* (the journal of the American Humor Studies Association), and *RISU, Rivista Italiana di Studi sull'Umorismo*. Among current book series, are the *Humor Research Series*, *Language Play and Creativity* (both published by DeGruyter), and *Transaction Series in Humor* (currently published by Routledge).

2018, for the revised second edition) and Ruch (1998, 2008), among others; sociology, for example, with the comparative work on jokes by Davies (1990, 1998) and Kuipers (2011/2015), and linguistics (see Attardo, 1994, 2017, 2021), which became more prominent in recent years.[4] Since this book presents a study of conversational humor that draws on key concepts and theories from linguistics and cognitive sciences, the next sections will discuss the main linguistic theories of humor and the contributions to the study of humor from cognitive linguistics.

1.2.1 The linguistics of humor

Linguistics contributions to humor studies come from a wide varieties of research traditions, including conversation analysis, discourse analysis, and sociolinguistics, among others (see Attardo, 2017, 2021, for an overview). As mentioned previously, the contributions of linguistics to the study of humor started to take a more central role only in the 1980s thanks to Raskin's work who "set semantics and pragmatics front and center, a position whence they have not retreated since" (Attardo & Raskin, 2017, p. 49), while also influencing future linguistic research on humor towards a "decidedly cognitive orientation" (Brône et al., 2006, p. 203). In fact, pragmatics, semantics, and cognitive linguistics figure prominently among the key disciplinary areas of the linguistic study of humor nowadays. A good example is the extensive research on humor and irony within pragmatics from a relevance theory perspective (see, for example, Yus, 2003, 2016, 2017).

The development of current linguistic theories of humor has been influenced by early humor theories from different disciplinary perspectives (see Attardo & Raskin, 2017 for a more comprehensive discussion). Raskin (1985) classified these early theories into three families: incongruity theories, hostility or superiority theories, and release theories (see also Attardo 1994, p. 47). In brief, incongruity theories focus on the cognitive processes of humor; hostility theories adopt a more social perspective by focusing on the target of humor and its aggressive nature, and release theories focus on the psychological effects of humor as a mechanism to relieve tensions. The two most influential families of theories for the linguistic study of humor have been incongruity theories and hostility theories, while release theories have been mostly ignored within linguistics but, for example, had a central role in the literary study of humor.

Influenced by incongruity theories and, to a lesser extent, hostility theories, current linguistic theories of humor include the Semantic Script Theory of Humor

4. The reader should note that this list of disciplines and works is not meant to be exhaustive but rather to offer a sense of the breadth of scope that characterizes scholarly works in the field of humor studies.

(SSTH, Raskin, 1985), the General Theory of Verbal Humor (GTVH, Attardo & Raskin, 1991), and the Ontological Semantic Theory of Humor (OSTH, Raskin et al., 2009), or "the SSTH-GTVH-OSTH dynasty of linguistic theories of humor" (Raskin, 2012, p. 63). The SSTH relied on the cognitive concept of script and claimed that for a text to be humorous (i.e., a joke), this needs to be compatible with two different scripts and these scripts need to be (at least in part) in opposition. These scripts, regardless of how their opposition is lexicalized in the humorous text, need to belong to the limited set of binary categories that are essential to human life (Raskin, 1985, p. 113). Similarly, the OSTH is also a script-based linguistic theory of humor that integrates ontological semantics in order to account for the world knowledge necessary for people to understand humorous texts, describing the procedure for deriving and processing script oppositions and logical mechanisms. The GTVH, contrary to the SSTH and OSTH, does not only focus on linguistics but instead proposed an expansion of the SSTH and the existence of six Knowledge Resources (KR), including script opposition (SO, derived from the SSTH) and target (TA, derived from hostility theories). These KR are organized hierarchically and can be mobilized to explain to what degree two jokes are similar or different.

The SSTH, OSTH, and GTVH share certain features. First, they were formulated to account mostly for jokes, not all humorous texts. In the years following its publication, however, expansions and modifications of the GTVH were proposed to allow for the analysis of other humorous texts, including short stories and longer narrative texts (Attardo, 2001; Tsakona, 2007). Second, these theories are also concerned with humor competence and not humor performance (or actual production). In this sense, they are meant to offer a description of the defining (essential) elements that would allow a speaker to differentiate between a joke and a non-joke, or different types of jokes, in the same way in which a native speaker would differentiate between a grammatical and an ungrammatical utterance (Raskin, 1985, pp. 49–59). Last, the three theories also share a cognitive basis, as the concept of script refers to the cognitive structures in the mind of the speaker that describe the world as the speaker knows it (Raskin, 1979, p. 325). The script opposition as described by Raskin is still at the core of the linguistic study of humor and is the basis of the method employed to identify instances of conversational humor in the corpus (see Chapter 2 for a more detailed presentation of the method).

1.2.2 Cognitive linguistics and humor

Besides informing the notion of scripts key to Raskin's work, cognitive linguistics made other important contributions to the study of humor and has recently seen an increase in the number of studies that focus on humor (see Brône, 2017, 2012, for a more thorough discussion of cognitive linguistics and humor). According to

Brône (2017), the two most extensive research programs within cognitive linguistics that focused on humor were linked to the work of Seana Coulson and Rachel Giora. Coulson and colleagues developed several experimental studies using eye-tracking, ERP (event-related potential, a voltage change generated in the brain in response to a specific event), and measures of reading-time that collectively provided evidence that supports the humor frame-shifting hypothesis. These studies revealed key features of how people process jokes showing that: people need more time to read jokes' endings or punchlines than non-joke endings (Coulson & Kutas, 1998); people require more regressive eye movements after reading the punchline (Coulson et al., 2006), and reading jokes elicits an N400, a negative component of event-related potential that peaks around 400 milliseconds after the stimulus, associated with semantic integration difficulties and, in the case of humor, the processing of an incongruity (Coulson & Kutas, 2001; Marinkovic et al., 2011). Joke processing has also been shown to elicit a P600, a positive component peaking around 600 milliseconds after the stimulus and associated with a semantic and syntactic repair process or, in the case of humor, the resolutions of a prior incongruity (Coulson & Kutas, 2001; Coulson & Lowett, 2004). More recent studies built and revised some of these findings, such as Canal et al. (2019), that showed that the incongruity detection step in humor processing affects the Left Anterior Negativity (LAN, an event-related potential associated with the detection of an incongruity) and not the N400.

Giora and colleagues developed a different line of research focusing mostly on the processing of jokes and irony, that led to the formulation of different hypothesis. The *marked informativeness hypothesis* indicates that jokes violate the graded informativeness requirement of narrative texts. According to this hypothesis, instead of gradually increasing the informativeness of the text, jokes end with a markedly informative message (the punchline), forcing an abrupt interpretative shift (Giora, 1991). According to the *salience hypothesis* (Giora, 1997, 2003), certain meanings are more salient than others and so more easily accessible than non-salient ones. This principle is key in the processing of jokes and irony, as these texts rely on the fact that the listener/reader will access the most salient meaning first. The salience hypothesis was later integrated into the *optimal innovation hypothesis* (Giora et al., 2004) that explains the pleasure of creative stimuli (thus, mirth caused by humor) in terms of salience and innovation. Jokes, then, would be characterized as texts that offer a non-salient meaning while at the same time allowing for the recoverability of the salient one, so that both meanings are available.

Research on humor within cognitive linguistics is currently expanding on the work of Coulson and Giora as well as exploring new lines of inquiry are exemplified by the works in the edited volume by Brône et al. (2015), which focus on humor and grammar, metaphors and figure/ground reversal, and corpus studies, among other topics. In addition to these areas, several researchers started to focus on

multimodality in communication from a cognitive linguistic perspective (e.g., Pinar Sanz, 2015, a book version based on a 2013 special issue of the journal *Review of Cognitive Linguistics*; Cienki, 2016; Kok & Cienki, 2016, for an overview of studies at the intersection of cognitive linguistics and multimodality), including conversations. The recent work of Brône, Feyaerts, and colleagues looks at the interactional nature of communication including but not limited to conversational humor and is particularly relevant as it overlaps with the topics discussed in this book. Among the non-verbal behaviors explored in this line of work are eye gaze (Brône & Oben, 2018; Vranjes et al., 2018; on humor, see Brône, 2021), but also head movements (Vranjes et al., 2019), hand gestures (Hsu et al., 2020), and complex gestural behaviors such as shrugs (Jehoul et al., 2017). Due to their direct relevance for the study of conversational humor, findings and methodological contributions from these studies will be discussed in more detail throughout this volume in those chapters that focus on the same topic (e.g., a discussion of Brône, 2021 is found in Chapter 5 on gaze).

So far, I presented the fields of linguistics and cognitive linguistics applied to humor studies as these are two key disciplinary areas that set the basis for this volume. More specifically, the present volume adopts a multidisciplinary approach to the study of humor that bridges linguistics and cognitive sciences by means of relying on script opposition as a key element to identify instances of humor in conversation (see Chapter 2), adopting a multimodal discourse analysis methodology to analyze the data, and building on cognitive theories of embodied communication to interpret these data. The following sections introduce the reader to another key area, the study of conversational humor and humor markers, situated within the discourse analytic tradition in linguistics, which constitutes the third key disciplinary area of this volume, and the starting point for the analyses and results presented in the rest of the book.

1.3 The study of conversational humor

The study of humor as it occurs in conversation followed a different path and remained separated from mainstream humor studies and theories until recently. Attardo (2015) offers the first up-to-date synthesis of the different research strands on humor and laughter within discourse analysis, organized into three periods: the precursors who worked on humor in the 1970s and 1980s and paid attention mostly to canned jokes and laughter; the functionalist period, which extended until the 2000s, and the corpus-synthesis phase that lasts until the present time. Here, I offer an overview of this strand of research, but the reader should note that some of these studies will be discussed in more depth in the following chapters.

The foundational works in this area, the precursors, were Sacks' (1974) analysis of the sequential organization of a joke telling episode within a conversation among friends, Jefferson, Sacks, and Schegloff's (1977) study on multi-party laughter, and Jefferson's (1979) study on the use of *inviting laughter* (using laughter to invite laughter from the interlocutor). These scholars worked from within a Conversation Analysis (CA) tradition and were primarily interested in the sequential organization of a joke and the function of laughter (the focus on laughter remained a key feature of the study of conversational humor until today and is discussed in detail in Section 1.4.3).

With what Attardo (2015) calls the functionalist phase, the focus of scholarly interest shifted to the study of the numerous functions of humor, with affiliative functions of conversational humor receiving the most attention (e.g., Norrick, 1993; Kotthoff, 2000) and fewer scholars exploring disaffiliative ones (e.g., Priego-Valverde, 2003). Functionalist studies of humor are numerous, as humor is an integral and ubiquitous element of human interaction with many different functions, which can potentially encompass any function at all (Priego-Valverde, 2003). As an example of humor pervasiveness in human interaction, Tannen (1984) showed that about 10 percent of the turns in a dinner conversation were humorous. The following is a representative summary of the many functions of humor that have been researched so far. People use humor to bond as well as to attack or criticize others ("bonding and biting," Boxer & Cortés-Conde, 1997) and to regulate interpersonal affect, such as reducing the impact of negative emotions (Samson & Gross, 2012). They also use humor to create solidarity (Davies, 1984; Everts, 2003), to build and signal their conversational personality (Tannen 1984), to show intimacy (Burns et al., 2001), to signal and regulate in-group and out-group dynamics (Plester & Sayers, 2007; Haugh & Bousfield, 2012), to mitigate a conflict (Norrick & Spitz, 2008), and to increase their social status (Bitterly & et al., 2017). Additionally, humor has also been employed in multiple professional contexts as a marketing strategy to increase people engagement with products and activities or to improve the image of a brand (e.g., Beard, 2008; Hatzithomas, et al. 2016; Dore, 2020), and can be employed as a strategic means to enhance persuasion in different contexts including advertising and education (Lyttle, 2001).

The last phase according to Attardo (2015), the corpus period, was marked by a methodological shift towards quantitative studies brought about by the use of existing corpora for the study of humor (e.g., Günther, 2003) and the creation of corpora that allowed for the analysis of humorous turns in conversation (Tannen, 1984). As Attardo (2015) points out, due to the challenges of identifying humor in a corpus that will be addressed in Section 1.4 on humor markers, some of these focused on laughter and laughter speech (e.g., Chafe, 2007; see Section 1.4.3 on laughter), while other studies only analyzed instances of humor that were marked as such (e.g., Partington, 2007, on explicit irony).

In the last few years, the field of conversational humor has begun to receive an increasing share of attention within humor studies. This resulted in quite a few publications exploring prosodic features of conversational humor (see Section 1.3.2), conversational humor in a second language (Bell, 2018; Shively, 2018), and the interactional and multimodal nature of humor across media, contexts, and situations (Tsakona & Chovanec, 2018).

In these recent approaches, conversational humor is defined as a type of interactional humor (Tsakona & Chovanec, 2018) that is cooperative and co-constructed by speakers engaged in oral interactions, be it in face-to-face or technology-mediated environment. Co-construction is the process by which interlocutors collaborate and influence each other in the process of meaning-making by means of contributing verbal and non-verbal elements, and it represents a central feature of conversation and dialogue (Coates, 2007; Koike & Czerwionka, 2016). The study of conversational humor as a co-constructed or *negotiated* activity dates back to the pioneer work of Davies (1984), who maintained that conversational partners jointly co-construct humor (i.e., joking) during an interaction and that, by doing so, they display features of a shared joking style. From this perspective, the process of humorous sense-making is seen as interactional, and (humorous) pragmatic intentions are not imposed by the text or any individual speaker, but are negotiated by both conversational partners as the conversation unfolds. Conversational humor, thus, emerges as collaborative and co-constructed by speakers by means of a strategic use of the multimodal resources at their disposal, and not a feature of a text established *a priori* or even attributed to the text by one single speaker.

Despite the fact that this proposal was outlined in the 80s, only few scholars focused on this line of research (e.g., Priego-Valverde, 2006; Kotthoff, 2009; Dynel, 2018), while the field of humor studies at large followed a different path and continued to focus on either the speaker, the listener, or the humorous text. This approach, combined with the dominant focus of the field on competence rather than performance described in § 1.2, has left room for further developments regarding the study of the interactional co-constructed nature of conversational humor.

1.3.2 Defining and identifying conversational humor

But what exactly is conversational humor? Instances of conversational humor do not only include spontaneous humor (such as jablines and ironic comments) but may also include canned jokes (that is, punchlines) that speakers retell during the conversation. Jablines, irony, and punchlines can all be instances of conversational humor, but they also are different types of humor. Irony is a type of humor by means of which the speaker implies something different from what they are stating (in the

case of prototypical irony, the speaker implies the opposite of what they are saying) and shows an opposition between what the speaker is saying or implying and what their beliefs and thoughts are assumed to be (see Colston, 2020). Punchlines, on the other hand, are the last and most significant part of a canned joke or narrative humor (Attardo et al., 2011a). Finally, jablines are spontaneous humorous comments, similar to ironic statements in that both fall within the category of conversational witticism or discursive humor. Irony and jablines are thus unplanned "humorous one-liners" (Attardo et al., 2011a, p. 225) that can be built on the previous turns; punchlines, on the other hand, belong to a narrative that is independent from the rest of the conversation and are delivered by building on the initial part of the narrative (the set-up of the joke). In contrast to jablines, which can occur anywhere in the narrative, punchlines tend to occur at the end of the joke. Table 1 (based on Attardo & Chabanne, 1992; Attardo, 1994; Attardo, 2001; Attardo et al., 2011a) provides a summary of the main characteristics of each type of humor and an original example of each type extracted from the corpus of conversational humor employed in the present study: segment DAH9 (irony), segment EJH6 (jabline), and segment DAH4 (punchline) .

Table 1. Types of humor, characteristics, and examples

Type of humor	Characteristics	Examples from corpus of conversational humor	
Irony	Unplanned,	1 Dani:	weeks ago and they said
	discursive, context-dependent	2	well we think he is **the best mayor** we've ever had a:nd
Jabline	Unplanned, discursive, not disruptive	1 Emma:	he won't count **your underwear (laugh)**
		2 Jane:	No he doesn't really care
Punchline	Planned, narrative, disruptive	1 Amy:	two guys walk into a: into a bar
		2	you think one of them **would have ducked**

The examples in Table 1, extracted from the corpus of face-to-face conversations analyzed in this volume, will be discussed in more detail in the following chapters. In each case, some context is provided to facilitate comprehension and the most significant element (the humorous phrase) is marked in bold.[5] The concept of humorous phrase as the most significant element in a verbal humorous sequence is based on Attardo and Chabanne (1992), who defined the punch line as the last

5. In the case of the punchline produced by Amy, this is a reference to a well-known joke of a guy who walks into a bar and says "ouch," which led to a productive walk-into-bar joke cycle (for a definition and discussion on the concept of joke cycles, see Attardo, 2001, p. 69 and following).

element (technically, the last phrase of the last sentence, see Attardo, 2001) that closes the narration of the joke, and on the method proposed by Hockett (1977), according to whom

> there is an easy procedure for locating the boundary between build-up and punch. Starting at the end, one finds the shortest terminal sequence, the replacement of which by suitably chosen other words will transform the joke into a non-joke. (p. 259)

To exemplify the method proposed by Hockett, looking at the examples in Table 1, it is possible to transform these humorous utterances into non-humorous ones by removing the phrase in bold. This, however, would result in an incomplete utterance, which is why a common practice to study humor in experimental settings substitutes, rather than just deleting it, the humorous phrase with a different one that violates the script opposition requirement (e.g., we think he is *the worst mayor*; won't count *your books*; you think one of them would have *ordered a drink*). By doing so, the new text does not lead to a humorous incongruity or its resolution and, as such, is not humorous anymore.

1.4 The study of humor markers

Humor is not only ubiquitous to humor communication, and multifunctional, but also risky. When someone tells a joke, they are exposing themselves to a potential embarrassment or humiliation if, for example, the audience does not find the joke funny or does not get the joke. The members of the audience are also exposed to the judgement of the joke-teller and others, who may expect them not only to get the joke but also to react to it in a certain way. Since wit and having a good sense of humor are appreciated traits in Western societies (Bell, 2009; Goddard & Mullan, 2019; Wickberg, 1998), an instance of failed humor represents a potential threat to the social image (*face*, Brown & Levinson, 1987) of the joke-teller and the audience. Therefore, understanding how speakers handle and manage these risks has important implications for different purposes including, but not limited to, promoting successful intercultural communicative practices, learning to create meaning in a second language and managing gender-related discursive conflicts in which humor plays a part.

Due to the risky nature of humor, which may result in a socially threatening situation for those who do not deliver a successful joke or do not get the humor, it is assumed that people rely on markers of humor (meta-communicative indicators in Canestrari, 2010), which are cues that speakers and hearers use to signal their humorous intention in the exchange (i.e., the intention of the speaker who uttered

the humorous text or the intention of the hearer who recognizes the humor in the text), and as such would be part of a theory of humor performance. The following sections comprise a discussion of the terminology, methods, and finding of humor markers research, starting with studies on the prosodic markers of humor, the role of laughter, and concluding with a section on the markers of a specific type of humor, irony.

1.4.1 Terminological issues in the study of humor markers

According to Schiffrin's definition, discourse markers are "linguistic, paralinguistic, or nonverbal elements that signal relations between units of talk by virtue of their syntactic and semantic properties and by virtue of their sequential relations as initial or terminal brackets demarcating discourse units" (Schiffrin, 1987, p. 40). Of the different functions that *discourse markers* can accomplish, one is particularly relevant given the purpose of the present study: signaling the speaker's intentions by conveying a metamessage about how a certain utterance should be interpreted. For example, discourse markers could be used to signal the speaker's intention to be humorous. It is important to notice that this function could be achieved by means of discourse markers belonging to a wide range of communication modes, including verbal language, but also gestures and facial expressions.

In the field of humor studies, scholars have used the terms *markers, indicators, cue, index*, and so forth to refer to elements that signal the humorous intention of the speaker. However, the same term has not always been used consistently or with the same meaning across publications, nor have authors always provided a clear definition of what each term meant (see the different terms and definitions used in Hay, 2001; Glenn & Holt, 2013; O'Donnell-Trujillo & Adams, 1983; L. Pickering et al. 2009; Ruch & Rath, 1993; Ruíz Gurillo, 2012). Attardo (2000b) was the first to attempt to clarify the terminological confusion in this area. In his article, Attardo defined *markers* as elements of the text that are not necessary for it to be humorous, and on this basis distinguished between markers and factors. Markers were described as elements that can be removed from the text without removing the humor, though their absence could affect the recognition of the humor. *Factors*, on the other hand, were presented as essential elements that cannot be removed from the text without destroying the humor. The main function of humor markers would then be, in line with Schiffrin's definition, to convey the metamessage "this is humorous" (Attardo et al., 2011b, p. 9) and thus enhance the chances that the speaker's intentions be adequately interpreted. In the same publication, Attardo et al. (2011b) introduced two new terms into the equation, *indicators* and *indices*. Indicators were described as coextensive with the humor

and always co-occurring with it. Moreover, in contrast to the definition of factors (Attardo, 2000b), indicators were defined as not being essential to the humor and thus could potentially be removed without affecting the humor itself. Indices, on the other hand, were defined as elements that unintentionally indicate the presence of humor (Attardo et al., 2011b), similar to the phenomenon of *leaking* described by Ekman and Friesen (1969).

Despite the classification proposed by Attardo (2000b) and Attardo et al. (2011b), there still are overlaps among the four terms that may generate some confusion, since all of these may still perform the same function of signaling the presence of humor, either purposefully or involuntarily. In the case of markers and indicators, the signaling function would be a product of the speaker's intention, while in the case of factors and indices, the function would be a consequence not actively sought after by the speaker. In an attempt at clarifying the differences among these elements, defining each one of them, and operationalizing their definition for future applications, Gironzetti (2017b) proposed the matrix reproduced in Table 2.

Table 2 should be read as follows: The first column identifies the four phenomena and corresponding terms to be defined: factors, markers, indicators, and indices. The remaining columns identify three features of these phenomena that were described in the existing literature on the subject: being an essential element to the humor, always co-occurring with the humor, and being intentional signal of humor intention. The values in each cell indicate whether these three features are necessarily true (+ sign) or not (– sign) for a given phenomenon. According to Gironzetti (2017b), there was a fourth feature mentioned in the literature, being temporally coextensive with the humor. However, this feature was not included in the matrix because it lacks explanatory power. This feature was, together with *always co-occurring*, one of the two distinctive features of indicators according to Attardo et al. (2011b). However, no phenomenon with this characteristic has ever been described in the literature.

Table 2. (from Gironzetti, 2017b) Humor factors, indicators, markers, and indices

	Essential	Always Co-occurring	Intentional signal
Factors	+	+	–
Indicators	–	+	+
Markers	–	–	+
Indices	–	–	–

According to the matrix presented in Table 2, factors are essential elements to the humor that always co-occur with it and do not intentionally signal its presence (but can signal the presence of humor unintentionally). Because factors are essential,

these elements cannot be removed from the text without removing the humorous effect as well. Indicators are defined in Table 2 as nonessential elements to the humor that are always co-occurring with it and intentionally signal its presence. Markers are elements that are not essential to the humor, nor coextensive with it, and intentionally signal its presence. These elements can be removed without destroying the humor (thus, for example, laughter would be a marker, since there can be humor with and without laughter, but humor nonetheless), and do not have to be present every time humor is present. More importantly, markers are intentional, and so the speaker must have the intention to resort to a given marker to signal the presence of humor. Finally, indices are elements that are not essential to humor, and thus can be removed without destroying the humor, and are not always co-occurring with it. In contrast to markers, indices signal the presence of humor unintentionally. An example of indices would be elements that involuntarily leak information about the state of mind of the person (Ekman & Friesen, 1969), such as genuine enjoyment smiling produced not as the result of the speaker's intention to signal the presence of humor, but as a manifestation of the person's state of mind, such as mirth due to humor (*exhilaration* according to Ruch, 1993, but see Martin, 2007 for a terminological discussion).

Based on the definition of markers in Table 2, several phenomena that have been studied so far would fall into this category, including laughter. However, it should be noted that while many scholars have used the term marker to refer to laughter, they were treating it as an indicator that always co-exists with the humor, since laughter was often employed as the only criterion to identify instances of humor in a corpus. Part of the problem is that it may often be quite difficult to discriminate between markers and indices, as they only differ based on whether the speaker is using a given signal intentionally or not. The next sections will focus on this issue in more detail. To avoid any misunderstanding, in the rest of the volume, the term *cue* will be used to refer to the general category of signaling elements, while *markers*, *indices*, *indicators*, and *factors* will be used with the specific meaning as it was outlined in Table 2 and in this section, unless referring to the specific term used by a scholar in their work (such as *discourse markers* in Schiffrin's work).

1.4.2 Prosodic cues of humor

Research on the prosodic features of humor stemmed from research about how prosodic features such as pauses, pitch height and range, and so forth are used by speakers to organize and structure their texts, and by hearers to interpret and parse these texts. The first studies on the topic, however, lacked an experimental and empirical component, were carried out using auditory rather than acoustic measures,

and thus relied heavily on the scholar's intuition and observation of the phenomenon. The following paragraphs offer an overview of research methods and results of studies that focused on prosodic cues of humor in spontaneous oral interaction. The participants analyzed in all the studies were not professional comedians and did not rehearse the humorous narrative prior to the study.

As part of his research on the act of oral storytelling, Bauman (1986) analyzed humorous and non-humorous narratives that included quoted speech and noted that in both cases the voice quality was altered to indicate to the listener that the speaker was actually reporting someone else's words, and not speaking for themselves. Among the prosodic features used to mark quoted speech, Bauman mentioned higher pitch, louder volume, and pauses. The role of pauses was also treated in the work of Audrieth, according to whom "timing is concerned with the amount of time delay between the end of the setup of the joke and the delivery of a punchline" (Audrieth, 1998, "Part 4. Delivery"). Audrieth suggested that joke tellers pay attention to pauses, as these are critical elements that can determine the success or failure of the humor.

Prosodic features regarding the delivery of jokes were also studied by Norrick (2001), who relied on his intuition and observations to describe the delivery of three joke-telling excerpts that spontaneously arose in everyday conversations. Norrick focused on timing as a complex phenomenon, loosely defined as including "features of the basic joke text, teller strategies, standard joke prefaces, formulas and patterns, the teller's style of delivery and audience response" (p. 272) and contrasted the rapid and fluent delivery of punchlines with the delivery of the rest of the joke.

In her chapter on prosody as a discourse marker, Wennerstrom (2001, p. 97) considered the relationship between lexical discourse markers and certain prosodic features, such as paratones (also known as speech paragraphs or intonational paragraphs, paratones are units of speech characterized by a high pitch at the beginning and a gradual fall towards the end; for a definition of paratone, see Kang et al., 2010, p. 556), and the role of prosodic features as discourse markers, in order to better understand how discourse is organized. She suggested that there may be a correlation between the structural components of narratives and their characteristic prosodic features (p. 204). These claims are based on the idea that narratives are evaluative, meaning that together with the reports of certain events, they also convey the speaker's attitudes towards it, such as, for example "this was amusing." In her analysis of a humorous sequence in a casual conversation among friends, Wennerstrom proposed that "part of what makes this a humorous frame is the fact that some of the speakers associate a low key with their contributions" (2001, p. 183), thus marking their comments as parentheticals, setting them aside from the general flow of the conversation, and displaying tone concord with the other speakers to reinforce the affiliative and bonding nature of the humorous exchange.

Albeit many studies presented in this section lack an experimental or empirical component and so could not confirm or dismiss the existence and roles of these cues with respect to humor and in contrast to non-humorous speech, they contributed to drawing attention to an important phenomenon and set the basis for more recent empirical studies.

1.4.2.1 *Empirical and experimental studies of prosodic humor cues*

Empirical and experimental studies that focused specifically on prosodic cues of humor began to appear only recently, starting with L. Pickering et al. (2009). In this study, a set of 10 video-recordings of two participants performing two jokes each, recalled from memory, were analyzed using a KayPENTAX Computerized Speech Laboratory. The measures analyzed for each intonational phrase were pitch maxima and minima, volume maxima and minima, length of pauses, and speech rate. The statistical analysis of the data showed that punch lines were delivered with a significantly lower pitch than the set-up, but this was considered to be an effect of the paratone structure explained in the previous section, rather than a characteristic of humorous texts *per se*. Regarding volume, pause length, and speech rate, no significant differences were found. Moreover, the presence of laughter, the use of a significant pause before the punch line, or the reported speech effect (which were all mentioned in previous studies as serving the function of humor cues, see § 1.1 and § 1.4.2) were not found to be stable characteristics that could reliably be used to identify the presence of humor or discriminate between humorous (i.e., jokes) and non-humorous narratives. In addition, the data analysis showed that there were no significant differences between set up and punch line regarding volume, pause length, and speech rate, nor were the presence of laughter, the use of a significant pause before the punch line, or the reported speech effect stable characteristics that could reliably be used to identify the presence of humor.

Attardo and Pickering (2011), Attardo et al. (2011a, 2011b, 2013) built on and expanded the results of L. Pickering et al. (2009) by focusing not only on narrative humor (jokes), but also on spontaneous conversational humor. Results showed that humor – either spontaneous or canned humor – occurring in conversation or in experimental contexts, is not signaled by pitch, volume, speech rate, or pauses, nor is it reliably signaled by the presence of laughter. In particular, Attardo and L. Pickering (2011) operationalized timing as a combination of speech rate (syllable per seconds) and use of significant pauses before the punchline and found no differences between the delivery of the punch line and the rest of the joke. If anything, punchlines were delivered slightly slower than the rest of the joke (p. 242).

Together, this first set of empirical studies confirms that, contrary to folk theories of humor, in English, conversational humor occurring in semi-naturalistic conversations or in experimental settings is not signaled prosodically. Furthermore,

contrary to predictions based on folk theories of humor, punchlines were found to be generally delivered with a low volume and low pitch. In this regard, L. Pickering et al. (2009) suggested that "prosody trumps humor" (p. 519): Because punchlines normally occur at the end of the narrative (the joke), their delivery is characterized by the typical prosodic features of the end of a paratone, taht is, lower volume and lower pitch. The only cue that the authors recognized could be used to indicate the humorous intention of the speaker and occurred in large numbers was smiling, but this was not part of their analysis. Follow-up studies by Attardo and collaborators (Attardo et al., 2013; Gironzetti et al., 2016a; 2016b) did address the role of smiling and its relationship with conversational humor, but not prosody, and will be discussed in Chapter 3.

Bertrand and Priego-Valverde (2011) studied conversational non-narrative humor focusing on discursive and prosodic cues used by French speakers to construct a humorous mode of communication. Their analysis of a one-hour long dialogue within a longer conversation between two speakers relied on CA methods and focused on reported humorous speech. The study considered different variables such as the use of certain lexical items, laughter, simultaneous speech and overlaps, pitch, and volume. Results showed that a variety of prosodic cues are used by interlocutors but are not specific to humor. Instead, these "participate in a congruence of cues that allow the creation of humor" (p. 13).

Finally, the most recent study on this topic (Buján-Navarro, 2019a) analyzes 109 instances of spontaneous humor, including irony, produced during late-night talk show interviews (*The Late Show*, with Stephen Colbert) by 14 interviewees, with the goal of describing the cognitive and multimodal characteristics of spontaneous humorous communication. Buján-Navarro relies on laughter by the public as the sole criterion to identify humor: humorous utterances were defined, based on laughter, as utterances produced by the speaker immediately preceding laughter by the public, and thus excluding any instance of failed humor or humor that was recognized by the audience and did not elicit laughter but, for example, smiling or other responses. Additionally, it should also be noted that laughter by the public is not necessarily indicative of humor understanding or appreciation, as the audience may be instructed to laugh by the producers of the show. Regarding the analysis of prosodic features, Buján-Navarro aimed at establishing whether humorous utterances, in contrast to non-humorous utterances, were cued by means of intensity and pitch. Mean pitch and intensity values were obtained for each utterance using *Praat*[6] and the statistical analysis found no significant differences between the two types of utterances. The author then concluded that no prosodic contrast had been found

6. The software *Praat* is used for speech analysis is freely available at https://www.fon.hum.uva.nl/praat/.

between humorous and non-humorous utterances, albeit recognizing that this particular type of signaling may have not been necessary in the context she analyzed due to the humorous nature of the television program in which these utterances were produced, which served as a general humorous frame for all exchanges.

In languages other than English, empirical studies of humor prosodic cues have been completed for Cantonese (Cheang & Pell, 2009), Greek (Archakis et al., 2010), Portuguese (Flamson et al., 2011), Japanese (Kadooka, 2012), and Dutch (Jansen & Chen, 2020). Cheang and Pell's (2009) goal was to identify acoustic parameters associated with the expression of sarcasm by Cantonese speakers and compare them with data on English (Cheang & Pell, 2008). The corpus they used comprised 96 utterances including sarcastic, neutral, ironic, and sincere utterances produced by six speakers in an experimental condition. Results of the analysis completed with *Praat* showed that sarcastic utterances in Cantonese were produced with an elevated mean F0, reduced amplitude, and reduced F0 range. In comparison with English, from the study emerged that Cantonese speakers raised mean F0 to cue sarcasm, while English speakers lowered it. However promising, due to the experimental setting and the language-specific findings, the results of this study cannot be generalized to the production of sarcasm in spontaneous conversation, or humor production in general, and further research is needed to confirm that these prosodic cues are in fact used by Cantonese speakers during spontaneous conversation.

Archakis et al. (2010) adopted a CA framework to investigate the role of pauses, speech rate, and intensity (average loudness in dB) in the delimitation of humorous and non-humorous turn construction units (TCUs). The software *Praat* was used to analyze 170 jab lines and non-humorous utterances extracted from a 3-hour corpus of spontaneous and unstructured conversations among six young Greek girls. The results of the analysis contradicted previous studies on English humor and showed that jablines, as opposed to non-humorous narrative TCU, are preceded or followed by pauses, and produced with a slower speech rate and higher intensity. However, the method used in this study raises some concerns, mentioned in Attardo et al. (2013) and echoed in Gironzetti (2017b), regarding the validity of the results and their generalizability.

Flamson et al. (2011) also used *Praat* to analyze spontaneous humorous speech in Portuguese and compare the acoustic features of humorous utterances and non-humorous utterances produced by the same speakers. The initial hypothesis, confirmed by the results of the study, was that speakers would not explicitly signal the presence of humor because they all belonged to the same community and had long standing social ties (p. 230). Speakers would use humor to reinforce these ties while preventing outsiders from getting the joke. While this is the only empirical study on prosodic cues of humor in Portuguese, the fact that laughter was used as the sole criterion to identify humor poses some limitations, some of which were

mentioned earlier in this chapter. In particular, contrary to what the authors stated (p. 251), the fact that laughter does not follow humor does not necessarily mean that the humor failed, as demonstrated by several other studies (e.g., Bell, 2009, 2015, see Chapter 6 for a discussion of failed humor research).

For Japanese, Kadooka (2012) used *Praat* to analyze the prosodic features of what he calls *punchline paratone* in authentic Kobanashi[7] stories, focusing on pitch, pauses, and speech rate. The results obtained only partially confirm the punchline paratone model proposed by the author; however, due to the vague description of the method used for analysis, it is not possible to further discuss the study or its potential contribution to the field.

Finally, on Dutch, Jansen and Chen (2020) used *Praat* to analyze the prosodic characteristics of sarcastic and sincere utterances produced by 10 male and 10 female native speakers in an experimental setting simulating a phone conversation. The definition of sarcasm offered at the beginning of the study, however, does not allow to distinguish sarcasm from irony, as the former is defined as "a communicative intention whereby the speaker says something different from what they mean" (p. 409). The authors hypothesized that sarcastic utterances would have different pitch, duration, intensity, and voice quality than sincere utterances. Their findings are consistent with a marked delivery of sarcasm by means of slower speech rate, lower pitch intensity, and less vocal noise overall, accompanied by gender specific features such as an expanded pitch span for females and greater durational differences in speech rate for males.

Despite the findings discussed in this sections, there are still many topics within this particular area of humor studies that have not been explored, not only for English but also in languages other than English. Overall, there is a need for more experimental and empirical studies using acoustic measures to investigate the relationship between humor and prosody in conversation. In addition, across these studies, different scholars pointed out the potential relevance of multimodal cues for humor marking in conversation, such as smiling and gaze, although these were outside of the scope of their analyses. In the current study, the possibility that humor in conversation may be marked multimodally is explored experimentally, taking advantage of the recent technological developments to record and analyze not only audio, but also video and eye-movements, and thus being able to address the multidimensionality of discursive practices more adequately (Erickson, 2004). The advantages and challenges of such a new multimodal approach to humor in discourse are explored in detail in Chapter 2.

7. Kobanashy stories are short stories that may include as few as two lines, told by Japanese performers with the goal of warming up the audience before the main act, or Rakugo (Hatasa, 2012).

1.4.3 Laughter as a humor cue

Laughter was among the first phenomena employed by scholars to talk about humor and has been recognized by many as potentially contextualizing an utterance as humorous, albeit not reliably (Ruch, 1995). The role of laughter in relation to humor is still controversial today. Although humor is a mental phenomenon and laughter a physiological one (Attardo, 1994, p. 10), scholars have confounded laughter and humor since the very early stages of the field (e.g., Bergson, 1901; Freud, 1916).

One of the earliest definitions of laughter that attempted to differentiate between laughter and humor was proposed by Aubouin (1948), according to whom laughter denotes an effect without specifying the cause. Thus, there can be physiologically originated laughter and intellectually originated laughter, but only the latter can have humor as one of the originating causes. Olbrechts-Tyteca (1974) went a step further and proposed five different reasons why humor and laughter are two different phenomena and so the use of laughter as a criterion to identify humor is problematic. The reasons are the following: (a) laughter largely exceeds humor, (b) laughter does not always have the same meaning, (c) laughter is not proportionate to the intensity of humor, (d) humor can provoke laughter or smiling, and (e) in many cases laughter or smiling cannot be observed directly (Olbrechts-Tyteca, 1974, pp. 11–13). Similar arguments against the use of laughter as the sole or main criterion to identify humor were later echoed by other scholars in the field and supported by recent experimental results (Attardo & L. Pickering, 2011; Attardo et al., 2011a, 2011b). The relationship between humor and laughter was found to be weak at best also in works outside of the field of humor studies. As an example, in a study examining interactions among native speakers and L2 speakers, Koike (2012) noted that laughter was frequently present in her conversational data also when humor was not even attempted, possibly, according to the author, due to the many functions that laughter can accomplish in a conversation. Despite the methodological problems that using laughter as a marker for humor in conversation entails, scholars within the field of humor studies continued focusing their attention on laughter.

Following Sacks' analysis of the telling of a dirty joke among a group of friends (Sacks, 1974/1989), Jefferson, Sacks, and Schegloff (1977, 1978) examined transcripts of naturally occurring conversations and focused on laughter as an orderly synchronous phenomenon. They observed that laughter was an indexical expression or token of understanding that occurred in reference to something else (what Glenn & Holt [2013, p. 5] call *laughable*) that participants in the conversation identified as the source of laughter. Laughter in and of itself was considered meaningful and could be used to refer forward or backwards to different segments of the conversation, for example, to "appreciate a joke which just occurred" (Jefferson et al.,

1977, p. 12). When humor and laughter co-occurred, Jefferson et al. (1978, p. 174) observed that conversational participants were "not merely laughing at the same time but laughing in the same way." Laughter, thus, was not necessarily signaling or marking the humor, but rather "helping the conversationalists nonverbally coordinate their constructed play" (Gibbs et al., 2014). The authors also put forward the proposal that the laughable and its responsive laughter could constitute an adjacency pair, which they defined, following Sacks, as a "massively occurring, apparently central construction unit for conversation" (Jefferson, Sacks, & Schegloff, 1977, p. 30), a hypothesis later defended by Norrick (1993) in relation to humor and laughter. It should be noted that this hypothesis is not discussed in the same terms in a later publication on the same topic (Jefferson et al., 1987), albeit the authors do define laughter as a systematic and socially organized behavior that is a "relevant, consequential response to a prior utterance" (p. 159).

Jefferson (1979) and O'Donnell-Trujillo and Adams (1983) studied laughter as an indication of the intention of the speaker. Jefferson (1979) studied laughter in conversation and recognized the role of laughter as a technique used by the speaker to invite laughter from the hearer, thus cueing the humorous intention of the speaker. O'Donnell-Trujillo and Adams (1983), on the other hand, explored some pragmatic features of laughter in conversation and recognized that it could be used to cue the listener on the humorous intention of the speaker and on the humorous interpretation of the utterance.

In a broad treatment of conversational joking, Norrick (1993) applied a CA approach to analyze natural occurring data from 11 conversations. Norrick drew upon Sacks (1974/1989) and Jefferson et al. (1977) as he considered humor and laughter to be two members of an adjacency pair, with laughter being the necessary response produced by the hearer, and the absence of laughter being thus meaningful. The claim that humor and laughter form an adjacency pair was later disproven by Provine (2000), who noted that most of everyday laughter found in people's interactions is not a response to humor, but to unspecified prosodic and social cues (p. 180; see also Glenn & Holt, 2013).

Also Hay (2001) criticized the idea that humor and laughter may be an adjacency pair and considered it misleading. In her study, Hay explored the array of strategies by which hearers can support the production of humor and found that laughter and the production of more humor are among the most frequently used ones. Her data showed that laughter is only one of the possible responses to humor in conversation and that, depending on the situation and the type of humor, it may not even be the most appropriate response. For example, laughing during trouble-talk may indicate that one finds the speaker's problems funny.

In a more recent collection of studies on laughter, Glenn and Holt (2013) referred to laughter as "the most common, overt indicator of the presence of humor"

(p. 2), while also clarifying that indicating the presence of humor it is not the only function of laughter nor the most pervasive one. In the third chapter in the same volume, Ikeda and Bysouth (2013) challenged the widespread idea that laughter indexes mirth – which would mean that the more one laughs, the more amused they are – with data that show that variations in the production of laughter correlate with laughter's different roles in conversation, such as turn-taking management and the negotiation of conversational roles. In this study, the authors also addressed, although briefly, the intertwined relationship of laughter and other multimodal cues, such as gaze and smiling, which they considered a meaningful combination of features that may serve, for example, to display appreciation of the laughable or to characterize a specific type of laughter as diverging from others.

This brief review shows that laughter tends to be recognized and instinctively associated with humor and has been widely used as a cue of the presence of humor (for a broader perspective, see Attardo, 2017, 2020). However, this practice often leads to false positives and false negatives, since laughter alone cannot capture all instances of humor in conversation: there is humor with and without laughter, and laughter with and without humor. This idea, that humor and laughter are not necessarily linked to one another, was already present in the work of Jefferson (1979, 1984) and since then it has been supported in further studies. Among these, Koike (2012) noted that most instances of laughter in her conversational corpus did not occur with or in the proximity of humor; Clift (2012) analyzed the use of laughter in non-humorous instances of reported speech and showed that it is used as a resource to construct reported complain, and Günther (2003) reported examples of laughter that could not be connected with humor. Therefore, it is safe to conclude that the presence of laughter alone can be, at best, only one of the cues used by conversational partners to frame a segment of conversation as humorous.

1.4.4 Irony cues

A large portion of research on humor cues has focused on a specific type of humor, irony. Before moving on to discuss these studies, however, it should be noted that throughout this volume, due to the focus on humor, irony is treated as a type of humor and we attend to ironic humorous utterances only. This classification may be controversial for some scholars coming from different disciplinary perspectives, as there is no consensus (see Attardo, 2000a, 2000b; Dynel, 2009). Additionally, in this volume, irony is not distinguished from sarcasm or parody. While some scholars have indeed focused on the distinction between irony and sarcasm (e.g., Leggitt & Gibbs, 2000), many others do not differentiate between these concepts, and use these term flexibly, to encompass different phenomena or different degrees of the same phenomenon (e.g., Ervas, 2020, considers sarcasm as a sharp version

of irony with a designated victim). To complicate this matter even further, the term ironic has undergone a shift in meaning in English (see Colston, 2017, Colston & Athanasiadou, 2017, for an extended discussion on irony, and Attardo, 2013, and Dynel, 2017, on the semantic shift that affected the meaning of the words sarcasm and irony in American English).

Although there is not a generalized agreement on the definition of verbal irony across disciplines, most researchers agree that verbal irony is evaluative (Attardo, 2000b), and while the evaluation can be implicit or explicit, it generally relies on the opposition or difference between the meaning intended by the speaker and the utterance meaning (Grice, 1989). Due to its pragmatic nature, verbal irony poses some challenges to speakers and listeners that may have difficulties understanding the ironic meaning intended by the speaker, and thus irony is thought to be often performed accompanied by irony cues (called markers in the literature), elements that are not necessary to the ironic meaning but "alert the reader to the fact that an utterance is ironic" (Attardo, 2000a, p. 7) and increase the listener's comprehension of the intended meaning (Burgers et al., 2012).

The study of ironic cues focused mostly on features belonging to three broad categories: prosodic features, lexical and grammatical features, and gestures and facial expressions. Studies on lexical and grammatical cues focused on the elements that lead listeners or readers to interpret an utterance as ironic or elements that frequently co-occur with ironic utterances. These studies often employed experimenter-generated materials, such as *ad-hoc* utterances with and without the target feature (so, ironic, and non-ironic), as well as authentic materials, such as utterances extracted from books. Among the lexical and grammatical irony cues, scholars identified the use of exaggerations (Kreuz & Glucksberg, 1989), hyperbolic collocations with extreme adjectives and adverbs (Kreuz & Roberts, 1995), interjections (Kreuz & Caucci, 2007), tag questions (Kreuz et al., 1999), and phrases with a conventionalized ironic meaning (Bryant & Fox Tree, 2002; Rockwell, 2006).

Scholars who studied ironic prosodic cues attempted at identifying and defining the characteristics of an ironic tone of voice, which, according to folk theories, would signal ironic utterances. Several studies have analyzed the prosodic features that characterize ironic utterances in contrast with non-ironic ones across different languages (Cutler, 1974; Laval & Bert-Erboul, 2005; Nakassis & Snedeker, 2002; Scharrer et al., 2011; Padilla, 2012; Jansen & Chen, 2020). Results from these studies relied on read data and often required participants to perform or interpret a stereotypical ironic tone, which led to the identification of a set of features associated with it, such as higher intensity, slower speech rate, and increased number of pauses. However, results from the analysis of natural discourse have been inconclusive and point to the fact that there is no specific ironic tone of voice *per se* (Attardo et al., 2003; Bryant & Fox Tree, 2005), but rather a set of prosodic features that can be

mobilized and manipulated by interlocutors in a variety of ways to support the interpretation of the ironic meaning.

Finally, studies that looked at non-verbal ironic cues identified several facial expressions that can accompany an ironic statement. Among these are the *blank-face* typical of a dead-pan delivery (Attardo et al., 2003), expressive movements in the mouth region of the face (Rockwell, 2001), raised eyebrow/s (Buján-Navarro, 2019a, 2019b; Tabacaru & Lemmens, 2014; Tabacaru, 2020), raising and lowering the corners of the mouth (Mantovan et al., 2019), smiling (Caucci & Kreuz, 2012), and eye-rolling (Colston, 2020). Gaze was also found to serve as an ironic cue, as interlocutors were found to look at each other more with sarcastic statements than non-sarcastic ones (Caucci & Kreuz, 2012), possibly to signal their communicative intent or check for comprehension. One important consideration is that these studies adopted different definitions of irony, as mentioned previously, as well as different methods for the identification and classification of non-verbal cues (such as *ad hoc* and FACS-based taxonomies, or naïve coders), which can make it difficult to compare or generalize these findings.

Additional non-verbal cues that have been associated with irony include head tilts, nods, shrugs, and lip tightening (Caucci & Kreuz, 2012; González-Fuente et al., 2015). Finally, it should be noted that several other non-verbal ironic cues have been mentioned in other studies, despite the fact that these cues were not the focus of the analysis (e.g., Kreuz, 1996; Haiman, 1998; Kreuz et al., 1999; Utsumi, 2000).

Instead of a direct association between a set of specific features and the production of ironic utterances, then, scholars recognized that irony can be signaled by several parallel cues (*parallel-constraint-satisfaction approach*; see Pexman, 2008), including prosodic contrasts (Anolli et al., 2000; Attardo et al., 2003) and a variety of other prosodic features (Adachi, 1996; Cutler, 1974; Fónagy, 1971; Kreuz & Roberts, 1995; Muecke, 1978; Rockwell, 2006; Schaffer, 1982), as well as lexical and non-verbal elements including gestures and facial expressions, as mentioned earlier. The fact that naturally occurring irony seems to be marked by a variety of parallel cues of different nature, combined with the lack of data to explain what factors determine the use of one cue or another (or different sets of cues) to mark irony, pose some challenges for the study of irony cues in face-to-face interaction. As this is a growing area of scholarly interest, it offers several opportunities for further studies on the characteristics of humor cues as well as the dynamics of their use. The contribution of the present volume represents but one step towards a more comprehensive and fine-grained study of multimodal irony cues in naturally occurring discourse.

1.5 Scope and organization of the volume

As briefly outlined at the beginning of this chapter, this volume presents a multimodal, empirical study of conversational humor understood as a type of interactional and co-constructed discourse. One of the main goals of this volume is to provide a detailed account of the multimodal performance of conversational humor, which includes the presence of humor cues, their functions, and the variables that affect their use in conversation by different speakers.

First, a terminological clarification is needed. This study deals with the performance of conversational humor and assumes conversational humor to be interactional and co-constructed. For this reason, then, the term *humor* as it will be used to discuss and analyze the data in this book should be interpreted to refer to the *humorous framing* of an utterance or phrase, and not *humorous potential*. Humorous framing is a matter of performance as it affects the way in which interlocutors co-construct particular instances of humor in conversation. Humorous potential is a matter of humor competence and is related to the presence of a script opposition. In instances of conversational humor, this humorous framing can be initially signaled by any of the speakers involved in the interaction, making it available for other speakers who, then, can orient their discourse towards it. Humorous framing, however, supposes the recognition of the *humorous potential*, which is a matter of humor competence and depends on a script opposition (Raskin, 1985). In order to study the humorous framing, then, it is first necessary to identify the humorous potential of utterances. To do so, the study presented in this volume relies on the Semantic Script Theory of Humor (SSTH, Raskin, 1985) and the cognitive concept of script (see § 1.2). Each humorous utterance described and analyzed in the next chapters, then, has been analyzed and found to be compatible with two different and at least partially opposed scripts.

The volume is structured into six chapters including the present one, which serves as the introduction. Chapter 2 summarizes the method and the main findings of the study, Chapters 3 to 5 deal with different multimodal aspects of conversational humor in depth, Chapter 6 focuses on failed conversational humor, and Chapter 7 presents the conclusions and implications for future research.

In Chapter 2, I briefly describe the methodology of the study and then highlight the original contributions of the volume by focusing on the main findings. These findings are discussed one by one by focus area (i.e., individual smiling behavior, joint negotiation and co-construction of the humorous frame, smiling synergy, gaze, and failed humor) respecting the order in which these are presented in the book. Together, the first two chapters provide the readers with the foundational knowledge necessary to engage with the detailed analyses, results, and conclusions of the study, which are explored in depth in each of the following chapters.

Chapter 3 delves deeper into the results pertaining to the individual smiling behavior of participants to show how changes in smiling intensity function as non-discrete cue of conversational humor, showing that it is not the presence of smiling but rather the ways in which interlocutors increase their smiling intensity that serve to frame a given utterance as humorous. In this chapter, I adopt an embodied perspective to move away from a linguocentric conceptualization of conversational humor as I discuss the role of smiling as an expressive and communicative resource allowing interlocutors to accomplish a variety of communicative moves (Scarantino, 2017). This chapter also examines Duchenne (i.e., sincere or felt) and non-Duchenne (i.e., phony) smiling and their relationship to conversational humor, as well as smiling voice as a possible auditory cue of conversational humor.

Chapter 4 builds on the data presented in Chapter 3 by adding a layer of complexity as it moves to consider the behavior of the conversational dyad rather than each single interlocutor. In this chapter, I examine the joint smiling behavior of the two interlocutors as it unfolds over time during the delivery of humorous utterances. This approach allows me to identify and describe a set of humor-specific smiling patterns and to quantify degrees of smiling synchronicity displayed within each conversational dyad. These findings are considered in light of different proposals within embodied behavioral studies to explain why and how people align their behaviors when they are interacting. Ultimately, I show how speakers operate on a *smiling dialogic synergy*, with smiling, in the form of smiling patterns and synchronicity, functioning as a non-discrete cue of conversational humor to negotiate the humorous framing as the conversation unfolds.

Chapter 5 moves one step forward and expands the multimodal analysis of conversational humor by shifting the focus of attention from smiling to gaze. After introducing the reader to an historical and methodological overview of eye-tracking techniques and studies, I focus on how people look at faces and discuss the functions of gaze in interaction, including mutual gaze and gaze aversion. Then, I present and discuss original social eye-tracking data to illustrate how conversational humor affects interlocutors' eye movements. Specifically, through the analysis of different gaze measures (e.g., total gaze duration and fixation duration), I show that the time people spend looking at each other's eyes and mouth (the two smiling facial areas) differs during humorous and non-humorous parts of conversation. The role of gaze in the negotiation of conversational humor is discussed in light of previous findings regarding smiling, as well as considering cognitive and social functions of gaze in conversation.

Chapter 6 differs from previous ones as it looks at a type of humor, failed humor, while considering several multimodal resources at the same time. In this chapter, I offer a qualitative in-depth description of the multimodal performance of failed conversational humor by looking at how smiling, gaze, and other multimodal

resources (e.g., head tilts) interact and are mobilized by speakers. Since each of the examples analyzed is qualitatively different, this data-driven treatment of failed humor leads to a discussion that problematizes the concept of failed humor followed by a proposal for the classification of types of failed humor from a multimodal and dialogical perspective.

Finally, Chapter 7 closes the volume by integrating findings on how different multimodal resources are mobilized in conversational humor. In this chapter, I offer a snapshot of how humor is performed multimodally through the discussion of representative scenarios in which different types of humor can be successful or fail. Each scenario illustrates the behaviors that interlocutors would be expected to display, based on data from the corpus. This final chapter also highlights the implications of this study for humor research, advocating for a non-linguocentric and embodied approach to humorous conversation, as well as discussing limitations and future research directions in humor studies but also multimodal studies, second language acquisition, studies in intercultural pragmatics, and second language pedagogy.

CHAPTER 2

Performing conversational humor multimodally – an overview

2.1 Introduction

This chapter begins with a presentation of the study, including its method, participants, and instruments, as well as the data collection and treatment steps. Then, it moves on to summarize the main findings organized in 5 dedicated sections, each focusing on one of the main areas of the study, that is: the role of interlocutors' individual smiling behavior, the process of joint negotiation and co-construction of the humorous frame through smiling patterns, the dyads' smiling dialogic synergy, the role of gaze to the mouth and the eyes of the interlocutor, and, lastly, instances of failed conversational humor.

As discussed in Chapter 1, the purpose of this volume is to provide insights into an underexplored area of humor research, namely, humor performance in face-to-face conversations, and contribute to our understanding of how speakers *do* humor and what resources they employ to negotiate the humorous framing of an utterance. In this sense, and in line with previous works on conversational humor, humorous framing is hypothesized to be actively negotiated by speakers (Davies, 1984) by means of several multimodal resources, in a process that allows meaning to emerge through joint, collaborative interactions (Haugh, 2008, p. 46). Thus, in this book I set out to explore ways in which interlocutors negotiate *the humorous framing*[1] of an utterance after they have recognized the humorous potential upon which they may then act, making it accountable for the others (see Gironzetti et al., 2018). This view of humor indicates that *the humorous framing needs to be negotiated among interlocutors*, rather than being a characteristic of the text *a priori* or an interpretation attached to the text by any given speaker, is supported by (1) the existence of speakers' comments that attempt to manipulate the humorous status of an utterance (such as "are you joking" or "that is [not] funny"), which indicate that the humorous nature of an utterance is not a static property of that utterance

1. As discussed in Chapter 1, *the humorous potential* is a matter of humor competence and is related to the script opposition (Raskin, 1985), while *the humorous framing* is a matter of performance. The potential has to be recognized for speakers to be able to act on it and frame a portion of text as humorous framing.

but can be manipulated, and (2) the existence of involuntary humor, an utterance that is not intended as humorous by the speaker that is nonetheless interpreted as such by the audience.

2.2 Researching the multimodal performance of conversational humor

The data reported in this volume come from a study on the performance of conversational humor that followed a sequential mixed-method design (Creswell & Plano Clark, 2011). The main goal of the study is to describe how humor is performed multimodally in dyadic face-to-face conversations. More specifically, I seek to find out what is the role of smiling and gaze in the process of negotiating conversational humor. Qualitative and quantitative data were collected through video recording and eye tracking of dyadic conversations; analyzed and coded separately, and then combined in the final analyses. Qualitative data comprise transcriptions of humorous and non-humorous segments of conversation, coding for humor presence and types, and coding for individual smiling behavior and joint smiling behavior. Quantitative data include eye-tracking measurements of fixation duration, total fixations count, and total fixation duration on selected areas of interest (AOIs) per participant. ELAN, a widely adopted tool for the creation of complex annotations developed at the Max Planck Institute for Psycholinguistics,[2] was used to align and annotate each recording. The study led to a number of conclusions that contribute significantly to the development of the field of humor studies, as well as the areas of social eye-tracking studies, embodied communication, and multimodality. This chapter presents the reader with an overview of the main findings that will be discussed in depth in the following chapters.

2.2.1 Data collection setting and instruments

The data were collected by means of audio, video, and eye-tracking recording of dyads of participants interacting freely in their native language (English or Spanish) in a semi-naturalistic setting while they were sitting across a table from each other with non-intrusive eye-trackers and cameras set up between them. The instruments employed for the data collection were the following: two Tobii X2–60 portable eye-trackers, two high-definition Microsoft HD LifeCam Studio scene cameras, two dedicated Dell Precision M4800 laptops for data collection and analysis (with microphones for backup audio recording), two Tobii Studio software licenses for

2. ELAN can be downloaded here: https://tla.mpi.nl/tools/tla-tools/elan/.

data collection and analysis, and one PZM microphone for high-definition voice recording.

The Tobii X2–60 eye-trackers were selected among other available devices based on the research questions guiding this study, the phenomena being studied, and the available literature on the subject. The chosen eye-trackers have a sampling rate of 60 Hz, which means they record 60 frames per second or one frame every 16.6 milliseconds. The sampling rate of the eye-trackers determined the sampling rate of 17 milliseconds for the study of smiling (discussed in Section 2.2.4). For studying the relationship between eye-movements, humor, and smiling, a sampling rate as low as 30 Hz would have been sufficient based on analyses by Rayner (1992) and Holmqvist et al. (2011), as well as reports of similar social eye-tracking studies (e.g., Brône & Oben, 2015). Moreover, the sampling rate of the eye-tracker is also linked to the freedom of movement allowed by the machine. More powerful eye-trackers (with a higher sampling rate) require the participants to stay still and often have their head strapped into a support that prevents them from moving. The use of more powerful devices would have not allowed participants to interact as naturally as they did in the study, thus interfering with one of the goals of the study (that is, to study semi-naturalistic interactions in which participants behave as close as possible to how they would behave in a naturally occurring situation) and with participants' display of facial expressions and gestures. Moreover, in order to be able to investigate the relationship between smiling and eye-movements, participants in the study should have been able to see each other's face with no other visual elements blocking their visual field. For this reason, the possibility of using wearable eye-tracking or others requiring a head strap or chinrest was discarded, as these would occlude part of the face, and a remote non-wearable model was chosen.

Each data collection session took approximately one hour. During the data collection, the researcher was in the same room with participants operating the computers and monitoring the data collection in real time, although she was not visible to them and remained in an area separated from participants through a screen in order to minimize the effect of her presence on the natural flow of the conversation between the two participants (see Figure 1 and 2).

As shown in Figure 1 and 2, the participants sat comfortably in front of each other, across a table, with nothing interfering with their view of each other's faces. The eye-trackers and cameras (one of each per participant) were lodged non-intrusively in a black wooden support that was built for the study and designed in order to hide the devices from participants while allowing for high-quality data collection and a seamless, semi-naturalistic conversation.

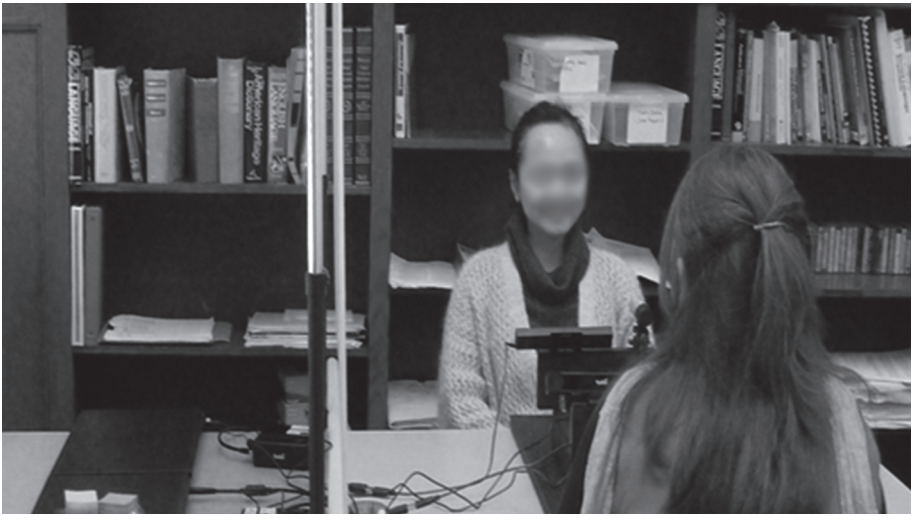

Figure 1. The setting for the data collection (from Gironzetti, 2017a)

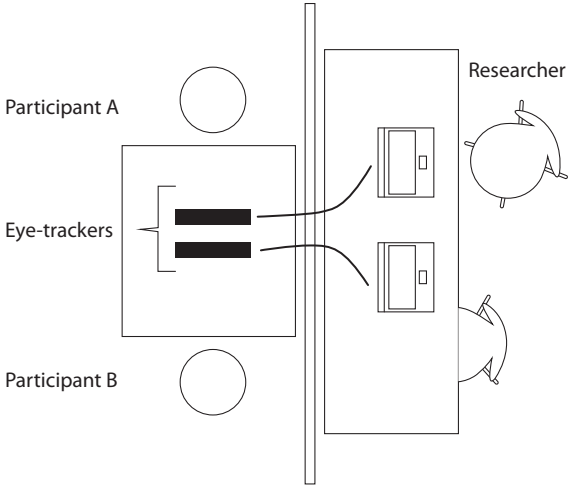

Figure 2. Schematic representation of the setting for the data collection (from Gironzetti, 2017a)

For the Tobii X2–60 eye-trackers to perform correctly, participants needed to be seating or standing facing the eye-tracker at a distance of approximately 60 cm and their gaze angle in relation to the eye-tracker should not exceed 31°. These measures were taken into account and the chair and table height and positioning were adjusted accordingly. Additionally, the chairs were fixed to the floor to limit

participants' movements that would have interfered with the data collection (e.g., swiveling on the chair).

As briefly discussed in Chapter 1, despite having created a least intrusive setting for the data collection to be able to record interactions as similar as possible to naturalistic conversations, it is likely that the setting for the study may have affected participants gaze and smiling behaviors, as well as the overall unfolding of each interaction. For example, the presence of the eye-trackers may still have been visually salient for participants and so affected their gaze patterns, particularly at the beginning of each conversation. The fact that chairs were fixed to the floor limited participants' movements and this could have had an effect on the overall behavior each participant displayed during the interactions. Due to these limitations, the data and findings discussed in this manuscript should not be taken as a faithful representation of the way people interact in a truly naturalistic, spontaneous conversation, but as the closest approximation to it that also enables the collection of smiling and gaze data.

2.2.2 Participants

Participants in this study were selected among staff, faculty, and students at a small southern university and screened prior to the data collection to ensure they all had normal or corrected to normal vision in order to allow the recording of their eye movements. Each participant was selected to take part in this study based on their native language and country of origin, employed as a proxy for their cultural background together with additional demographic information (e.g., other languages spoken, time spent abroad, age, etc. See Appendix C for the full demographic questionnaire employed to select and screen potential participants). This choice was a practical one and not without issues (see Chapter 7 for a discussion of this limitation and Crafa et al., 2019, for a discussion of how to define culture and cultural groups). Dyads of participants were assigned based on self-reported native language and level of familiarity with each other, in order to avoid dyads of participants who were close friends, as this may have an impact on their use of humor (see Chapter 1). Table 3 summarizes the self-reported demographic information of each participant and their corresponding dyad.

Before the data collection started, all participants were given a copy of the consent form approved by the institution's IRB, and asked to grant permission to use their video, audio, and gaze recording for this study, as well as permission to audio- and video-record them and record their gaze movements. Only participants who gave their consent to participate took part in the data collection and data analysis. For each conversation, the following data were collected: one high-definition

Table 3. Summary of participants self-reported demographic information

Pseudonym	Dyad	Language	Ethnicity	Country	Age	Gender	Education
John	1	English	White	U.S.	25–34	Male	BA
Tony	1	English	White / Asian / Pacific Islander	U.S.	18–24	Male	Some college credits, no degree
Jake	2	Spanish	Hispanic or Latino	Mexico	18–24	Male	Some college credits, no degree
Yoan	2	Spanish	Hispanic or Latino	Mexico	25–34	Male	MA
Emma	3	English	White	U.S.	18–24	Female	Some college credits, no degree
Jane	3	English	White	U.S.	25–34	Female	BA
Hans	4	Spanish	Hispanic or Latino	Mexico	45–54	Male	MA
Andy	4	Spanish	Hispanic or Latino	Mexico	25–34	Male	BA
Ann	5	Spanish	Hispanic or Latino	Mexico	18–24	Female	Some college credits, no degree
Kate	5	Spanish	Hispanic or Latino	Mexico	18–24	Female	Some college credits, no degree
Dani	6	English	White	U.S.	45–54	Female	MA
Amy	6	English	White	U.S.	18–24	Female	Some college credits, no degree

audio track and a lower-quality audio track for backup, two high-definition video files (one per participant focusing on their face and upper torso), and two separate sets of eye-tracking data (one per participant) at a sampling rate of 60Hz.

2.2.3 Data collection procedure

For those participants who agreed to take part in the study, the data collection continued according to the following steps.

1. Before coming to the data collection site, participants were screened for normal or corrected-to-normal vision. They were informed not to wear any make-up on their lashes and eyes (including fake eyelashes), as these may occlude part of the eye and so interfere with the eye-tracking data collection. They were also

asked to wear contact lenses instead of glasses and avoid wearing any hats or caps (they would be asked to remove these prior to the data collection), again to avoid reflection from the glasses' lenses or partial occlusion of the eyes that would interfere with the recording of the eye movements.

2. Once participants arrived at the data-collection location, the researcher calibrated each eye-tracking machine with one of the participants to ensure the correct recording of their eye-movements. Calibration was performed with a five-point physical calibration grid and repeated as necessary until successful calibration was obtained for each participant.
3. Few minutes before starting with the actual data-collection, and after having completed the demographic questionnaire, each participant was given a written copy of a joke in their native language (Spanish or English; see Appendix D). Each participant was told to memorize the joke in order to be able to retell it, as they were instructed to use these jokes as icebreakers to start the conversation and then continue talking freely for about 15–20 minutes.
4. Once participants were ready, they sat across a table, each facing one eye-tracker as well as each-other, and the researcher started the recording (video, audio, and eye-trackers). Then, while recording, the researcher used a camera with flash to take a picture of the participants so that the flash of the camera was recorded by the eye-trackers and automatically tagged as a lack of data. This blind spot in the data was later used as one of the synchronization points to align the data collected from the two eye-trackers and the videos. As an additional measure of synchronization, the researcher also recorded key-pressing logs at the beginning, middle, and towards the end of the recording to ensure good data alignment from both eye-trackers.
5. The researcher then moved to the separated research area as to not interfere with or disrupt the conversation, while also monitoring the ongoing data recording. Each dyad talked for about 15 to 20 minutes until the researcher stopped them.

Following this procedure, 22 conversations were recorded. The number of conversations recorded, and their length were determined in order to account for anticipated high-rate of data loss that tends to characterize (semi-)naturalistic dual eye-tracking studies (see Gironzetti, 2020 for a more detailed discussion of the challenges of conducting dual or social eye-tracking studies). Of the 22 conversations initially planned and recorded (some only partially), 16 were not included in the analysis due to the high rate of eye tracking data loss (e.g., when participants covered their face with their hands or moved their head very fast) or due to unforeseen issues during the data collection (e.g., video recording stopped and could not be restored, successful calibration of the eye tracker could not be obtained for one

participant). The following paragraphs summarize the main finding of this study based on the analysis of humorous and non-humorous exchanges extracted from six conversations with a data loss rate below 30%.

2.2.4 Treatment of data

Once the data collection ended, data were processed and coded in order to allow for further, more specific data analyses. The video, audio, and eye-tracking recordings that were collected for this study were first synchronized and then annotated using ELAN (https://tla.mpi.nl/tools/tla-tools/elan/), as shown in the two examples in Figure 3 and 4.

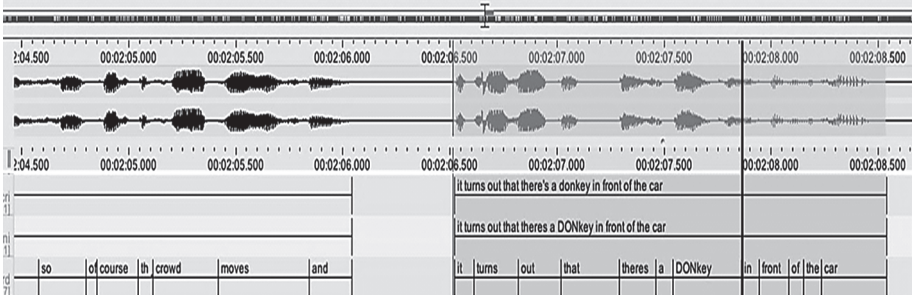

Figure 3. Example of humor coding in ELAN (humorous utterance highlighted in dark gray)

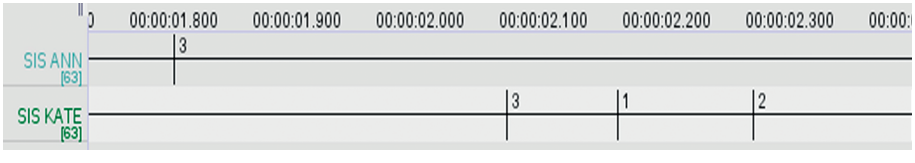

Figure 4. Sample smiling intensity coding in ELAN with a dedicated tier for each participant

The video and audio files were coded for the presence of humor (Figure 3) following the procedure explained in Chapter 1 and an equal number of conversation segments of equal length with and without humor were extracted to constitute the corpus for the analyses, for a total of 48 humorous instances, including 16 punchlines, 19 jablines, and 13 ironic humorous comments, and 48 segments of conversation without humor (non-humorous instances). The individual smiling behavior of participants was coded in ELAN (Figure 4) by applying the Smiling

Intensity Scale (described in Chapter 3) and then coded by dyad to highlight potential individual and dyadic smiling patterns (see Chapter 4). The joint smiling behavior of each dyad was displayed by means of line graphs to show the changes in smiling intensity as these unfolded over time. A sample line graph with explanations is represented in Figure 5.

Line graphs were employed to represent changes in the smiling behavior of each participant on the Smiling Intensity Scale (SIS) as these unfolded over time and in relation to the delivery of the humorous instance (dotted vertical line) and the smiling behavior of the interlocutor.

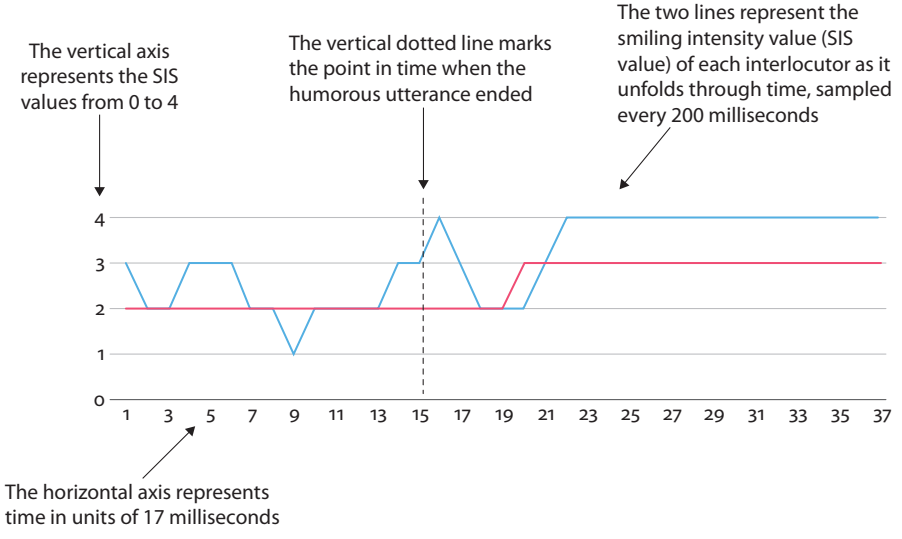

Figure 5. Sample line graph of joint smiling behavior with explanatory labels

The eye-tracking data were analyzed considering two areas of interest (AOIs), the eyes and the mouth facial areas, analyzed separately and also as a whole for each participant (see Chapter 5 and Appendix A). The different data sources thus coded and organized were then integrated in ELAN and later analyzed in ELAN and through statistical analyses with the goal of highlighting similarities, differences, and patterns in the behavior of participants with respect to the presence and absence of humor in the conversation. The following sections of this chapter highlight the main findings of the study, while a more detailed discussion of each aspect is developed in the following chapters.

2.3 Individual smiling behavior

Speakers rely on higher smiling intensity as a cue of humor in conversation.
Smiling intensity is higher in the presence of humor with respect to each speaker's baseline.

The first findings relate to the relationship between the presence of humor in conversation and the smiling behavior of each individual speaker and contribute positively to the argument that smiling serves as a cue for the presence of humor in conversation. Here, the term *presence* should be interpreted in relationship to the *humorous potential* of a given utterance that, if recognized, can be acted upon by one or both conversational partners.

The data clearly show that smiling is instrumental in cueing the presence of humor in face-to-face conversations and framing a given utterance as humorous. However, the relationship between smiling and humor is not linear, that it to say, the presence of smiling alone cannot be considered an *indicator* of humor (always co-occurring with it) but rather a *marker* or, possibly, an *index* (see Table 2). In this sense, if we were to treat smiling as a discrete marker or index of humor, considering only its presence or absence, we will encounter some of the same limitations already discussed for laughter (see Section 1.4.3), since there can be smiling when there is no humor and there can be humor without smiling. Instead, as it will be discussed in more detail in Chapter 3, *smiling relates to humor in terms of an increase of its intensity with respect to each person's baseline, not its presence*. In general, as illustrated in Figure 6, a more intense smiling behavior is closely associated with the presence of humor, while a less intense smiling behavior is associated with the absence of humor in the conversation. Thus, it is not the presence of smiling that cues the humor, but rather the intensity with which smiling is performed. The difference in smiling intensity displayed by participants with and without humor was found to be statistically significant (see Chapter 3 for a discussion of these results). Figure 2.7 shows on the horizontal axis the categories of utterances with and without humor, and on the vertical ais the values that correspond to different degrees of smiling intensity according to the Smiling Intensity Scale (for a full description, see Section 3.2), ranging from 0, no smiling, to 4, jaw-dropped smiling.

Figure 6 summarizes the data on 12 participants' smiling intensity showing that the variable humor significantly predicts individual smiling intensity, $F(1, 11.563) = 98.11$, $p < .001$, with the presence of humor predicting the display of a higher smiling intensity for each participant, $b = 1.1$, $t(28) = 12.3$, $p < .001$.

This finding was proven to be true for each participant in each dyad, regardless of their gender, the language used in the conversation (English or Spanish), and the type of humor (punchline, jabline, or irony). However, it is important to notice that participants displayed a high degree of individual variability in their smiling

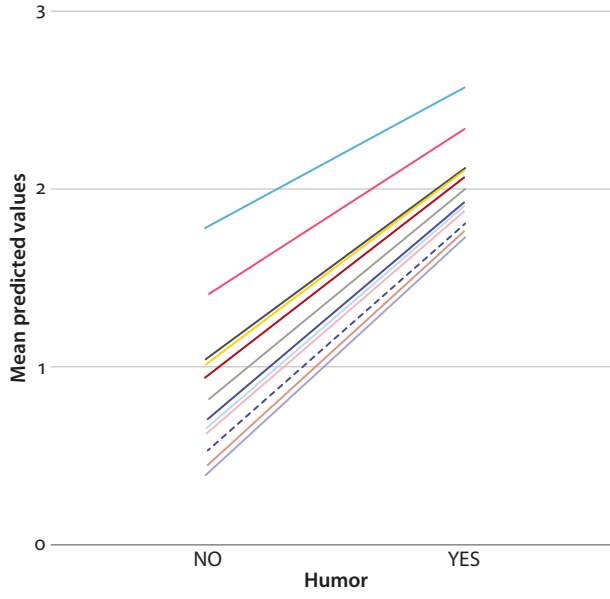

Figure 6. Predicted smiling intensity (SIS) in the presence and absence of humor by participant

behavior, which shows that there is no absolute threshold value of smiling intensity that can be used to indicate the presence of humor. Instead, the increment of speakers' smiling intensity occurs in relation to each speaker's individual smiling baseline, as shown in Figure 7.

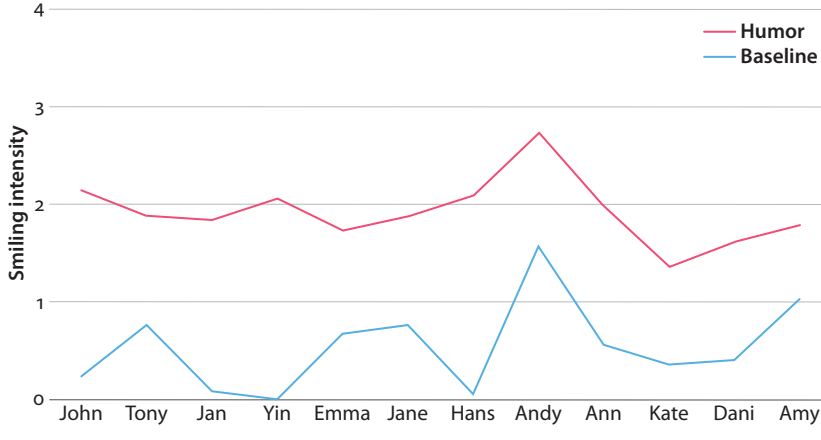

Figure 7. Individual smiling intensity: participants' smiling baseline and smiling with humor

In Figure 7, it is possible to observe the average baseline smiling intensity for each participant (pseudonyms on the horizontal axis) on the Smiling Intensity Scale (vertical axis, from 0, no smiling, to 4, jaw-dropped smiling), which varies between the lowest value of 0.01 for Yin and the highest of 1.56 for Andy, as well as the individual variation in how each participant adjusts their smiling intensity to mark the presence of humor, again ranging from the lowest value of 1.34 for Kate and the highest of 2.71 for Andy. Overall, the average difference in smiling intensity between the baseline and the instances of humor was 1.4 on the SIS scale, with SIS value 0 (non-smiling facial display) being the most frequent baseline facial display and SIS value 3 (wide open mouth smiling facial display) the most frequent facial display in the presence of humor across all conversations. This is to say that, typically, people were not smiling in the absence of humor, and were displaying a wide, open mouth smiling in the presence of humor. Figure 8 illustrates these two smiling behaviors as displayed by one participant. The distribution of each smiling intensity behavior across participants for humorous and non-humorous segments of conversation is analyzed and described in detail in Chapter 3.

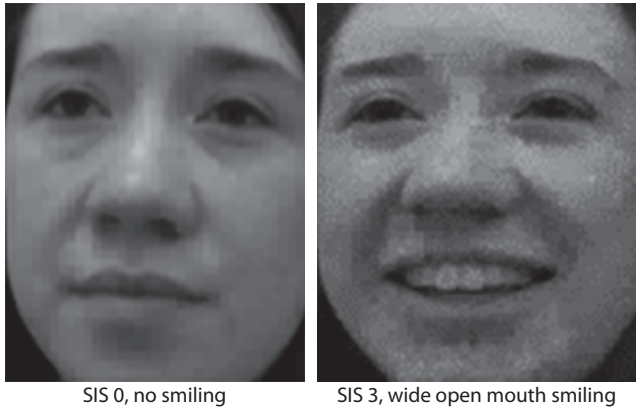

Figure 8. Most frequent smiling behaviors for baseline (Left) and humor (Right) across conversations

2.4 Joint negotiation and co-construction of the humorous frame

Speakers rely on smiling to jointly negotiate the humorous framing of an utterance. Smiling intensity is manipulated before, during, and after the delivery of the humorous utterance, resulting in humor-specific smiling patterns that serve to co-construct the humorous frame.

The second findings build on the individual smiling intensity results summarized in Section 2.3 to shed light on the dialogical process of negotiating and co-constructing humorous discourse in conversation, a process to which both members of the dyad contribute independently on their conversational role (i.e., being the speaker or listener of a particular utterance). A fine-grained sequential analysis of participants' smiling behaviors led to the identification of specific patterns of smiling behavior displayed by individuals within each dyad, highlighting the fact that the relationship between smiling intensity and humor is not monologic and not linear in time, that is to say, smiling is not manipulated by one conversational partner independently from the other, and is not necessarily displayed in the conversation right after a humorous utterance has been produced. In fact, by examining the dyads' smiling behaviors as they unfold over time, it is possible to notice that participants do not increase their smiling intensity only after the humorous utterance was produced, e.g., as a reaction to the humor by the hearer, or only as the humorous utterance is being produced, e.g., to indicate a humorous intention on the side of the speaker. Instead, participants displayed complex *framing smiling patterns*, often preceded, or followed by *smiling accommodation gesture* (Figures 9 and 10), that are representative of the conversational dynamics of the dyad and the ongoing negotiation of the humorous framing.

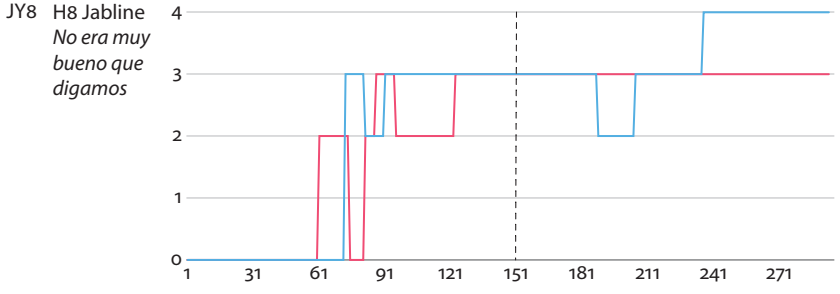

Figure 9. Joint framing smiling pattern (segment JYH8, jabline)

Note: the dashed vertical line indicates the occurrence of humor; the horizontal axis indicates time in units of 17 milliseconds; the vertical axis indicates the smiling intensity as coded using the Smiling Intensity Scale. The speaker of the humorous utterance, Yin, is marked with a red line.

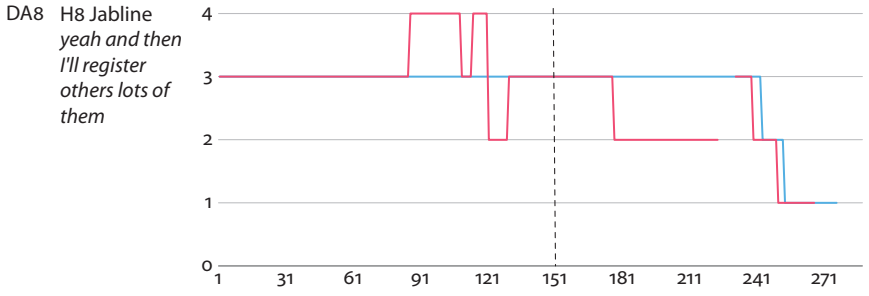

Figure 10. Smiling accommodation gesture after the humorous event (segment DAH8, jabline)

Note: the dashed vertical line indicates the occurrence of humor; the horizontal axis indicates time in units of 17 milliseconds; the vertical axis indicates the smiling intensity as coded using the Smiling Intensity Scale. The speaker of the humorous utterance, Dani, is represented with a red line.

A framing smiling pattern consists of a long, sustained smiling (over 1 second) upheld by one (single framing) or both participants (joint framing). This smiling pattern frames a stretch of speech as humorous, as illustrated in Figure 9. It should be noted that the same pattern and gesture, plus an additional one, *inverted smiling gestures*, were also identified in a previous study on computer-mediated dyadic conversations (Gironzetti et al., 2018), which point to the fact that these patterns may occur independently of the conversational environment.

In Figure 9, the two participants are jointly framing the utterance as humorous by matching each other's smiling intensity before the humorous event, starting at time-point 91 on the horizontal axis, as illustrated by the two trend lines (blue and red line) overlapping. These matching smiling behaviors are sustained by both interlocutors for over 3 seconds, until after the humorous utterance was produced at time-point 151.

A smiling accommodation gesture, on the other hand, occurs when one of the participants mirrors the behavior of the other, independently of their conversational role (Gironzetti et al., 2018). In Figure 10, it is possible to observe a clear example of smiling accommodation occurring after the humorous utterance was produced and after participants displayed a joint framing smiling pattern. At time-point 241 on the horizontal axis, the speaker of the humorous utterance, Dani (represented with red line) begins to lower their smiling intensity from SIS value 3 to SIS value 2 and is immediately followed by the other speaker (represented with a blue line), who displays the exact same behavior at time-point 243, with a slight delay with respect to Dani. The joint and gradual lowering of the dyad smiling intensity continues, prompted by the Dani's behavior, until they both stabilize their smiling intensity at SIS value 1 (closed mouth smiling).

As the examples in Figures 9 and 10 illustrate, an increase in smiling intensity is rarely a monologic activity. In contrast to what folk theories of humor predict, a peak smiling pattern – which would result in a sharp increase in smiling intensity and a peak that coincides with the humorous event – produced by either the speaker of the humorous utterance (to signal their intention to be humorous) or by the listener (to display their appreciation) was found to occur only in a handful of cases. On the contrary, most of the time, *participants jointly negotiate the humorous framing of the text by means of manipulating and adjusting their smiling*, which is used as a communicative device that allows speakers to negotiate whether a given utterance, for example, is humorous or not. This negotiation is not necessarily initiated by the speaker of the humorous utterance, as the listener can be the first one to interpret the text produced by the interlocutor as humorous and signal it by means of increasing their smiling intensity, thus opening up the possibility for the other person to join, reject, or continue negotiating the humorous frame. In this sense, the humorous pragmatic intention is not imposed by one speaker to the other or the text but is negotiated by both speakers in the interaction. The active negotiation of the humorous framing of an utterance in which participants engage occurs at the level of each individual participant (by means of increasing one's individual smiling intensity), and also at the level of the dyad, by means of joint framing smiling patterns and accommodation gestures.

2.5 Smiling dialogic synergy

Speakers align their smiling behavior and increase the amount of time they match each other smiling behavior as part of the process of jointly co-constructing the humorous frame.

The third set of findings provide further evidence regarding the relationship between the smiling behaviors of each of the members of the dyad. The analysis of participants' smiling synchronicity confirmed what already observed in the study of participants' smiling patterns, that is, smiling is used by speakers to negotiate and co-construct the humorous frame.

The study and plotting of speakers' smiling patterns (Section 2.4) made it possible to observe the smiling behavior of both speakers at the same time, and it became evident that participants interacting with each other face-to-face show coordinated smiling behaviors. These joint behaviors were thus classified to distinguish among four possible, relevant scenarios: reciprocating each other smiling without matching smiling intensity; matching each other smiling intensity; not reciprocating each other smiling behavior; and reciprocating a non-smiling behavior. Figure 11 shows

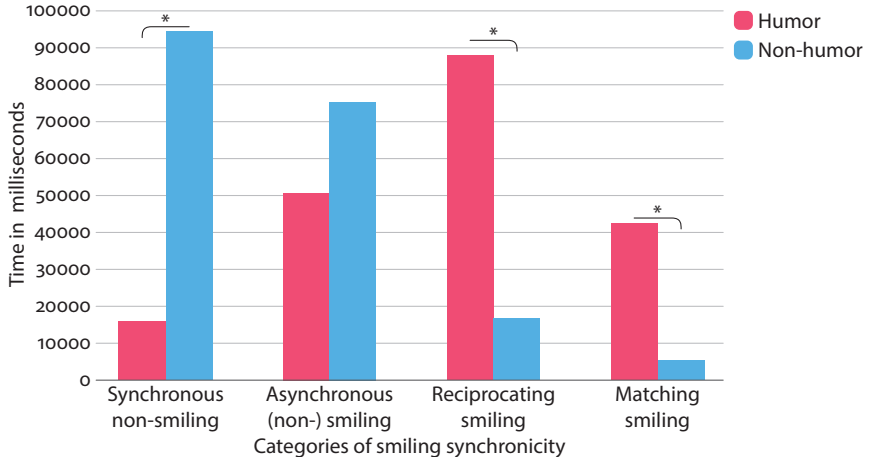

Figure 11. Smiling synchronicity for humorous and non-humorous segments (statistically significant differences are marked with an asterisk)

the total time participants displayed any of these behaviors during humorous and non-humorous segments of conversation.

The behavior categories represented in Figure 11 can be interpreted as follows: synchronous non-smiling behavior is when both conversational partners do not smile; asynchronous (non-) smiling behavior is when one participant is not smiling and the other is; reciprocating smiling is when both conversational partners are smiling at the same time, but at different SIS values; and matching smiling is when both conversational partners are smiling at the same time and at the same SIS value.

As illustrated in Figure 11, the presence of humor correlates with a change in the smiling behavior of the dyad, with more time spent displaying either matching or non-matching smiling, that is, smiling behavior at the same SIS value or at different SIS values other than 0. The difference between the time participants displayed a given behavior during humorous and non-humorous segments of conversation was found to be statistically significant, $\chi 2(7) = 34.889$, $p < .001$. Posttests showed that there is no difference in the time participants engage in asynchronous (non-) smiling behavior if humor is present or absent. However, there are significant differences in the time participants engage in the remaining three types of behaviors when humor was present or absent from the conversation (marked with an asterisk in the graph), with more time spent reciprocating and matching each other smiling when humor was present, and more time spent displaying synchronous nonsmiling behavior when humor was absent (statistical analyses are discussed in detail in Chapter 4).

It should be noted that these differences were found in each and all conversations analyzed, as will be shown in Chapter 4. Moreover, in relationship with the

smiling patterns and gestures introduced in the Section 2.4, it should be noted that both reciprocating and matching smiling behaviors, when occurring for more than 1 second, produce what we called a *joint framing smiling behavior*, at either the same (matching) or different smiling intensity. In the absence of humor, on the other hand, the dyads were shown to display more non-smiling behaviors (both interlocutors not smiling) and more asynchronous smiling, with one participant smiling but not the other.

Finally, the correlation between the smiling behaviors of the members of the dyad was found to be stronger in the presence of humor rather than in its absence, thus contributing to identifying smiling as a particularly relevant behavior in relationship with humor (statistical analyses are discussed in detail in Chapter 4). Participants displayed synchronic smiling behaviors for a significant longer time when humor was present in the conversation compared to when humor was absent. In the absence of humor, participants displayed non-smiling behaviors for a significant longer time compared to when humor was present. These two results together show that smiling is a dialogic behavior in which speakers engage in order to accomplish specific communicative goals such as, in our case, negotiating the humorous framing of the text as it is produced in real time.

2.6 Gaze

The fourth set of findings shift the focus of attention to eye-movements to look at the relationship between conversational partners' eye-movements and the presence and type of humor, the interlocutor's smiling behavior, and their conversational roles as speakers or listeners of the humorous utterances. The initial goal behind this part of the study was twofold: one the one hand, gaze behavior was analyzed to determine whether participants were intentionally aligning or diverging in their individual smiling behaviors in response to, or as the result of, one of these factors. If smiling, which belong to the visual world, is used by speakers to negotiate the humorous framing of an utterance, then it should be possible to see some changes in the way people explore each other's faces. On the other hand, gaze itself serves to accomplish cognitive, affective, and social functions in conversation and thus it could be employed as a multimodal cue to conversational humor.

It should be noted that, due to the novelty of the approach used in this study, no initial hypotheses were formulated regarding in which direction these changes may happen (thus, whether the presence of absence of a certain smiling feature would trigger more or less visual attention paid to a specific facial areas, or whether a certain gaze behavior would cue humorous instances). In this regard, the study was exploratory in nature with the goal of contributing new data from which to develop an initial hypothesis. The underlying theories of how emotions, cognitive load,

and social factors affect eye-movement are dealt with in depth in Chapter 5. The explanation of the statistical procedure, linear mixed models, used to analyze eye movements of participants is included in Appendix A and discussed in Chapter 5.

2.6.1 Gaze aversion and conversational humor

Increased gaze aversion (avoiding looking at the interlocutor's eyes) with respect to each participant's baseline characterizes all types of conversational humor.

The analysis of the participants' eye-movements using mixed linear models led to the identification of a significant effect of the presence of humor on participants' gaze on the eyes, $b = -218.046$, $t(732.596) = -2.475$, $p = .019$. The relationship between the presence of humor and participants' gaze on the eyes is negative, which means that higher values for participants' gaze are associated with the absence of humor from the conversation. Thus, the absence of humor predicts higher values for participant's gaze on the interlocutor's eyes, which indicates that more attention is paid to the eyes when there is no humor in the conversation. On average, speakers spent 11% (0.55 seconds every 5) of the time looking at the interlocutor's eyes in the presence of humor, and 12.5% (0.62 seconds every 5) of the time in the absence of humor. Figure 12 summarizes these data and shows the high degree of individual variation from one conversational partner and dyad to another. Participants' pseudonyms are listed on the vertical axis and based on their dyadic distribution (e.g., Amy and Dani interacted with each other as part of dyad DA) and the horizontal axis shows the percentage of time each participant looked at the interlocutor's eyes during the conversation.

As illustrated in Figure 12, every person shows a distinct, individualized behavior regarding the time spent looking the interlocutor in the eyes. The many factors that intervene and may modulate this behavior (such as the gender of the interlocutors, their language and cultural background, their smiling behavior, as well as their age and level of familiarity) were accounted for in the mixed linear models. Some others, however, such as the felt enjoyment of the humor or changes in how they felt toward each other during the conversation, were not considered as part of this study.

The results summarized here point to the fact that an increase in gaze aversion may not only accompany sarcastic statements, as previously shown (Williams et al., 2009), but any type of humorous utterance occurring in face-to-face conversations. The reasons for this increase have yet to be explored. One possibility is that gaze aversion serves as a processing strategy to reduce the high cognitive load caused by processing and resolving the humorous incongruity (on gaze aversion as a response to the cognitive difficulty of a task see Doherty-Sneddon & Phelps, 2005;

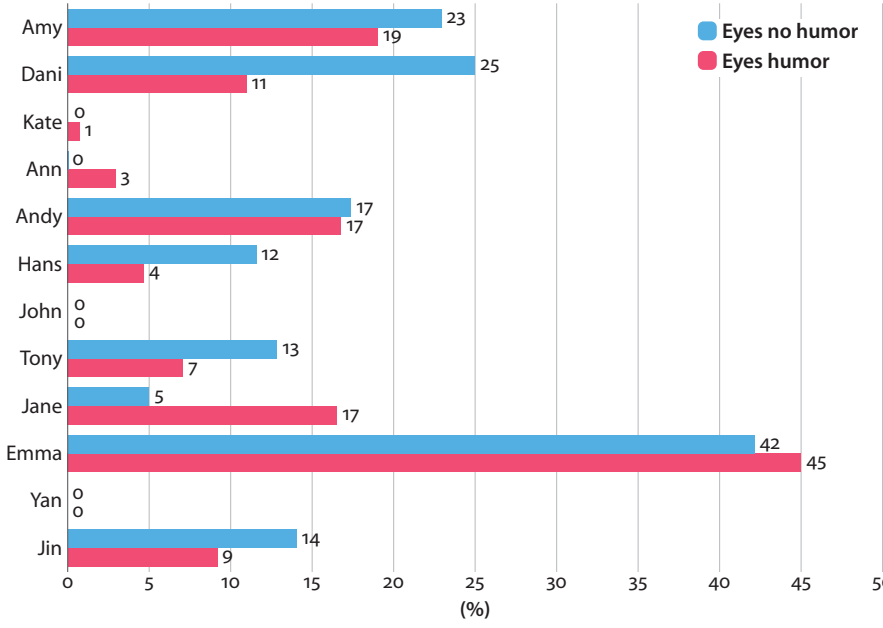

Figure 12. Percentage of time participants looked at the interlocutor's eyes

Doherty-Sneddon et al., 2002). A second possibility is that gaze aversion accompanies humor due to its *non-bona fide*[3] (Raskin, 1985) mode of communication (on gaze aversion and lying see Einav & Hood, 2008, and Vrij, 2002). Finally, it is also possible that increased values of gaze aversion are due to the visual saliency of the mouth during humorous instances caused by the interlocutor smiling behavior. These hypotheses will be explored in more details in Chapter 4.

2.6.2 Gaze to the mouth and conversational irony

Increased gaze to the interlocutor's mouth with respect to the participant's baseline characterizes conversational irony.

Results of the analysis of participants' eye-movements indicate that the eyes and the mouth receive different attention from participants depending not only on whether the humor is present in the conversation, but also depending on the type of humor. In the previous section, it was outlined how the absence of humor predicts that participants will spend more time overall looking at the interlocutor's

3. *Non-bona fide* communication was defined by Raskin (1985) as any communication mode that does not follow Grice's maxims and included, among others, humor and lying.

eyes. A further analysis of participants' gaze to the interlocutor's mouth revealed a significant effect of the type of humor, with high values for gaze to the mouth associated with each type of humor. However, this effect was found to be significant only in the case of irony, $b = 601.98$, $t(7.382) = 8.072$, $p < .001$. Thus, the presence of irony – the unplanned, discursive, and highly context-dependent type of humor that was generally marked with a lower smiling intensity than jablines or punchlines – predicts that participants will spend more time looking at the interlocutor's mouth. This may be due to a variety of factors, including the contextual (pragmatic) nature of irony, which may require more effort and additional cues to be recognized or processed; the lower visual saliency of the interlocutor smiling behavior, which for irony was generally of a lower intensity and thus less visible parafoveally, requiring more overt attention, or the fact that participants may be trying to avoid making eye-contact with the interlocutor, as discussed in Section 2.6.1, and could end up looking at the mouth as a way to maintain their gaze on the interlocutor's face to show engagement.

Similar to what already discussed for participants' gaze to the eyes, the data regarding the time participants spent looking at the interlocutor' mouth also show a great degree of individual variation from one participant and dyad to the other. These data are summarized in Figure 13.

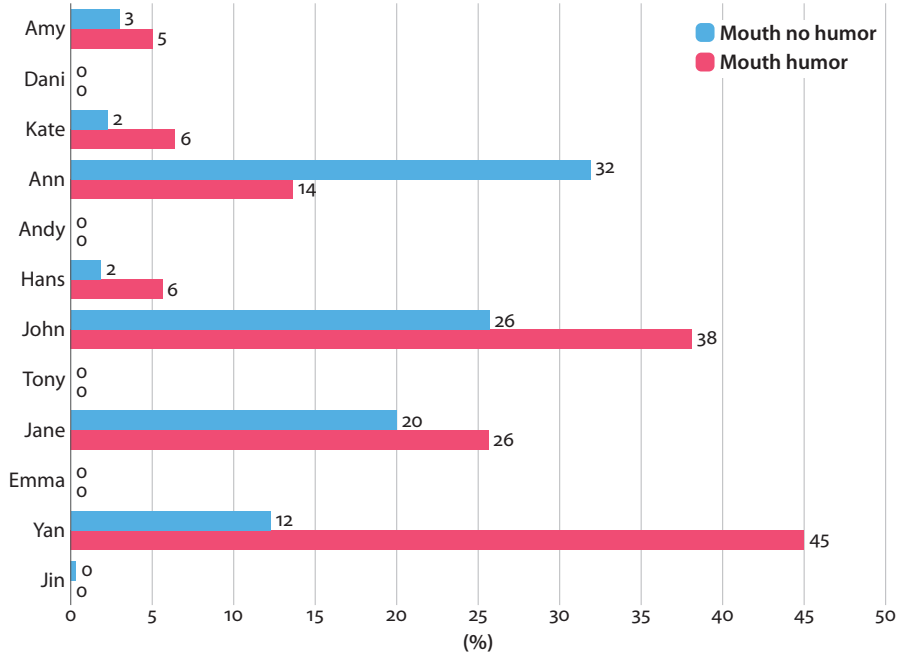

Figure 13. Percentage of time participants looked at the interlocutor's mouth

The data reported in Figure 13 refer to the percentage of time participants looked at the interlocutor's mouth without differentiating among the three types of humor (irony, jablines, and punchlines). Yet, with the exception of the behavior of one participant – Ann, who displayed the opposite behavior and looked at Kate's mouth more in the absence of humor – the general trend is that the mouth was looked at for a longer time in the presence of humor. The case of Ann's (and Kate's) behavior is of particular relevance and will be discussed in depth in Chapter 6 with regards to the conversational performance of failed humor.

2.7 Failed humor

Behavioral misalignment characterizes failed humor. Different types of failed humor are accompanied by cues that can indicate humor support at one level and humor failure at another.

The analysis of three cases of failed humor discussed in Chapter 6 adds to our understanding of how conversational humor is performed and to the ongoing debate regarding humor support and failed humor. Based on these analyses on the role of gaze and smiling in the negotiation of the humorous frame, as well as other behaviors (i.e., head tilts, lip pressing), *misalignment* was identified as a key element in the performance of failed humor and a new categorization of failed humor types was proposed, including *upfront failure*, *failed humor negotiation*, and *joint failed humor*. When humor fails upfront, one of the two interlocutors or displays a lack of humor recognition. In this case, we would expect one of the interlocutors to display cues typical of humorous discourse, while the other interlocutor would display gaze and smiling behaviors characteristic of non-humorous discourse (or a lack of display of behaviors characteristic of humorous discourse), and thus behavioral misalignment would occur with respect to their own and the interlocutor's behavior. A case of failed humor negotiation would occur, on the other hand, when both interlocutors engage in the humorous negotiation, at least initially (that is, both recognize the humorous potential of the utterance), but fail to frame the humorous utterance in the same way. In this case, one interlocutor would misalign with the other and their own humor baseline, displaying signals of lack of humor appreciation, understanding, or agreement, coupled with other multimodal behaviors such as explanations of the humor, frowns, lip biting, and head tilts. It is important to notice that, in contrast with upfront failure, a case of failed humor negotiation would have both participants displaying some signals of humor support to, at least, indicate that the humorous potential was recognized and that the utterance was framed as humorous.

Finally, interlocutors were also shown to engage in the humorous negotiation and agree, albeit on a negative outcome, both displaying signals to indicate their

lack of appreciation, understanding, or agreement. This last case, an instance of joint failed humor, could initially be considered to have been successful, as participants display increased smiling intensity and synchronic smiling patterns. However, in contrast to other examples of successful humor negotiation in the corpus and, more specifically, within the dyad, these signals were also accompanied by a display, by both participants, of a lack of appreciation through verbal comments and their facial expressions (e.g., lip-biting, see Section 6.3.2). This example is particularly relevant and adds to the discussion of what it means to display a synchronic smiling behavior or an increased smiling intensity. It is possible, in fact, that a synchronic smiling behavior and a localized increase of smiling intensity index a successful humor negotiation without necessarily including appreciation, which, if overtly displayed, would involve the mobilization of additional resources such as lip pressing, brows raising, and head tilts.

2.8 Conclusions

The motivation behind this study lays in the notion of language as joint, situated action, in which two or more interlocutors actively negotiate the framing of an utterance and contribute to the co-construction of interpretative frames. In a face-to-face conversation, interlocutors have at their disposal a wide variety of resources to do so beyond verbal language, which include multimodal signals such as facial displays and gestures (Davitti & Pasquandrea, 2017) that they can employ to communicate even when they are not speaking.

This study shows how interlocutors mobilize these resources to perform conversational humor in monolingual (Spanish or English) conversations. Overall, the findings presented in this book, and summarized in this chapter, show that the conversational performance of humor is multimodally marked and the multimodal resources mobilized by interlocutors differ quantitatively and qualitatively from those mobilized during non-humorous portions of conversation. Additionally, the data showed significant dyad-level variability in interaction, since the two participants interacted with each other and affected each-other's behavior in a unique way, resulting in a dyadic behavior that was not just the sum of their individual behaviors. While it is true that listeners behave in reaction to speakers, we must remember that speakers also react to listeners (Cornejo et al., 2018), and finding from this study showed that their behaviors are affected by each other as well as by the dynamic and changing situational context in which the interaction is taking place.

The analysis of failed humor instances in Chapter 6, summarized in Section 2.7, adds to the discussion of how conversational humor is performed dialogically and multimodally by shedding light on different ways in which humor can fail at the dyad level. A dialogical classification of failed humor types based on the multimodal behavior of both interlocutors complements current typologies that focused on the levels at which a speaker may fail to successfully engage in a humorous exchange. This new classification allows researchers to distinguish between upfront failed humor (humor that is recognized and acted upon by just one interlocutors) and failed humor negotiation (humor that is recognized by both interlocutors, but not equally appreciated, understood, or agreed upon), and introduces a new category of joint failed humor (humor that is recognized and acted upon by both interlocutors, but with a negative outcome such as, for example, a joint lack of appreciation).

Thus, conversational humorous discourse is characterized by a dialogical marking by means of smiling patterns, smiling intensity, smiling synchronicity, and differential attention to the eyes and mouth facial areas of the interlocutor which vary on the dyad-level and depend on the dyad's baseline. When recognized and acted upon, the humorous potential of an utterance results in participants smiling together, synchronizing their smiling behavior, diverting their gaze from the interlocutor's eyes, and, in the case of irony, focusing more on the interlocutor's mouth. It is this interplay of these different resources and the verbal message at a specific time and place that contributes to the co-construction of humorous discourse. By modifying their behavior with respect to one or more of these resources within temporal proximity to the utterance whose framing is being negotiated, speakers frame it as humorous and can then take a stance on it, such as agreeing or disagreeing with it. These results and their implications are discussed in depth in the following chapters.

CHAPTER 3

Individual smiling behavior

3.1 Introduction

This chapter focuses on smiling as a particular kind of communicative facial display to understand how it is mobilized by speakers engaged in humorous conversation as a means to support the negotiation of humorous framing. In the first part of this chapter, previous studies, instruments, and findings in facial analysis are discussed, with a specific focus on smiling. Then, the chapter moves on to consider the study of smiling and humor, including the relationship between the Duchenne display and humor and the effects of smiling on the speaker's voice (known as smiling voice). Both these phenomena have been recognized in previous studies as possible humor markers due to their connection with humorous enjoyment (Duchenne display) or smiling (smiling voice). Finally, the study of smiling is integrated with the study of conversational humor in a data-driven discussion of how smiling is used by conversational partners as a non-discrete cue for the negotiation of humor in conversation. This chapter and the analyses on individual speakers presented in it are the basis for the discussions and analyses in the following chapters of the manuscript, which adopt a dialogic perspective to conversational humor and look at the behavior of both speakers within a dyad.

3.2 Smiling as a social emotional expression

The study of smiling has been approached from two different traditions within psychology, the Basic Emotion Theory (also known as BET), which was later revised and expanded to address some of its limitations, and the Behavioral Ecology View (BEV), two perspectives that recently lead to the Theory of Affective Pragmatics (TAP). Scholars working within the BET, the approach with the longest tradition, consider smiling an emotion-expressing behavior (Ekman et al., 1990; Ekman et al., 1992). On the other hand, scholars working within the behavioral ecology view, which emerged in response to BET and challenged its main tenets, shift the focus from the expression of emotions to the communicative function of smiling in social interaction (Fridlund, 1994; Messinger & Fogel, 2007).

3.2.1 Smiling within the Basic Emotion Theory (BET)

Basic Emotion Theory research typically focuses on the underlying emotional state of the person producing a given facial expression. These studies operate under the assumption that facial expressions (also known as emotional expressions) primarily serve to express emotions, and their goal has been to be able to identify a facial expression that signals a specific emotion (but see Keltner & Cordaro, 2017, who call for more free response studies that investigate the communicative dimensions of multimodal emotional expressions). More recent works looked at how emotional expressions are perceived and interpreted within a context, rather than studying the face alone (see Aviezer et al., 2008; Carroll & Russell, 1996; Kayyal et al., 2015), thus considering emotional expressions at the individual level (e.g., Clore, 1994; Schwarz, 1990), the dyadic level (e.g., Keltner & Kring, 1998), and within larger social groups and cultures (Mackie, Silver, & Smith, 2004; Rodríguez Mosquera et al., 2004). For example, at the dyadic level, which is the primary focus of this volume, emotional expressions have been found to serve for signaling mental states, rewarding or punishing prior action, and evoking complementary or reciprocal behavior (Keltner & Lerner, 2010, p. 326).

Within the BET, smiling has been researched primarily by applying the standard method for coding facial expressions, Ekman and Friesen's Facial Action Coding System (FACS; Ekman & Friesen, 1978, see Section 3.3.1) with a focus on smiling and its underlying emotions, contrasting genuine (also known as Duchenne's) and phony or feigned smiling (see Section 3.4.1). Recent works also looked at gaze and head movements as these provide cues to interpret the emotional valence of the smile. For example, smiling has been recognized as a distinct signal for the display of pride and embarrassment, but in order to differentiate between these two emotions one must attend to head movements, hand movements, gaze, and body posture, since smiling alone does not provide enough information (Gonzaga et al., 2006; Keltner, 1995; Tracy & Robins, 2004).

3.2.2 Smiling within the Behavioral Ecology View (BEV)

The focus on context is central to the BEV approach presented in this section. In contrast to the "facial expressions as emotion expression" approach of BET scholars, a different and parallel approach was adopted by those who, in line with Fridlund (1994), considered faces as tools for communicating social motives (see also Chovil, 1991a, 1991b). In this view, facial expressions do not simply leak the emotions of the person because there is no necessary connection between the facial display and the emotion felt by the person. Rather, facial displays are used to transmit or

negotiate behavioral or social intentions (Ruvolo et al., 2015). Therefore, while BET would approach smiling as an emotional expression of felt or feigned happiness, the BEV would approach a smiling facial display as expressing, for example, the intention to play or courtesy (Fridlund, 2017). Kraut and Johnston's (1979) study of smiling bowling players provided further evidence that interaction, rather than felt happiness, correlates with the occurrence of smiling, as bowlers were observed to smile when looking and talking to others, but not necessarily after scoring a strike (see also Fernández-Dols & Ruiz-Belda, 1995, and Ruiz-Belda et al., 2003). The study by Crivelli et al. (2015) also provided evidence that smiling is a social behavior intended for communication and that is determined and better predicted by the social context rather than by inner emotions. In their work, Crivelli and colleagues analyzed the facial behavior of 174 winning judo fighters and found that the display of Duchenne's smiling was strongly predicted by engaging in social interaction but not winning the match, thus supporting the BEV approach rather than the BET. Finally, while not developed within the frame of BEV, Haakana's (2010) findings and conclusions are also in line with this approach. In his work, Haakana described smiling as a pre-laughing device used by speakers to accomplish different communicative functions, among which the author included framing the discourse as humorous by indicating that one is only mildly amused (as opposed to laughter, which would indicate, according to Haakana, that one is amused), or framing the talk as being delicate.

The BEV has also been largely criticized by supporters of the BET who rejected it based on two central criticisms. On the one hand, the BEV view was rejected based on studies that link facial expressions (smiling) and emotions cross-culturally, as there is some evidence that people from different cultural backgrounds consistently recognize the same facial expression as indicative of the same underlying emotion (Russell, 1995). On the other hand, BET scholars advocated against the behavioral ecology view underscoring the fact that facial expressions cannot be interactional as they also occur when people are alone (Ekman et al., 1990). In response to the first criticism, Fridlund (2017) noted that the method used in BET studies was circular and tautological, since the images of facial expressions matching certain emotions were used to confirm the universality of those emotions. In response to the second criticism, the position of behavioral ecology supporters is that being physically alone does not mean being psychologically alone, and thus the basic assumption of the behavioral ecology view remains unchallenged (see for example the work on the implicit audience effect by Fridlund, 1991; Fridlund et al., 1992; Hess et al., 1995; Jones et al., 1991; Schützwohl & Reisenzein, 2012; Wagner & Smith, 1991).

3.2.3 Smiling within the Theory of Affective Pragmatics (TAP)

The most recent addition to the debate, the TAP reconciles some core arguments of both BET and BEV by means of focusing on what emotional expressions mean in a context. TAP adopts an approach similar to how pragmatics focuses on the meaning of utterances in context to argue that emotional expressions function as analogs of speech acts, allowing us to accomplish a variety of communicative moves (Scarantino, 2017). Thus, in this view, any given emotional expression carries a variety of informational content on a continuum between voluntariness and involuntariness, including information about the underlying emotions experienced by the person (involuntarily, as argued by the BET), but also about what the person wants to declare or signal (voluntarily, as argued by the BEV). As the same locutionary act can perform a multiplicity of illocutionary acts, some directly and some indirectly, an emotional expression can perform a multiplicity of illocutionary acts, some voluntarily and some involuntarily, and all by default at the same time (Scarantino, 2017, p. 176). Central to the TAP is the understanding of emotional expressions as "voluntary or involuntary behaviors that carry natural information about emotions, are designed to help signalers influence the behavior of recipients and allow recipients to predict the behavior of signalers" (Scarantino, 2017, p. 176).

According to this theory, then, a smiling emotional expression would carry information about the emotion being experienced by the person (e.g., expressive emotional expression of happiness), as well as information that serves social purposes such as demanding that the interlocutor joins the signaler in celebrating a success (e.g., imperative emotional expression) or an inclination to affiliate (i.e., the Duchenne smile according to Fridlund's BEV) or appease (i.e., the phony smile according to Fridlund's BEV) that is still subject to change depending on the context (e.g., commissive emotional expression).

This view is of smiling as, at the same time, a natural cue of emotion and a social cue of different behaviors, would situate smiling in a sort of hybrid space between Grice's natural meaning (factual meaning on the basis of which we cannot arrive at any conclusions regarding communicative intentions) and non-natural meaning, which, in contrast to the first, is not factual and requires certain intentions. As such, smiling, together with other facial expressions, would operate on the organic meaning plane as defined by Green (2019), that is, showing by design something about the person's mental state, the underlying emotion of mirth, making it perceptible to others as well as showing how that emotion feels or appears (Green, 2010, p. 67). In doing so, an overt smiling could operate in a way analogous to speech acts to convey speaker meaning, that is, the speaker's intention.

Green's and Scarantino's proposals, then, develop a novel approach that reconciles the opposite views of BEV and BET scholars described in the previous sections.

As it will be discussed further in this and the final chapter, the TAP approach to smiling as an emotional expression combined with the insights of the facial feedback hypothesis of embodied cognition and the dialogue as synergy model offer a solid framework for explaining why people smile the way they do when they are engaged in dyadic, humorous face-to-face conversations.

3.3 The study of smiling intensity

Smiling is a heterogeneous construct that, from an anatomical point of view, can be characterized by the action of different muscles, alone or in combination, two of which are described in detail in the next section. As stated by Rychlowska and colleagues, "a smile is the most frequent facial expression, but not all smiles are equal" (Rychlowska et al., 2017, p. 1259). In fact, several taxonomies of smiling behavior exist nowadays, and smiling behaviors tend to be categorized based on (a) the different muscles involved, thus applying quantitative (anatomically based) criteria; (b) the functions that these fulfill, applying qualitative criteria related to social or emotional functions; or (c) a combination of both.

On the quantitative side, previous research showed that people produce anatomically distinct types of smiles that involve the action of different facial muscles and produce different visual changes (Ekman, 1973; Ekman & Friesen, 1978; Ruch, 2008). Among the first studies on this subject, Lynn (1940) and Rubenstein (1969) methodological experiments developed new instruments to measure and record smiling. Lynn (1940) devised and employed the "facial cinérecorder" (described in detail in Lynn, 1940, pp. 82–85) to record and later analyze the smiling facial expression of 1200 participants after having auditorily and visually stimulated the smile. Smiling expressions were analyzed in terms of visual changes in the position of the mouth's corners from the beginning to the end of the smile every 1/10 of a second and reported as a numeric score of mimetic smiledness quotient (p. 86). A few years later, Rubenstein (1969) develop yet another method for measuring facial expressions "objectively by representing the external appearance of the face as a family of profiles(or waveforms)" (p. 305). Nowadays, FACS and FACS-based instrument, discussed in Section 3.3.1 and following, are typically employed to analyze facial expressions.

On the other hand, smiles can also be qualitatively different, a line of inquiry with a long research tradition starting in the 1920s that includes early taxonomies (which also accounted for quantitative differences; Grant, 1969; Blurton-Jones, 1971; Young & Décarie, 1977); studies on the development of smiling in infants and preschoolers (Washburn, 1929; Zelazo & Komer, 1971; Cheyne, 1976) as well as blind and seeing children (Thompson, 1941); studies looking at the role of culture

as it affected and modulated the display of smiles (Birdwhistell, 1970), and even an early study[1] (Wolff et al., 1934) from the perspective of superiority theories of humor with a focus on disparaging jokes and laughter, which was operationalized as "change in facial expression" (p. 351).

Today, we know that smiles differ quantitatively as well as qualitatively depending on the underlying emotions being experienced (Ekman et al., 1990; Keltner, 1995; Woodzicka & LaFrance, 2001) and the social tasks being accomplished (Kaukomaa et al., 2013; Rychlowska et al., 2017), including the context in which the task is performed. Different types of smiling are produced but also perceived differently by interlocutors and associated with distinct contexts. Reward smiles, for example, were found to be more trustful (Martin et al., 2021, pp. 7) and were associated with happiness, contentment, cheerfulness, joy, shared laughter, and humorous context (pp. 4–5). Additionally, the same type of smile was strongly associated with descriptions that used some of the following English terms: picture, genuine, close, chuckle, laugh, compliment, flatter, joy, love, sincere, real, true, unfeigned (Martin et al., 2021, pp. 4–5). The following sections outline the instruments most frequently used nowadays to study smiling and its intensity, to then move on to discuss the original results on smiling and conversational humor.

3.3.1 Facial Action Coding System (FACS)

Most of the recent research on smiling and smiling intensity has been conducted applying Ekman's Facial Action Coding System (FACS; Ekman & Friesen, 1978; Ekman et al., 2002; see also Chapter 2 in this volume) or FACS-based instruments, while a more limited number of works adopted a more descriptive or impressionistic categorization (see Jakonen & Evnitskaya, 2020; Lehtimaja, 2011; Piirainen-Marsh, 2011). FACS is based on movement and facial anatomy: it is a system to categorize the activity of different facial muscles and actions that produce visible and distinctive changes on the appearance of someone's face. The coding system classifies these visible changes according to 44 different Action Units (AUs) that are described as anatomically separated and visually distinguishable muscle movements that combine to create different facial expressions. Other visible changes that are not caused

1. In this study, one of several dedicated to humor according to its authors, Wolff and colleagues recorded 15 participants while they read 16 jokes (including 8 disparaging ones and 8 non-disparaging ones) and then employed three raters to estimate the degree of laughter, as an expressive action in response to humor, on a scale from zero to four. Unfortunately, no clear definition of what each level of the scale represented was discussed in the study, nor were raters trained to apply the scale. Disparaging jokes that targeted Jews were associated with a lower laugh response as well as lower ratings in verbal responses than control jokes by Jewish and non-Jewish participants, and similar results were obtained for disparaging jokes targeting non-Jewish (i.e., Scotch jokes).

by movement nor have an anatomical basis – e.g., changes in skin color – are not accounted for within FACS. In the case of smiling, for example, the action of AU6 can be involved. This AU is also known as the cheek raiser and lid compressor, and it is the result of the activity of two muscles in the eyes region of the face, the orbicularis oculi, located right around each eye. AU6 causes the cheeks to move upwards and pulls the skin towards the eyes, producing distinctive wrinkles also known as crow's feet; AU6 is typically associated with sincere enjoyment and the display of a sincere smile (Duchenne smile). In addition to scoring the presence of each AU and to further characterize each AU, as part of FACS, raters have the possibility of assigning a laterality score (bilateral, unilateral, and asymmetrical, indicating whether the AU involves the right, left, upper, or lower part of the facial region) and an intensity score on a scale from A to E indicating visible changes from slight to maximum intensity.

According to FACS, several AUs can be associated with different types of smiling, as we will see in the next section, since this behavior can signal a variety of mental states – not only enjoyment but also anger or embarrassment – and serves different communicative functions. However, most studies relied on the two AUs that have been associated with a felt smile, or Duchenne smile, that is, AU6 and AU12. The visual display of a Duchenne smile was described by Frank and Ekman (1993) as follows: "the skin above and below the eye is pulled in towards the eye-ball, and this makes for the following changes in appearance: the cheeks are pulled up; the skin below the eye may bag or bulge; the lower eyelid moves up; crow's feet wrinkles may appear at the outer corner of the eye socket; the skin above the eye is pulled slightly down and inwards; and the eyebrows move down very slightly." (p. 18) The location of the muscles that cause these two smiling AU are illustrated in Figure 14 and marked with a white oval (AU6) and a black rectangle (AU12).

AU6 (marked with a white oval in Figure 14), also called Cheek Raiser and Lid Compressor, and its appearance are based on the action of two muscles, the orbicularis oculi. The visible changes that characterize AU6 include drawing the skin towards the eye from the temple and cheeks, raising the infraorbital triangle and lifting the cheek upwards, and pushing the skin surrounding the eye towards the eye socket. This AU is typically associated with the appearance of crow's feet lines or wrinkles (Ekman et al., 2002, p. 31).

AU12 (marked with a black rectangle in Figure 14), on the other hand, is also called Lip Corner Puller and is based on the action of the zygomaticus major muscle. The muscle responsible for AU12 pulls the corners of the lips back and upward (obliquely), deepens the nasolabial furrow, and raises the skin adjacent to the nasolabial furrow (Ekman et al., 2002, p. 178). Both AUs and underlying muscles can cause the cheeks to raise and produce similar changes in appearance and they have been described as often occurring together in a Duchenne display or felt, genuine smile. A recent study by Martin and colleagues (Martin et al., 2021) identified

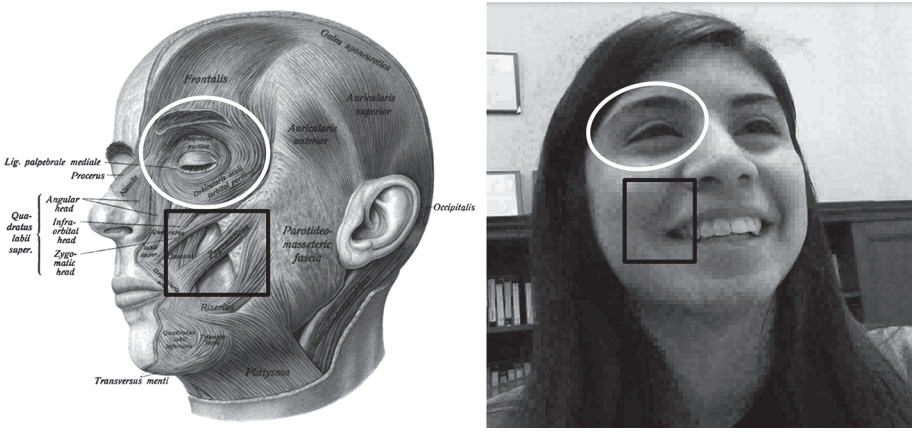

Figure 14. Side-by-side view of facial muscles and smiling facial display

Note. First image on the left by J. Sobotta, Illustration: K. Hajek and A. Schmitson – Sobotta's Atlas and Textbook of Human Anatomy, 1909, Public Domain, https://commons.wikimedia.org/w/index.php?curid=29817225.

reward smiles as those typically associated with humorous content and produced by the action of AU12 in frequent combination with smiles produced by means of AU12 in combination with AU16 (Lower lip depressor), AU25, and AU26.

3.3.2 Smiling intensity scales

As it was anticipated in the previous section, people smile in different ways. In Ken Kesey's book One Flew Over the Cuckoo's Nest (1962), nurse Ratched is described as "smiling her neat little smile" (p. 60), while a few pages later McMurphy is said to display "a big friendly grin" (p. 75). But what exactly means to display a big or little smile? And what is the difference between a smile and a grin? In order to be able to measure the differences between different types of smiling, scholars developed different instruments based on FACS that employ either additive or holistic scoring systems. Additive scoring systems treat smiling as a composite behavior caused by the action of discrete AUs, each contributing equally towards the overall smiling intensity. On the other hand, holistic scoring systems, while also considering smiling a composite behavior to which different AUs may contribute, integrate the effect of different AUs into a single, comprehensive scoring system.

3.3.2.1 *Additive FACS-based scoring systems and applications*

Based on the work of Ekman and Friesen, Harker and Keltner (2001) developed an additive FACS-derived scale that combines the intensity of the two AUs involved in producing a Duchenne smile, AU6 and AU12, each measured on a five-point intensity scale. By applying this scale, the final intensity score obtained for a given

smile is the sum of the intensity scores assigned to each AU, that is, the intensity of AU12 added to the intensity of AU6 would result in the composite intensity score for the smiling expression. This scale was used by the authors to show that higher smiling intensity in the yearbook photo correlates with self-reported life satisfaction and was later applied in subsequent studies. Hertenstein et al. (2009) used this scale to analyze whether smiling intensity in photographs can predict divorce. Oveis et al. (2009) applied the same scale to study smiling intensity in photographs as an indicator of affective style in children and their families. Finally, Seder and Oishi (2012) explored the relationship between smiling intensity on a Facebook picture and future life satisfaction.

This FACS-derived scale, however, due to its additive nature, fails to integrate in a meaningful way the intensity scores of two different AUs (AU12 and AU6) and does not provide an overall smiling intensity score, but uses sum measures to describe the overall intensity of a facial expression that involved more than one AU. For instance, a facial expression involving AU6 and AU12 – a Duchenne display – would be described as having an overall intensity equal to the intensity of AU12 plus the intensity of AU6. As each AU's intensity is measured on a five-point scale, the maximum intensity of this behavior would be 10 (in this case, both AUs would be displayed at the maximum intensity) and the minimum would be 2 (with both AUs displayed at the minimum intensity). Thus, a Duchenne display comprising AU6 at intensity A (the lowest range equal to 1 on a five-point scale) and AU12 at intensity D (the second highest range equal to 4 on a five-point sale) would have an overall intensity of 5, with A equal to 1, D equal to 4. However, this approach assumes that each AU equally contributes to generate the expression. This means that the smiling expressions described above would have the same overall intensity of a facial expression produced by a very strong squinting of the eyes (AU6 at intensity D or 4), accompanying a weak raising of the mouth's corners (AU12 at intensity A or 1).

3.3.2.2 *Holistic FACS-based scoring system*

Inspired by the work of Harker and Keltner, other authors developed and applied a trichotomous scoring system to rate the smiling intensity of people in pictures (Freese et al., 2006; Abel & Kruger, 2010; Kaczmarek et al., 2018). This system was developed to allow for a fast scoring of a high number of images compared to Harker and Keltner's. The three possible scores for smiling intensity integrated AU12 and AU6 as follow: a score of 1 indicated absence of smile; a score of 2 indicated a partial smile (only AU12); and a score of 3 indicated a full Duchenne smile (involving AU12 and AU6).

These studies built on previous works that found a positive correlation between positive emotions and physical and mental well-being and relied on smile intensity to infer these positive emotions. Freese et al. (2006) analyzed 1957 high school

yearbook photographs and measures of life-satisfaction and well-being obtained when respondents were in their fifties in an attempt to replicate the results obtained by Harker and Keltner (2001). However, they were not able to do so and failed to find significant differences associated with respondent' different smiling scores. Abel and Kruger (2010) analyzed smiling intensity in a set of 230 photographs of baseball players, controlling for other variables such as college attendance, marital status, birth year, career length, age at debut year, and BMI (body mass index), and found a positive correlation between smiling intensity and longevity. Players with a full Duchenne smile in their pictures lived on average 79.9 years, compared to 72.9 years for players that were not smiling and 75 for players with partial smiles. Finally, Kaczmarek et al. (2018) analyzed the relationship between type of smile and work-related accomplishments by looking at different smiles in 440 profile pictures of scientists and bibliometric and sociometric measures. They found that scientists with a full smile in their profile picture received more citations per paper and more followers on social-network updates compared to scientists with only partial or no smile on their profile picture.

3.3.2.2.1 *The Smiling Intensity Scale (SIS)*

The most recent addition to the family of FACS-based instruments to study smiling is the Smiling Intensity Scale (SIS, Gironzetti et al., 2016b), a holistic five-point Likert-like scale that integrates the muscular changes produced by smiling in the eyes and mouth areas. The SIS is the instrument used in the present study and thus is presented in detail in the following paragraphs. The SIS has also been employed in other studies (Amoyal & Priego-Valverde, 2019; Amoyal et al., 2020), including for the development of the SMAD script, which is part of the HMAD R script (https://github.com/srauzy/HMAD) for the automatic detection of internal facial movements and head movements from a video recording.

Similar to the scale developed by Harker and Keltner (2001) and the trichotomous scoring system used by Abel and Kruger (2010) and Freese et al. (2006), the SIS is based on FACS (Ekman & Friesen, 1978) and accounts for the changes produced by different AUs. However, while the SIS takes into account a FACS description of certain facial expressions, it also attempts to solve or avoid incurring in some of the problems and limitations of the FACS-based scales described in the previous section. The SIS was developed with the initial purpose of measuring the degree of smiling intensity of people' facial expression in video-recordings that may lack the high-quality definition needed for a full FACS analysis. Therefore, the SIS is a holistic instrument that measures smiling intensity by integrating the visual information of different facial elements (or AU). In contrast to Harker and Keltner's (2001) FACS-derived scale for smiling intensity, the SIS is not summative but provides an overall smiling intensity score that is not the result of the sum of the individual intensity of the eyes

and mouth muscular contraction. In contrast to the system employed by Abel and Kruger (2010), Freese et al. (2006), and Kaczmarek et al. (2018), the SIS allows for a higher degree of precision by rating smiling intensity on a five-point scale. In the SIS, smiling is primarily identified with a muscular contraction in the mouth area (AU12) that causes the corners of the mouth to move upwards: if there is no upward movement of the corners of the mouth, there is no smiling. In addition to AU12, the SIS integrates the muscular contractions of other AUs that may be involved in smiling such as AU6, AU7 (the Lid Tightener, that produces visual changes similar to AU6 and engages the same muscles, but is associated with the display of phony smiling as it can be easily produced on command), AU14 (the Dimpler, producing characteristics dimples on the mouth sides), AU25 (the Lips Part), and AU26 (the Jaw Drop, normally co-occurring with AU25). However, the SIS does not aim at differentiating between Duchenne and non-Duchenne smiling (Ekman et al., 2002), or smiling that involves the action of the facial muscle in the mouth area and smiling that involves the action of the facial muscle in the eye area (Bänninger-Huber & Rauber-Kaise, 1989; Ekman & Friesen, 1982).

Figure 15 illustrates the five levels of smiling intensity of the SIS, each descriptive of a different smiling behavior, as these were displayed by a speaker engaged in a computer-mediated conversation. Figure 16 illustrates the same five levels of smiling intensity on the SIS as displayed by a speaker, Amy, who was engaged in a face-to-face conversation as part of Dyad 6 in the original corpus analyzed for this study.

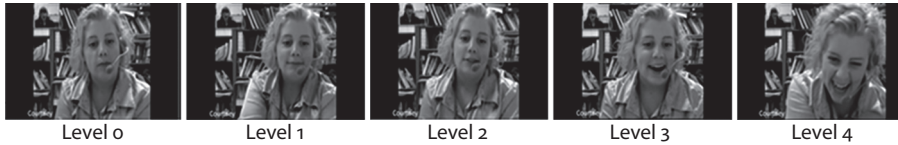

Figure 15. The smiling intensity scale (from Gironzetti, Pickering, Huang, Zhang, Menjo, and Attardo, 2016b)

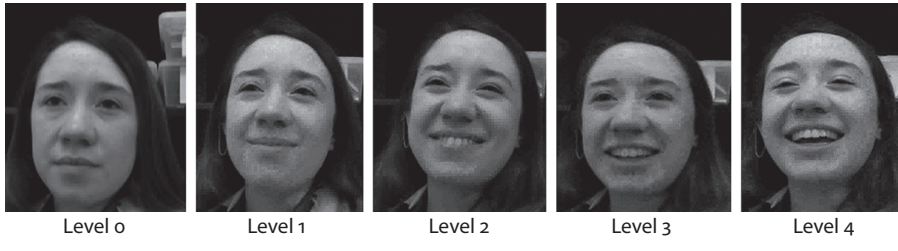

Figure 16. The smiling intensity scale as displayed by Amy in face-to-face conversation

The five levels of smiling intensity shown in Figures 3.2 and 3.3 are described as follows:

- Level 0: Neutral. No smile, no flexing of the zygomaticus (no AU12), may show dimpling (AU14) or squinting of the eyes (caused by AU6 or AU7), but no raised side of the mouth (no AU 12), the mouth may be closed or open (AU25 or AU26).
- Level 1: Closed mouth smile. Shows flexing of the zygomaticus (AU12), may show dimpling (AU14) and may show flexing of the orbicularis oculi (caused by AU6 or AU7).
- Level 2: Open-mouth smile. Showing upper teeth (AU25), flexing of the zygomaticus (AU12), may show dimpling (AU14), may show flexing of the orbicularis oculi (caused by AU6 or AU7).
- Level 3: Wide open-mouth smile. Shows flexing of the zygomaticus (AU12), flexing of the orbicularis oculi (caused by AU6 or AU7), and may show dimpling (AU14). 3A: showing lower and upper teeth (AU25), or 3B: showing a gap between upper and lower teeth (AU25 and AU26).
- Level 4: Jaw-dropped smile. The jaw is dropped (AU26 or AU27), showing lower and upper teeth (AU25), flexing zygomaticus (AU12), flexing of the orbicularis oculi (AU6 or AU7); may show dimpling (AU14).

The SIS is the instrument employed in this study to measure participants' smiling intensity. This scale presents some advantages over others discussed previously. First, it is a holistic rather than an additive scale, and as such does not incurs in the scoring issues described in Section 3.2.2.1. Second, it was developed to allow the measuring of smiling behaviors even with low quality videos that may lack the resolution needed for a full FACS coding (as the videos analyzed in Gironzetti, Attardo, & Pickering, 2018). And third, while it does integrate different AUs to code for degrees of smiling intensity, it is primarily based on the action of AU12 and allows for coding both Duchenne and non-Duchenne smiling.

The following sections of this chapter discuss how interlocutors use, manipulate, and adjust their smiling behavior during humorous discourse based on the original findings from the analysis of the conversational corpus for this study. All the smiling data discussed here were analyzed by applying the SIS.

3.4 Smiling and humor

3.4.1 Duchenne display and phony smiles

Among the many different types of smiling behaviors that have been studied by scholars, one has received a lot of attention: the Duchenne smile or Duchenne display. A Duchenne display, named after the French physician Guillaume Duchenne, has been described as the joint and symmetric contraction of the zygomatic major and orbicularis oculi muscles (Platt et al., 2013, p. 776). This smiling behavior involves two different AUs: AU6, which has been described in Section 4.1 and is considered to be hard to produce on command, and AU12 or Lip Corner Puller, caused by the voluntary action of the zygomaticus major which pulls the corners of the mouth upwards (Ekman & Friesen, 1982). Also known as the sincere, genuine, or felt smile, the Duchenne smile is considered hard to fake due to the difficulty in producing AU6 on command, and it is perceived more positively than other types of smile (Gunnery & Ruben, 2016; Andrzejewski & Mooney, 2016). For this reason, Duchenne smile is often described in opposition to a non-Duchenne smile – also known as fake or phony smile – that only involves AU12 but does not display any visible muscle movement caused by AU6 in the eye area. However, it should be noted that phony smiles can combine AU12 with AU7 – the Lid Tightener – , which involves the flexing of the orbicularis oculi muscle causing a visual effect akin to the action of AU6, and which, contrary to AU6, is easily produced on command. Finally, an additional note of caution regards smiles produced with a high-intensity AU12. A strong contraction of the zygomaticus muscle can cause wrinkling in the eyes' region of the face similar to AU6, thus making it very difficult for the researcher to determine whether AU6 is also present.

With regard to humor, the Duchenne display has also been traditionally associated with "[w]hen individuals genuinely enjoy humor (…) which refers to the joint contraction of the zygomatic major and the orbicularis oculi muscles (pulling the lip corners backwards and upwards and raising the cheeks) causing eye wrinkles, respectively" (Ruch, 2008, p. 21). However, a growing body of recent empirical works began to contest the idea that a Duchenne smile is a signal of genuine enjoyment and hard to fake (Harris & Alvarado, 2005; Papa & Bonanno, 2008; Schmidt et al., 2006; Schmidt et al., 2009; Krumhuber & Manstead, 2009; Kunz, Prkachin, & Lautenbacher, 2009; Gunnery & Hall, 2014; Gunnery et al., 2013; Crivelli et al., 2015; Girard et al., 2019; Girard et al., 2021). Results from these studies showed evidence of Duchenne displays produced in posed and negative contexts, such as when people are asked to smile on command, when positive affect is absent, or in response to input eliciting negative emotions. Further studies suggest that

the contraction of the orbicularis oculi may serve as an intensifier of the facial display, accompanying other AUs associated with positive and negative emotions (Messinger et al., 2012). In this view, the contraction of other facial muscles would carry the semantic meaning of the facial display (such as enjoyment or anger), and the orbicularis oculi would contribute to indicate the intensity with which the emotion is felt or displayed for the interlocutor to capture it.

While the study discussed in this chapter did not focus specifically on Duchenne versus non-Duchenne smiling, this information was nonetheless recorded as part of the SIS scoring since the SIS does integrate AU6 (the Duchenne AU together with AU12) as a possible smiling AU. Based on the data regarding participants' smiling behavior in face-to-face conversation, the results do not support the hypothesis that a Duchenne display is a signal of true enjoyment co-occurring with humor. As we will see in the examples discussed below, in all conversations analyzed, Duchenne displays occurred with and without humor, and at times when participants were discussing serious and unamusing matters, such as the how to complete class assignments, or how much they disliked the place where they were living, as illustrated in Figure 17. This finding is particularly relevant for the field of humor studies as it does not support the use of a Duchenne display as a humor marker, as, similar to laughter (see Section 1.4.3), it can occur with and without humor and humor can occur with and without a Duchenne display. Additionally, these results add evidence to the growing body of research that questions the association of a Duchenne display with underlying feelings of true enjoyment, since Duchenne displays were recorded when participants were talking about unamusing or even negative topics.

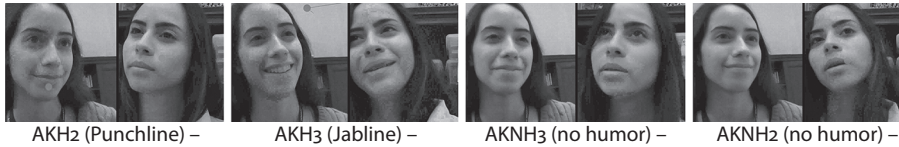

Figure 17. Relationship between Duchenne display and humor in the conversation between Ann (left frame) and Kate (right frame)

The frames of conversation illustrated in Figure 17 show Ann (left) and Kate (right) displaying a phony smile right after delivering a punchline (first frame) and a Duchenne display co-occurring with a jabline (frame 2). The last two frames illustrate a Duchenne display co-occurring with a serious, non-humorous part of the conversation on how to download a phone app (frame 3), and a phony smile co-occurring with a serious, non-humorous part of the conversation on how they were warned not to hang out with a certain group of people (frame 4).

Similarly, Figure 18 illustrates the presence of a Duchenne display during a non-humorous segment of a different conversation, TJ, and Figure 19 illustrates its presence during a humorous segment from the same conversation. In both figures, changes in the SIS value displayed by each interlocutor (SIS on the vertical axis) are plotted over time in millisecond (horizontal axis), and the presence of a Duchenne display is marked with diamond marks over the SIS line corresponding to the same interlocutor.

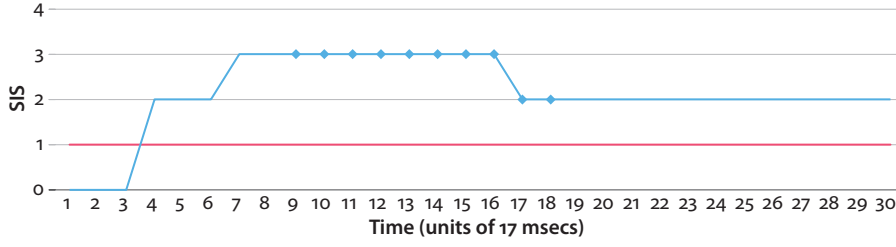

Figure 18. Duchenne display and smiling during non-humorous segment TJNH4: Tony SIS (red line), John SIS (blue line), and John Duchenne display (diamond marks)

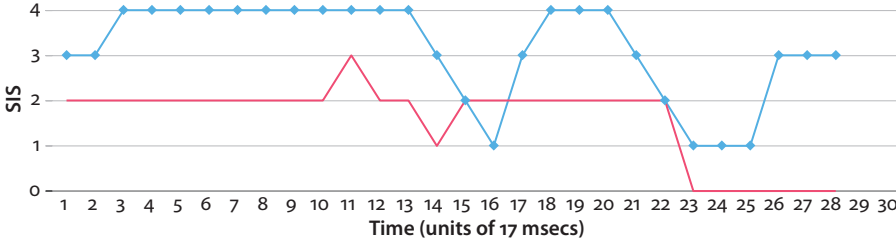

Figure 19. Duchenne display and smiling during humorous segment TJH7: Tony SIS (red line), John SIS (blue line), and John Duchenne display (diamond marks)

Excerpt TJH7

```
John     but he seemed like he was dead or like distracted or like
         doing something else the entire time so we were like oh uh
         hey man what what's up
Tony     @laughter@
John     and then (…) awesome so I brought him on campus yesterday
```

What can be observed in Figure 18 is a fragment of a non-humorous portion of conversation in which Tony, the listener at this particular point in time, displayed a sustained polite smiling (SIS 1, red line) and John (blue line), who was speaking, displayed a rather sudden increase of smiling intensity, from SIS 0 to SIS 3 to SIS 2, accompanied by brief Duchenne display (diamonds marks) matching the duration

of his SIS 3 display. In this portion of conversation there was no verbal humor; however, it is possible that John's Duchenne reflects a change in his state of mind and could indeed be a sign of true enjoyment (e.g., maybe what he was talking about reminded him of something amusing), albeit unrelated to verbal humor or what was being discussed by the two interlocutors at that point in the conversation.

In Figure 19, John (blue line) is again smiling at a high intensity (SIS 4), with two moments of sharp decrease and subsequent increase, while Tony (red line) displays a sustained SIS 2 smiling. During the whole length of this segment that immediately preceded the delivery of a jabline by John, he also displayed a Duchenne smiling (diamond marks).

While a thorough investigation of the Duchenne display is out of the scope of the current study, in this study the Duchenne display was shown to co-occur with an increase of smiling intensity, but independent from the presence or absence of humor. This finding is consistent with the hypothesis that a Duchenne display is not necessarily as a marker of true enjoyment but may in fact serve as an intensifier of the facial display (Messinger et al., 2012).

3.4.2 Smiling voice

While nobody would dispute the fact that smiling is a visual phenomenon, some research exists on smiling as an acoustic phenomenon, known as smiling voice or laughing voice (Tartter, 1980; also called spread voice, Crystal & Davy, 1969, p. 38, and smiled speech, Fagel, 2010). This label has been used to describe a change in voice quality as a side effect due to "the adjustment of the vocal tract in smiling or laughing" (L. Pickering et al., 2009, p. 524) that causes widening of the mouth opening, shortening of the vocal tract, and enlarging of vocal tract opening (Shor, 1978). Smiling or laughing voice has been studied in phonology and speech communication (see works by Drahota et al., 2008; Quené & Barthel, 2015; Torre, 2014), but has been used as a cue for humor in a limited number of studies (Holmes & Hay, 1997), since laughter has been preferred (see Chapter 1 on the use of laughter as the default marker of humor). The only study to date that explored the relationship between smiling, laughing voice, and presence of humor was L. Pickering et al. (2009), and results suggested that smiling voice may be one possible paralinguistic indicator of the presence of humor, occurring in five of the 20 samples analyzed.

To test the hypothesis that smiling may not only serve as a visual cue of conversational humor, but also as a prosodic one, 6 naïve listeners, blind to the scope of the project and the initial hypothesis, were exposed to audio clips for each humor and non-humor instance extracted from the corpus and presented in random order. The clips and the questions were distributed to each speaker by means of an online survey that guaranteed the anonymity of respondents. For each audio clip,

participants were asked two questions, a closed one and an open-ended one. First, they had to indicate whether they thought the speaker was smiling or not (by checking the corresponding box), and then they were asked to explain, in detail, what made them reach this conclusion. The clips were selected so that humorous and non-humorous segments with and without smiling at SIS 2 and 3 were represented and performed by different male and female speakers. Clips with SIS 1 were not included because this type of closed mouth smiling tends to occur without speech, thus making it impossible for participants to hear the speakers' smiling voice. Clips with SIS 4 were also not included because this type of jaw-dropped smiling tends to co-occur with laughter, which would have cued participants to indicate that the speaker was smiling albeit not due to their smiling voice. Table 3.1 summarizes the characteristics of the audio clips used in the survey.

Each clip lasted between 2 and 3 seconds to allow enough time for participants to be able to recognize and process it, considering that on average participants are able to recognize emotions expressed through speech prosody in 800 to 1000 milliseconds in the case of positive emotions, and 500 to 600 milliseconds in the case of negative emotions (Cornew et al., 2010; Pell & Kotz, 2011; Rigoulot et al., 2013). Additionally, clips were created to avoid cutting the speakers mid-word or phrase, which is why they differ slightly in terms of duration.

Table 4. Audio clips for the study of smiling voice perception

Audio	SIS	Speaker	Humor	Segment	Text
# 1	3	John	Punchline	JTH1	A talking frog is really cool
# 2	3	John	Irony	JTH4	I think I forgot the first half of it
# 3	3	John	Jabline	JTH6	So… I had an interesting week
# 4	0	John	No	JTNH1	I was hoping to have one just for that
# 5	0	John	No	JTNH2	No not really it starts before and really it never stops
# 6	0	John	No	JTNH3	In the summer we go to Zurich
# 7	3	Jane	Punchline	EJH1	But a talking frog
# 8	0	Tony	Punchline	JTH3	Because there was a donkey
# 9	0	Emma	Punchline	EJH2	It was a donkey
# 10	2	Amy	Punchline	DAH1	There is a donkey lying on the ground
# 11	0	Amy	No	DANH11	I could piece that together to make a degree
# 12	2	Amy	No	DANH10	So hopefully I'm gonna get there one day
# 13	0	Amy	No	DANH10	Actually I wanna work for google
# 14	2	Dani	No	DANH7	So I think they started to build them
# 15	0	Dani	Irony	DAH6	You have a different last name
# 16	2	Dani	Irony	DAH10	We think he's the best mayor we ever had
# 17	2	Emma	No	EJNH10	My mom took me to the grocery store
# 18	2	Emma	No	EJNH5	I looked up my son's Facebook post

The results of this brief survey showed that naïve listeners were able to correctly recognize whether a speaker was smiling or not by simply listening to them only 53% of the time, with individual positive identification scores between 61% and 44.4%, that is, participants were able to correctly identify if someone was smiling or not in 11 out of 18 samples at best. Correct identifications of non-smiling voice represented 28% ($N = 30$) of all cases, and correct identifications of smiling voice 25% ($N = 27$). Among the incorrect results, incorrect identifications of non-smiling voice made up 30% of all cases ($N = 33$), and false positives, that is, incorrect identification of smiling voice, 17% ($N = 18$), as visually summarized in Figure 20.

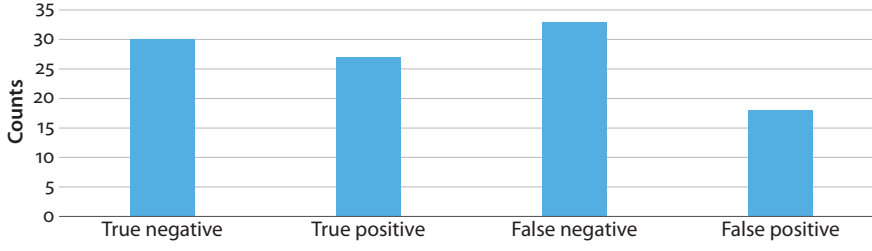

Figure 20. Distribution of true and false positives and negatives in the identification of smiling voice

As shown in Figure 20, smiling intensity only had limited impact on listeners' ability to correctly recognize when someone was smiling, with the counterintuitive result that lower intensity smiling was more frequently recognized as smiling than higher intensity smiling. In the case of clips with SIS 3, listeners correctly identified only 37.5% of clips, while they were able to correctly identify 50% of clips with SIS 2.

In the case of true positives (when participants correctly identified the speaker was smiling), among the cues that participants explicitly mentioned when asked to explain why they thought the speaker was smiling were the following: the identification of an underlying positive emotion ($N = 9$; e.g., the speaker sounds pleased, happy, optimistic, joyful, helpful), prosodic cues ($N = 8$; e.g., tone, high pitch, pauses, laughter), lexical cues ($N = 6$; e.g., the use of specific words such as cool, talking frog, donkey), and external/contextual cues ($N = 3$; e.g., personal stories attributed to the speaker). In the case of true negatives (when participants correctly identified the speaker was not smiling), the cues on which participants relied to explain why they thought that speakers were not smiling included: adjectives to describe the voice quality of the speakers ($N = 14$, e.g., serious, normal, assertive), prosodic cues ($N = 2$; e.g., tone, low volume), underlying negative emotions ($N = 1$, intimidated), and communicative purpose ($N = 2$; e.g., the person is explaining something). Additionally, participants mentioned that they were not able to explain why they thought the person was not smiling ($N = 7$), said that they should have

been smiling because the topic was funny ($N = 2$), or had troubles due to the audio quality ($N = 2$).

Based on these exploratory findings, the effectiveness of this cue for the identification of smiling was found to be just at chance level and thus the data do not support a rejection of the null hypothesis (i.e., that smiling voice is not necessarily interpreted as a cueing smiling and as such is not a reliable indicator for the presence of humor in the conversation). It is possible, however, that smiling voice may cue certain listeners for smiling – and thus, indirectly, for humor – auditorily, and not just visually, through the changes it causes to speakers' voice quality, which is perceived as conveying positive emotions and characterized by high pitch, laughter, and a distinctive use of pauses and tone of voice. In this sense, for certain listeners, smiling voice may function as an index for conversational humor as explained in Table 2, that is, as a feature of conversational humor that is not essential, not always co-occurring with the humor, and not intentionally signaling the presence of humor. Moreover, some listeners were better than others at identifying whether someone was smiling or not, so individual aptitude may also affect the effectiveness of smiling as a prosodic marker of conversational humor.

3.5 Individual smiling behavior and conversational humor

In the following sections, the focus will be on how interlocutors display their individual smiling intensity when humor is present or absent from the conversation. In the remaining of this chapter, data from different interlocutors and conversations will be discussed, zooming-in on the details of the relationship between humor and smiling by looking at how these are affected by the type of humor, the language spoken in the interaction, the gender of participants, and their cultural background.

3.5.1 Smiling intensity during humorous and non-humorous discourse

When people interact with each other during conversation, they rely on their facial expressions, among other non-verbal signals, to accomplish a wide variety of functions that span discursive and affective domains. Documented functions of facial expressions comprise back-channeling to regulate discourse (Brunner, 1979; Chovil, 1991a, 1991b; Robinson, 2006; Holler & Bavelas, 2017; Duncan et al., 1979; Argyle, 1988 [1975]; Jensen, 2015); displaying positive emotions or signaling affiliation (Ekman et al., 1969; Izard, 1997; Elfenbein & Ambady, 2002; Ekman, 2007; Niedenthal et al., 2016), and framing the co-occurring discourse in different ways, including initiating a humorous or playful frame (Coates, 2007; Haakana, 2010; Kaukomaa et al., 2013; Gironzetti et al., 2016a, 2016b). As it will be shown in the

following sections, smiling intensity is used in a distinctive way when humor is present in the interaction and serves the purpose of contributing to the negotiation of the humorous interpretation of a portion of discourse.

For the purposes of studying the role of individual smiling intensity during humorous portions of discourse, video recordings of each participant were analyzed applying the SIS to measure for how long and under what circumstances participants displayed each type of smiling (from SIS 0 to SIS 4) during humorous and non-humorous portions of discourse (see Chapter 2 and Appendix A for a discussion of the full research design and protocol). The results are summarized below by means of comparing individual participants smiling behavior with humor (Figure 21, representing all humorous segments per participant) and without humor (Figure 22).

The first difference that characterizes humorous discourse versus non-humorous discourse (the baseline) is for how long individual participants displayed each smiling intensity behavior. Figures 21 and 22 summarize the percentage of time participants displayed a given smiling intensity behavior in the presence or absence of humor. To facilitate the interpretation and comparison of these data, the darker colors correspond to the higher values on the SIS, thus, higher smiling intensity, while the clearer colors correspond to the lower levels of the SIS, indicating lower smiling intensity. The data on the smiling intensity of each conversational partner within a dyad are reported in Appendix B.

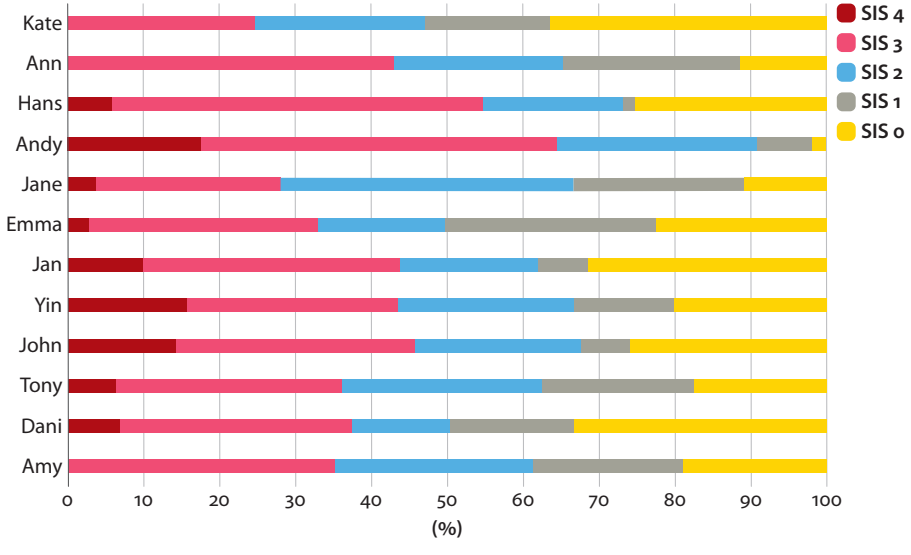

Figure 21. Individual smiling intensity distribution with humor

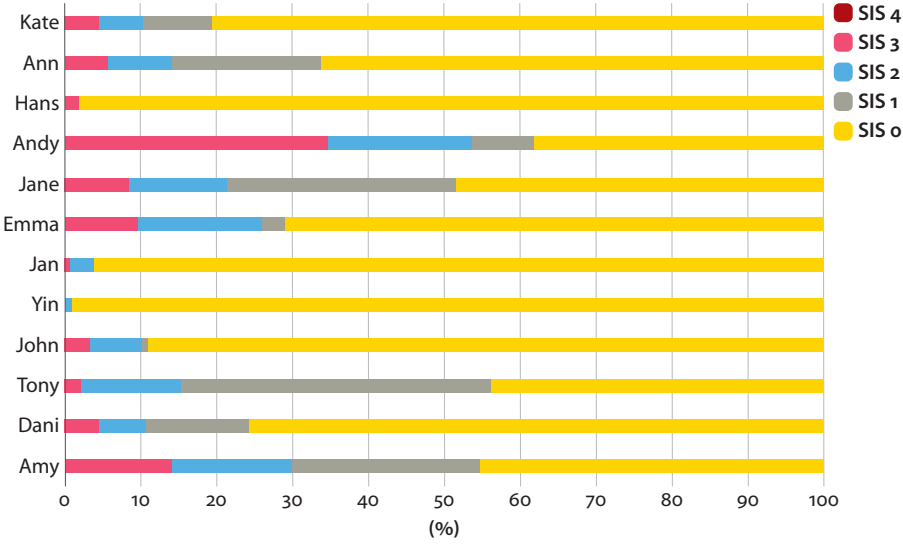

Figure 22. Individual smiling intensity distribution without humor (baseline)

A simple visual comparison between these figures allows us to see a difference in participants' smiling behavior: Figure 21, which represents participants' smiling intensity with humor, is much darker than Figure 22, which represents baseline values (or smiling intensity without humor). This is because, on the one hand, in the presence of humor, participant spend more time smiling at higher intensity values on the SIS. On the other hand, in the absence of humor, participants spend more time smiling at a low intensity on the SIS, or not smiling at all.

A further comparison between the two sets of data in Figures 21 and 22 highlights important changes in the time participants display each behavior in the presence of humor:

- a 372% increase for SIS 3 (wide open-mouth smile),
- a 148% increase for SIS 2 (open-mouth smile),
- a 13% increase for SIS 1 (closed mouth smile), which remains almost stable, and
- a decrease of 67% in the case of SIS 0 (no smile).

Values relative to the percentage of change for SIS 4 (jaw-dropped smiling) are not reported because this behavior was not displayed in the absence of humor. The fact that SIS 4 is absent from baseline data indicates that this may be a behavior that is specific of humorous discourse, in that it does not always occur with humor but when it does occur, it is only in the presence of humor. The role of laughter as a marker of conversational humor could then be reconsidered to include its visual aspects, as it is possible that only a specific kind of laughter, accompanied

by a jaw-dropped smiling, serves as an index or marker of humor (in the sense described in Table 2 in Chapter 1). Additionally, this behavior could only co-occur with a certain type of humor or with humor that has been not only recognized and understood, but also appreciated or agreed upon (see Attardo personal conversation with Ruch as reported in Attardo, 2019, p. 200). These findings align with previous results from the study of a corpus of eight computer-mediated conversations. In these studies by Attardo and colleagues (Attardo et al., 2013; Gironzetti et al., 2016a, 2016b) the analysis of participants' smiling intensity for 75 cases of humorous discourse and 75 cases of non-humorous discourse clearly indicated that people do not usually display high smiling intensity (SIS 3 or 4) during non-humorous discourse.

Keeping in mind that each person may have a different smiling baseline, the most frequent display in the absence of humor in our corpus was a non-smiling behavior (SIS value 0), followed by a polite smiling (SIS value 1). Thus, during non-humorous portions of discourse, people were found to display no smiling at all or what is known as a polite smile: a discrete, slight smile displayed with a closed mouth, such as the one illustrated in Figure 23.

Figure 23. Andy facial display at SIS 0 (left) and SIS 1 (right) during the non-humorous segment AHNH1

The type of smiling at SIS 1 indicates, or indexes, that the person is available and engaged in the conversation, while also being a signal of affiliation. On the other hand, in the presence of humor the most frequent display was a wide-open mouth smiling (SIS value 3). During humorous portions of discourse, interlocutors were found to increase their smiling intensity with respect to their individual baseline and display more open-mouth (SIS value 2) or wide open-mouth smiles (SIS value 3), as represented in Figure 24.

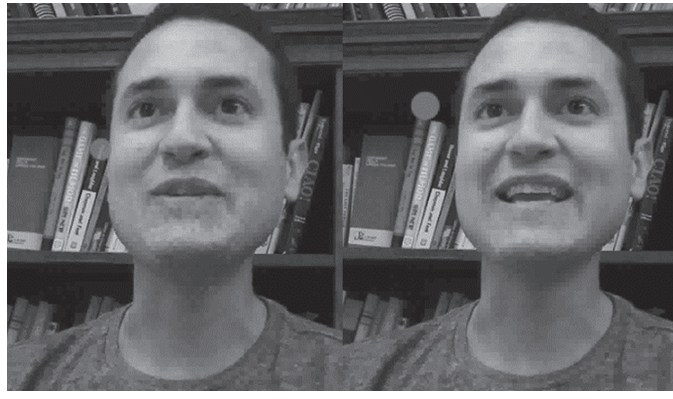

Figure 24. Andy facial display at SIS 2 (left) and SIS 3 (right) during the humorous segment AHH1

Excerpt AHH1

```
Andy    se asomó dentro de la ventana y era un burro
        [he peeked inside the window and it was a donkey]
```

Overall, a comparison of interlocutors' behavior during humorous and non-humorous discourse reveals that the presence of humor is typically accompanied by a wide-open mouth smiling expression while in the absence of humor, the most common facial display is a neutral non-smiling facial expression. These findings indicate that smiling, and more specifically an increase of smiling intensity with respect to the speaker's baseline, characterizes humorous discourse and could in fact be used to signal and/or negotiate the interpretation of an utterance as humorous, as well as its appreciation or agreement with its content. Before we can reach a more robust conclusion regarding the role of smiling intensity, however, it is necessary to explore the effect of other variables that may influence interlocutors' smiling behavior. These variables are the language and country of origin and upbringing of interlocutors, used as a proxy for the cultural background of interlocutors; the gender of the two people involved in the interaction; the type of humor (irony, jablines, or punchline) whose interpretation is being negotiated; and the conversational role (speaker or listener of the humorous utterance). Each variable is explored in detail in the following sections.

3.5.2 Smiling intensity in English and Spanish

The data that we are discussing in this chapter belong to a corpus of dyadic conversations carried out in English and Spanish by dyads of North American English native speakers and Mexican Spanish native speakers. The comparison of smiling behavior across these two groups is relevant in that we know that culture affects verbal and non-verbal behavior in a variety of ways (see Ekman et al., 1969; Andersen, 2000; Andersen et al., 2003; Krys et al. 2016) and thus could impact the way in which smiling is used during face-to-face interactions. However, it should be noted that participants cultural background was established on the basis of where they lived and grew up (self-reported country and city of origin) and the language they spoke (self-reported first/native language), which could potentially be problematic since cultural differences can also emerge within countries (Crafa et al., 2019; Taras et al., 2016; McSweeney, 2009).

The different cultural background of participants – Spanish speakers were from Mexico while English speakers were from the United States – did have an effect on their smiling behavior, although minimal. When compared with the English-speaking group, the Spanish-speaking group displayed more variability and, on average, a lower smiling intensity without humor (baseline SIS, Spanish = 0.43, English = 0.64), and a higher smiling intensity with humor (humor SIS, Spanish = 1.99, English = 1.83).

A box-plot visual exploration of the data (see Figure 25) revealed that participants' smiling behavior in the presence or absence of humor was very similar across language groups, as they both displayed higher values in the presence of humor and lower values in its absence. This similarity was confirmed by a Wilcoxon nonparametric signed-rank test, which revealed that there was no significant difference between the two language groups in their smiling behavior when humor is present or absent from the interaction, ($Z = 39.5$, $p = .969$).

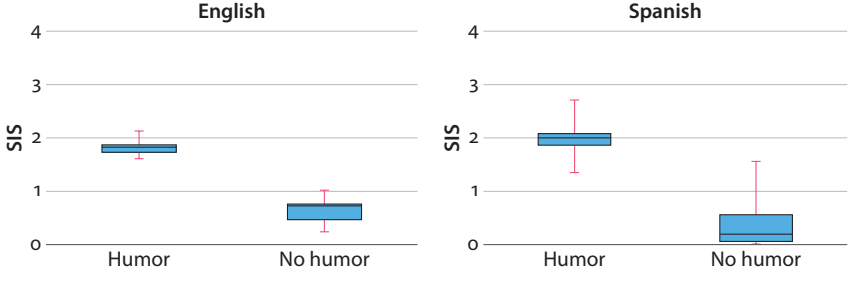

Figure 25. Box-plot comparison of SIS with and without humor across language groups

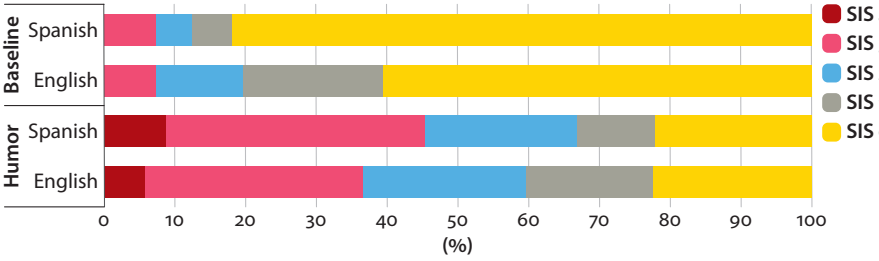

Figure 26. Distribution of smiling and non-smiling behaviors with and without humor across language groups

Further analysis of the distribution of smiling and non-smiling behaviors with and without humor across language groups (Figure 26) revealed some more fine-grained, group-specific differences. Overall, English and Spanish speakers displayed a lack of smiling (SIS 0) for the same percentage of time during humorous portions of conversation (22% for both groups). However, the two groups displayed different behaviors in the absence of humor: English speakers did not smile during 61% of the time, while Spanish speakers did not smile during 82% of the time. This difference is due to English speakers displaying SIS 2 (open mouth smile) and SIS 1 (closed mouth smile) smiling behaviors for longer time than the Spanish group in the absence of humor. Based on these results, one possibility is that the presence of humor may trump sociocultural norms in modulating the display of culture-specific smiling behaviors, which in turn surface more clearly in the absence of humor.

3.5.3 Smiling intensity by males and females

An equal number of self-identified male ($N = 6$) and female speakers ($N = 6$) participated in this study to allow for the exploration of gender differences in their smiling behaviors. Males and females differ in how they (choose to) control or display facial expressions and emotions, as social expectations and cultural norms often determine gender-based differences in non-verbal behaviors. For example, different studies showed that women smile more (e.g., more frequently) than men (Haviland, 1977; Burgoon et al., 1989; Dodd et al., 1999; LaFrance et al., 2003; Van Beek et al., 2006), and because they are socialized into displaying more positive emotions, they are also expected to display more smiling in general, and more positive (e.g., harmless, affiliative) smiling in comparison to men, while men, on the other hand, are socialized to display more powerful emotions, they are expected to display fewer affiliative smiling and more dominance smiling (Keltner, 1995;

Fischer, 2001; Hess et al. 2000, 2009; Hansen et al. 2020). Based on these finding, participants would be expected to show gender-based differences in their smiling intensity with women smiling more and at higher intensity than men. However, despite these differences, in our study, participants' gender did not have a strong effect on their smiling behavior.

A box-plot visual exploration of the data (see Figure 27) revealed that participants' smiling behavior in the presence or absence of humor was very similar across gender groups, as they both displayed higher values of smiling intensity in the presence of humor and lower values in its absence. A Wilcoxon nonparametric signed-rank test revealed that there is no significant difference between the two gender groups in their smiling behavior when humor is present or absent from the interaction, ($Z = 525$, $p = .091$). Nonetheless, when compared with the female group, the male group displayed more variability and, on average, a lower smiling intensity without humor (baseline SIS: males = 0.45, females = 0.62), and a higher smiling intensity (humor SIS: males = 2.11, females = 1.71) with humor. This finding aligns with previous results showing that men smile overall less than women (Hall, 1984; Hall & Halberstadt, 1986).

Figure 27. Box-plot comparison of SIS with and without humor across gender groups

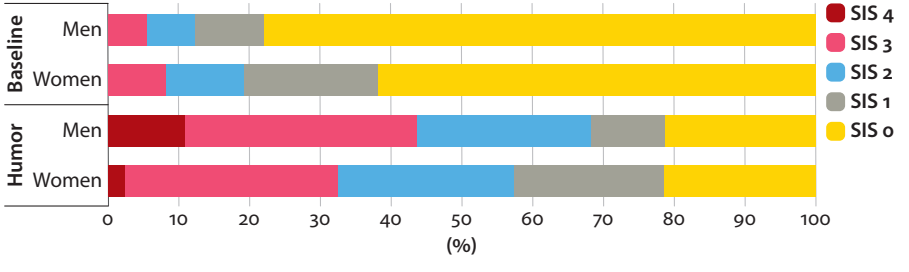

Figure 28. Distribution of smiling and non-smiling behaviors with and without humor across gender groups

Further analysis of the distribution of smiling and non-smiling behaviors with and without humor across gender groups (Figure 28) revealed that participants in both groups displayed similar behaviors in the presence of humor, not smiling for about 20% of the time. However, in the absence of humor, as already noted when discussing Figure 27, women displayed SIS 0 (no smile) during less time than men, and displayed SIS 1 (closed mouth smile) for longer time than man (SIS 1, men = 8%, women = 18%). These findings could be explained in light of prior research on gender differences and smiling, keeping in mind that SIS 1 smiling is the polite, discrete smile that women are socialized into displaying, and thus expected to be displayed by women to signal availability, engagement, and affiliation. Overall, women may display a higher smiling intensity baseline than men as they are expected to be more expressive and smile more than men during interactions with others (Wang et al., 2013;), but also because they are more attentive to others' needs, which may lead them to display more prosocial smiling in the form of SIS 1 smiling (Hall, 2006).

3.5.4 Smiling intensity across types of humor

The third variable considered, which may have had an impact on participants' smiling intensity, is the type of humor (irony, jabline, or punchline, as defined in Chapter 1) that was being negotiated at a given moment. Previous studies identified characteristic facial displays co-occurring with each different type of humor, including reduced smiling when processing written irony (Thompson et al., 2016). Data for the smiling intensity of participants classified based on the type of humor are summarized in Table 5 and Figure 29, in which the average smiling intensity of participants and the most frequent smiling intensity value (mode) are reported.

Looking at Figure 29, all types of humor seem to have been marked in a similar way across conversations, with an average individual smiling intensity close to 2 on the SIS (open mouth smiling), and a frequent display of a wide-open mouth smiling expression (SIS 3). Of the three types of humor, irony was generally marked with lower a smiling intensity than jablines or punchlines. A Friedman's ANOVA was

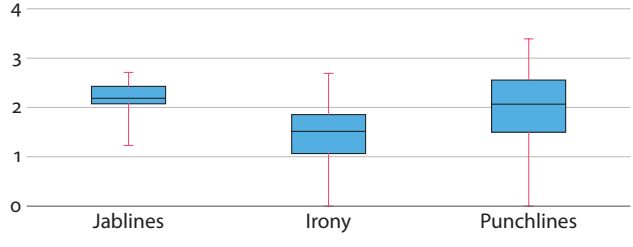

Figure 29. Box-plot comparison of smiling intensity across types of humor

Table 5. Smiling intensity across types of humor

Type of humor	Humor smiling intensity mean	Humor smiling intensity mode
Punchline	2.05	3
Jabline	1.96	3
Irony	1.51	3
	Humor Mean 1.84	Humor Mode 3

Note. Hum. MODE refers to the MODE value for all the humorous segments.

performed to compare participants' smiling intensity across types of humor, and the results were not significant, $\chi 2(2) = 2.385$, $p = .304$, confirming that there is no significant difference in participants' smiling intensity across types of humor. Jablines SIS values were found to have the lowest variance and the lowest standard deviation compared to irony and punchlines SIS values (jablines, $M = 0.21$, $STD = 0.46$; irony, $M = 0.53$, $STD = 0.72$; punchlines, $M = 0.63$, $STD = 0.79$). Additionally, while the difference was not significant, irony marking was lower compared to the other two types of humor, even though for all three types of humor participants displayed a mean individual smiling intensity close to SIS 2 (jablines, $M = 2.21$; irony, $M = 1.51$; punchlines, $M = 2.11$). We will get back to the lower smiling intensity associated with irony in Chapter 5 when discussing participants gaze behavior.

3.5.5 Smiling intensity across conversational roles

The fourth and last variable considered in the analysis of individual participants' smiling intensity was the conversational role (speaker or hearer) of each participant in each instance of humor. A participant was considered the speaker if they produced the humorous utterance and, conversely, they were considered the listener if they did not produce the humorous utterance. The study of smiling with respect to conversational roles has been approach mostly from one perspective, focusing on how listeners employ smiling as a frequent non-verbal signal to offer positive feedback to the speaker and the effect it may have on the speaker verbal response (Beukeboom, 2009; Koutsombogera & Papageorgiou, 2010; Jokinen, 2010; Bavelas & Gerwing, 2011).

The present analysis did not focus on smiling as a feedback signal, but as a semiotic resource that could be equally employed by any interlocutor (speaker or listener) to begin, sustain, or join in the negotiation of the humorous framing. Thus, the initial hypothesis posited that if the humorous framing of an utterance were negotiated dialogically, there would be no significant differences in the smiling behavior of participants with respect to their conversational role, as the negotiation could be initiated by any of them and the co-construction of the humorous frame

would require that they both engage, collaboratively, in this process (for a more detailed analysis of cases of failed humor, see Chapter 6). The data for each participant in both conversational roles are summarized in Table 6 and visualized in Figure 30.

Table 6. Smiling intensity with humor per participant across conversational roles

Participant	SIS speaker role	SIS listener role
Jo	2.01	2.1
T	1.91	1.87
Ji	1.77	1.90
Y	1.71	2.61
Ja	2.30	1.65
E	2.05	1.46
A	3.08	2.46
H	1.94	2.28
An	1.73	2.13
K	1.74	0.79
Am	2.24	1.48
D	1.36	2.03
	Mean 1.98	*Mean* 1.90

Note. All values are rounded to two decimal places.

As shown in Table 6 and Figure 30, there were no differences in individual smiling intensity based on the conversational role of participants ($p = .63$), and there were no trends that emerged from the data either (e.g., some participants increased their smiling intensity when they were the speaker, some decreased it), as conversational role did not seem to affect the intensity at which participants smiled. This finding further supports the idea that both conversational partners co-construct and negotiate the humorous framing, regardless of their conversational role.

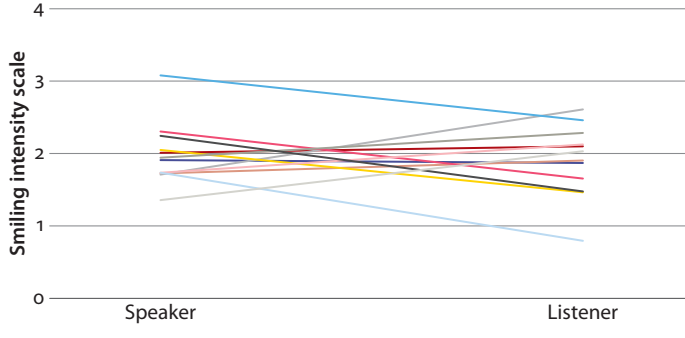

Figure 30. Linear visualizations of smiling intensity during humorous segments per participant across conversational roles

3.6 Conclusions

In this chapter, the role of smiling as a visual and acoustic cue for conversational humor was explored. Data from the corpus regarding individual participants' smiling intensity have been analyzed by looking at average smiling intensity and most frequent facial display by participant and dyad, the perception of smiling voice, and then further explored across language, type of humor, gender, and conversational role groups. No significant effects of any of the variables considered were found to affect individual smiling intensity, as it seems that individual smiling intensity is affected by the mere presence or absence of humor in the conversation, regardless of participants' cultural background (indexed by language), gender, type of humor, and conversational role. Therefore, an increased smiling intensity with respect to the speaker's baseline was found in our corpus to serve the function of humor marker (see Table 2 in Chapter 1). This increase in individual smiling intensity emerged to be a more reliable marker of conversational humor than laughter (which co-occurred with humor only occasionally) and so it has the potential to be employed as a means to identify the presence of humor in a conversational corpus. However, these findings should first be replicated using different corpora and speakers from different backgrounds in order to be generalized and applied to the whole population.

Duchenne displays were briefly addressed and noted to co-occur, at times, with an increase in participants smiling intensity regardless of the presence of humor or the topic being discussed by participants. Based on these data, a Duchenne display did not necessarily provide information about genuine positive emotions felt by the person, in line with the growing body of research that rejects this interpretation (see § 3.4.1). On the contrary, it is possible that AU6 can serve as an intensifier of the perceived emotions linked to a given facial display (Messinger et al., 2012; Girard et al., 2021), including smiling, and not necessarily as a marker of true enjoyment. Finally, it is also possible that a Duchenne display may function as an index or marker of true enjoyment but independently from the topic of the conversation (so, only in relation to the psychological state of the person but not the immediate context of the conversation).

Finally, smiling voice was also investigated as it could possibly serve as a stand-alone humor marker or as a by-product of humor marking through increased smiling intensity. Smiling voice was not confirmed to be a reliable acoustic cue to smiling and, thus, to conversational humor co-occurring with smiling, which in turn indicated that participants rely mostly on smiling as a visual cue to negotiate the humorous nature of an utterance and that smiling voice can, at best, be a further confirmation that the interlocutor is actually smiling. This opens the possibility for

smiling, and humor, to affect participants gaze patterns as part of the multimodal negotiation and co-construction of the humorous frame, as aspect that will be further explored in Chapter 5.

In the next chapter, the analysis will build on the results presented in this chapter to look at the joint behavior of the two members of each dyad, in line with the principles of theories of embodied cognition and social cognition that emphasize the relationship between the body and the mind, and the bodies and minds of individuals engaged in a joint activity, such as a conversation. The analyses presented in the following chapter will allow for a more nuanced discussion of the dialogical dynamics that characterize the multimodal performance of conversational humor.

CHAPTER 4

Smiling patterns and dialogical smiling synergy

4.1 Introduction

This chapter shifts the focus of the analysis from the individual smiling behavior of single interlocutors (discussed in Chapter 3) to the joint smiling behavior of the members of each conversational dyad. The chapter begins by outlining the principles and empirical studies on behavioral accommodation, coupling, synchronicity, and alignment, closing with a discussion of the *dialogue as synergy* model (Fusaroli et al., 2014). Then, smiling data for each dyad are analyzed in terms of the most frequent smiling patterns displayed with humor in the corpus. This part of the analysis adds a layer of complexity to data from Chapter 3 by looking at how conversational partners use smiling in conversation, that is, dynamically synchronizing and matching each other's smiling behavior depending on the presence and type of humor in face-to-face conversation. These data are then discussed through social cognition lenses to show how *dialogic smiling synergy* serves the purpose of helping interlocutors in the negotiation of the humorous framing as the conversation unfolds.

4.2 Social cognitive theories of interactional behavior

As the goal of this study, in broad terms, is to describe and explain how interlocutors *do* humor in a conversation, it is necessary to move beyond an account of each individual behavior (see Chapter 3) and consider the dyad of conversational partners as our unit of analysis. Before moving on to the data analysis, in this section, I review and summarize social cognitive theories that are currently being applied to the study of people's behavior while they interact with each other, as well as the results obtained thus far from studies in this field, particularly with regards to smiling. I will then present the main tenets of this line of research, which will be applied to the discussion of the results of the present study and of new directions in which the field is currently moving.

4.2.1 Behavioral alignment, synchron(icit)y, and coupling

When people are engaged in a conversation, they influence each other's behaviors: they tend to repeat what they and others have previously said, reuse the same words several times, move in similar ways, and imitate each other's gestures and body postures. Throughout the years, this phenomenon has been referred to with many terms, including (*interactive*) *alignment*, *accommodation*, *convergence*, *coordination*, *coupling, matching*, *mimicry*, *synchrony,* and *synchronicity*, depending on disciplinary framework of the study, the scope and methodology employed for the analysis, and the timeframe under consideration. A thorough discussion of this terminology is beyond the scope of this volume (but see Paxton & Dale, 2013b; Paxton et al., 2016 for a discussion). All these terms, however, which for simplicity's sake in this section of the manuscript will be collectively referred to as *behavioral synchronization*, generally refer to speakers' tendency to adapt to each other while interacting with each other, and the temporal relationship between their coupled behaviors.[1] Thus, when two or more people interact, behavioral synchronization results in a higher degree of harmonization on different levels, ranging from mental states to body posture (Shockley & Riley, 2015), and entails a reutilization of the constituents of the interaction (gestures, words, syntactical choices, etc.). An example that pertains to humor and that was mentioned previously in this book (see § 1.4.2) is how speakers use a low key to mark their humorous comments in a conversation as parentheticals while displaying *tone concord* with other speakers to reinforce the affiliative and bonding nature of the exchange (Wennerstrom, 2001, p. 183).

Interest in behavioral synchronization dates back to the 60s, when scholars interested in this phenomenon slowed down video recordings of interactions to analyze these frame by frame and manually annotate specific body movements of people interacting with each other (see Condon & Ogston, 1966; Condon & Sander, 1974; Kendon, 1970). More recent techniques being used allow researchers to automatize (part of) the process and include, among others, motion energy analysis and the frame differencing method, which compare video frames and calculates the difference in pixel change as a measure to quantify movement (this is the technique employed in Paxton & Dale, 2013a, 2013b, for example), and motion tracking by means of different instruments (see Cornejo et al., 2017, for an overview).

Several studies (e.g., Louwerse et al., 2012; Tschacher et al., 2014) demonstrated that people engaged in social interaction synchronize their behaviors and align

1. What mechanisms, on a neurological level, allow people to synchronize with each other is outside of the scope of this volume. Several theories have been hypothesized, including the role of mirror neurons (e.g., Navarretta, 2016) and, more recently, predictive coding and the Free Energy Principle (Koban et al., 2019).

across modalities, "from physiology to syntax" (Dale et al., 2013, p. 79), in a variety of settings and for different purposes. Behavioral synchronization has been argued to occur to facilitate communication and dialogue, since sharing the same behaviors would provide speakers with an easier path to share their mental representations and thus reach mutual understanding (M. Pickering & Garrod, 2009, 2013; Louwerse et al., 2012). Similarly, it also serves to bridge a potential breakdown in communication (Fujiwara et al., 2019), favor language learning (Atkinson et al., 2007), lead to greater rapport and satisfaction (Hove & Risen, 2009; Wiltermuth & Heath, 2009; Valdesolo et al., 2010; Reddish et al., 2013), and favor trust (Mitkidis et al., 2015). Co-laughter (that is, when two or more people laugh at the same time), for instance, is an example of behavioral synchronization and has been associated with greater body synchrony within a conversational triad; co-laughter is connected with greater levels of cooperation, as "triads who laugh together more appear to move more in synchrony" (Dale et al., 2020, p. 12).

Additionally, behavioral synchronization has been shown to occur in different kinds of interactions including when people are interacting face-to-face or over the phone (Richardson et al., 2007), as well as when they are only co-present and not directly interacting with each other (Golland et al., 2015). In fact, it seems that all is needed for synchronization to occur is "some medium […] that serves to link people together, whether that medium is a physical connection between people, visual information about another person's movements, or linguistic information that is exchanged during a conversation" (Shockley & Riley, 2015, p. 400). Therefore, regardless of the setting, behavioral synchronization can occur across modalities and mobilize the connection of body postures (Shockley et al., 2003; Varlet et al., 2011), physiological reactions (Guastello et al., 2006), pronunciation and voice features (Gregory & Webster, 1996; L. Pickering et al., 2012; Trofimovich, 2013), brain activity (Hasson et al., 2012), and also facial expressions, no matter if these are consciously perceived or not (Dimberg & Petterson, 2000; Dimberg et al., 2000; Hess & Blairy, 2001; Hess & Bourgeois, 2010).

Besides where and how people synchronize their behaviors, different factors were shown to affect in what way and to what degree people synchronize their behaviors. These include, for example, social factors and contextual influences, such as arriving on time or being late for a task (Miles et al., 2010) as well as individual traits, such as the individual's pro-social orientation or lack of thereof (Lumsden et al., 2012). At the same time, synchronization itself may also have an impact on people' social perception by, for example, eliciting feelings of rapport, attraction, positive affect, and connectedness (Bargh & Chartrand, 1999; Lakin & Chartrand, 2003; Miles et al., 2009; Tschacher et al., 2014), as well as enhancing cooperative ability (Valdesolo et al., 2010) or increasing attention (Macrae et al., 2008).

Within the paradigm of behavioral synchronization and coordination, smiling has also been studied, although not extensively. Results in this area showed that in conversation, people tend to reciprocate each other smiles (Hinsz & Tomhave, 1991; Cappella, 1997; Hess & Bourgeois, 2010; Wild et al., 2003) and expect others to reciprocate their own smile, since a lack of smiling reciprocity tends to be perceived as a sign of averseness or unwillingness to communicate (Cappella, 1997; Heerey & Crossley 2013; Heerey & Kring, 2007). A similar phenomenon was also observed in the behavior of young children (between 7 and 9 years old) who, in an experimental setting with a same-age and same-sex confederate, were shown to increase the amount of their smiling in response to an increase in the companions' smiling (Chapman & Chapman, 1974). Smiling was also found to be contagious (Hess & Bourgeois, 2010) as people in a dyadic interaction tend to mimic the interlocutor's smiling or laughing with similar smiling and laughing (Navarretta, 2016; El Haddad et al., 2019). In the corpus of six dyadic conversations annotated and analyzed by Navarretta and colleagues (Paggio & Navarretta, 2011), 86% of smiles and 98% of laughs produced by one participant co-occur with smiles or laughs produced by the other participant, and of the 668 smiles in their corpus, they noted that 60% were mirrored.

While the behavioral synchronicity of smiling and laughter within dyads has received some attention, the relationship between smiling and humor has only begun to be addressed, based on initial observations by Attardo and L. Pickering (2011). In an exploratory study, Gironzetti et al. (2016b) investigated the possibility that synchronized smiling behaviors and increased attention to facial regions involved in smiling would be used to negotiate the humorous nature of the text during computer-mediated conversation. The analysis of the individual and coupled smiling behaviors of participants revealed that the presence of humor co-occurs with a higher individual smiling intensity of each participant and a higher degree of smiling synchronicity as compared to the baseline of the conversation. A follow-up study (Gironzetti et al., 2018) on the same corpus of computer-mediated interactions confirmed that humor correlates positively with an increase of smiling intensity relative to the baseline, foreshadowed by a localized increase of smiling. Additionally, the study showed that participants display framing smiling patterns that are representative of the conversational dynamics of the dyad and the ongoing negotiation of the humorous framing. A comparative study between the English corpus from Gironzetti et al. (2016a, 2016b, 2018) and a similar French corpus (see Priego-Valverde et al., 2018) indicated that smiling behavioral synchronization may be a feature of humorous conversation across cultures, as participants from both groups showed an increase in the percentage of time during which they displayed synchronized smiling behaviors during humorous versus non-humorous portions of conversation (Priego-Valverde et al., 2018). Lastly, Gironzetti (2021a) employed

the same corpus analyzed in this manuscript to discuss spontaneous conversational humor (jablines and ironic comments) as a type of contingent, emergent, and co-constructed discourse (p. 115), showing how individual smiling behavior is a key feature employed by speakers to frame utterances as humorous, and how conversational partners jointly coordinate their smiling behavior to be able to negotiate and maintain the humorous frame.

4.2.2 From alignment to synergy

Besides focusing on the type of synchronization that occurs and the social setting or factors that affect it, researchers are also exploring different models to explain how and why synchronization occurs. Moving away from an approach centered on the individual speaker, these models focus on the dialogical dynamics of linguistic interactions. As we will see in detail in the next paragraphs, in the last few years the field has moved away from early behavioral synchronization models towards more complex and contextualized proposals. Early models did not account for all contextual factors of an interaction, such as the topic being discussed or the relationship between the interlocutors, and theoretically limited the degree of variability in speakers' behavior thus potentially leading to de-contextualized mimicry (Christensen et al., 2016). Recent interpersonal synergies perspectives, on the other hand, propose that different contextual factors, including the relationship between interlocutors, the goal of the interaction, the environment in which it is taking place, the type of interaction, etc., affect the ways in which interlocutors display behavioral synchronization and their degree of synchronization (Paxton & Dale, 2017).

One of the most influential models of behavioral synchronization has been M. Pickering and Garrod's *interactive alignment* (IA) model (Garrod & M. Pickering, 2009; M. Pickering & Garrod, 2004), which approaches dialogue as the coordination and imitation of linguistics behaviors governed by an automatic structural priming mechanism. According to this model, conversational partners will prime each other or even themselves towards using certain linguistic features or expressions and will mutually influence each other's behavior by making it more similar and regular in time. However, this model has been criticized because it does not fully consider the context of the interaction and cannot explain why conversations do not gradually progress towards mimicry (Fusaroli et al., 2014). Moreover, studies that adopted the IA model focused mostly on task-oriented interactions, thus failing to represent the dynamic of naturally occurring conversation, in which participants seem to selectively align depending on the context and goals of the interaction (Fusaroli et al., 2012). As a consequence, while the roles of priming and synchronized behaviors have been widely accepted as mechanisms that operate during conversations and

may contribute to the success of the interaction, the automaticity of the IA model has been rejected (Fusaroli et al., 2014) as it cannot account for the complexity of real-life natural occurring interactions. Quoting Fusaroli et al.,

> An adequate model of dialogue should therefore specify how local task requirements come to guide and constrain alignment and, even more importantly, distribute complementary (rather than identical) actions among interlocutors making them temporally coupled, selectively aligned, and fulfilling different roles in the interaction. (2014, p. 149)

The *dialogue as synergy* model proposed by Fusaroli et al. (2014) recognizes the value and role of synchronization while also considering the context in which the interaction takes place and the intentions of the individual participants, since when people interact with each other they reach a functional balance that allows for flexibility and adaptation, rather than blindly amplifying each other's behaviors. In the *dialogue as synergy* model, the degree of synergy between participants in an interaction is determined by three features that affect their alignment and synchronization practices: (1) the *functional specificity* of the interaction (p. 150), which does not always requires speakers to reach a deep mutual understanding in each interaction; (2) the *context sensitive selectivity* (p. 151), which accounts for the context in which the interaction takes place and rejects automatic priming as the underlying mechanism of all successful interactions as well as indiscriminate alignment as a result of successful interaction; and (3) the *dimensional compression* of the dyad's linguistic behavior, which refers to the reduction of the dyad's behavior variability as the interactional routine stabilizes (p. 153). According to this last feature, as the dyad begins the interaction, each speaker will display a variety of behaviors and the level of synchronicity between speakers will be relatively low. However, once the dyad has stabilized its routine, speakers will perform a more limited number of different behaviors and will show a higher level of synchronicity. The authors pointed out that while linguistic behaviors are affected by all three features, non-linguistic behaviors such as dialogical coordination of posture, visual attention, or speech rate, would mainly depend on synchronization and alignment mechanisms and are affected only by the first two elements.

Such a complex and dynamic model, of which dyadic face-to-face conversations are an example, is compatible with the view that verbal and non-verbal communicative modalities are interrelated, complementary, and part of the same integrated system (Seyfeddinipur & Kita, 2001; Goldin-Meadow, 2005; Louwerse et al., 2012). From this perspective, then, face-to-face dyadic interactions are expected to show different degrees of behavioral alignment across modalities depending on the function of the interaction, the context, and the specific initial degree of behavioral alignment of the dyad. More specifically, in the case of humorous

versus non-humorous interactions, smiling behaviors are expected to vary based on the functional specificity and context sensitive selectivity of the interaction: speakers are expected to actively rely on their smiling behavior as a communicative tool to negotiate the humorous nature of the exchange across different levels of recognition, understanding, appreciation, and agreement (Hay, 1994a, 2001), instead of blindly approaching mimicry (as predicted by the interactive alignment model alone). For the purpose of the current study, the *dialogue as synergy* model will be adopted to discuss findings related to the smiling behavior of the dyads, as it provides more explanatory power as well as an interesting avenue of research that allows the integration of the study of smiling alignment and synchronicity in dyadic conversations with the negotiation of pragmatic intentions during conversation (Haugh, 2008).

4.2.3 Embodied cognition and facial displays

In the previous section, it was mentioned that alignment across modalities has been argued to occur in order to facilitate communication and dialogue, since sharing the same behaviors would provide speakers with an easier path to share their mental representations and thus reach mutual understanding. This hypothesis falls under the umbrella of *embodied cognition theories*, which suggest that cognition is shaped (also) by the body and the body influences the mind (for a more detailed discussion of embodied cognition theories, see Wilson, 2002; Shapiro, 2011; Wilson & Golonka, 2013). During the last few years, for example, several studied demonstrated the functioning and the effects of *embodied metaphors* (e.g., Williams & Bargh, 2008; Miles et al., 2010; Slepian et al., 2011) and how embodied signals and perceptions affect emotions (e.g., Mori & Mori, 2010; Neal & Chartrand, 2011). According to embodied cognition theories, then, people are thought to understand each other's expressions not just through abstract, logical processing of verbal language, but also by replicating each other's behavior, which in turn would allow them to better understand what the other is experiencing.

This view has also been recently applied to the study of humorous conversation. In his discussion of the relationship between humor, smiling, and mirth, Attardo's (2019) relied on the *facial feedback hypothesis* of embodied cognitive theories (see Strack et al., 1988; McIntosh, 1996; Soussignan et al., 2002), to explain the dynamics of humor support. According to the facial feedback hypothesis, facial mimicry–which in our case refers, more specifically, to smiling mimicry–generates in the perceiver an internal simulation of the emotion perceived in the interlocutor and, by this means, it facilitates the recognition of that emotion. Attardo (2019) posited the existence of a virtuous circle, or feedback loop, of humor support: as producing a facial display associated with an emotion leads the subject to experience that

emotion, then speakers who align their facial display to that of a smiling interlocutor would experience mirth. This, in turn, could lead them to have the intention of producing more humor, triggering a virtuous circle of humor support that could lead to instances of sustained humor. This hypothesis will be discussed in the conclusions in light of the results presented in the following paragraphs and in relation to the dialogue as synergy model.

4.3 Analyzing smiling patterns and synchronicity during humorous discourse

In this section, data regarding the smiling behavior of the dyads with and without humor are presented and discussed. To facilitate the interpretation and the visualization of the joint smiling intensity data that will be presented in the following sections, the smiling behavior of the two interlocutors within a dyad will be displayed in the form of a line graph, with the vertical axis indicating the SIS value displayed by each person at a given point in time, and the horizontal axis indicating time in milliseconds, as illustrated in Figure 5 in Chapter 2.

Following the model in Figure 5, these line graphs allow the reader to visualize the smiling behavior of each member of the dyad as it unfolds through time, and thus appreciate how each individual participant contributes to what looks like a *smiling dance*, with participants following each other's smiling and switching in their role as leader or follower. In addition to this, data are also analyzed jointly, by looking at both participants at the same time and whether they were displaying a synchronic behavior at any given point in time. The coding of participants' joint smiling behavior was based on the coding of each speaker´s individual smiling intensity using the SIS (see Chapter 3), and data for each member of the dyad were combined to obtain a time series (a sequence of discrete time data) reflecting the smiling behavior of both participants within a dyad. These data were then classified into one of four different categories of synchronic behavior with respect to smiling. Table 7 illustrates in a schematic way the possible smiling behaviors of each participant in the dyad and how the dyad joint smiling behavior was coded, and Figure 31 offers an example of each category from the corpus.

According to the description of each category in Table 7 and their representation in Figure 31, each of the four mutually excluding categories of joint smiling behavior can be applied to code the behavior of the dyad at any point in time. This allow to measure for how long, in milliseconds as well as in percentage of time spent, each behavior is displayed during humorous and non-humorous portions of conversation and thus to determine whether any of these behaviors are characteristic of conversational humor.

Table 7. Joint smiling behavior coding categories

SIS speaker A	SIS speaker B	Category	Joint behavior description
0, no smiling	0, no smiling	Type −1, Not smiling	Both participants display non-smiling behaviors at the same time.
0, no smiling	Any SIS value among 1, 2, 3, 4	Type 0, Non-reciprocal smiling	One participant displays a non-smiling behavior, the other participant displays a smiling behavior .
Any SIS value among 1, 2, 3, 4 but different from speaker B	Any SIS value among 1, 2, 3, 4 but different from speaker A	Type 1, reciprocal smiling	Both participants display smiling behaviors at the same time, but at different intensity levels on the SIS.
Any SIS value among 1, 2, 3, 4 but equal to speaker B	Any SIS value among 1, 2, 3, 4 but equal to speaker B	Type 2, matching smiling	Both participants display smiling behaviors at the same level of intensity on the SIS and at the same time.

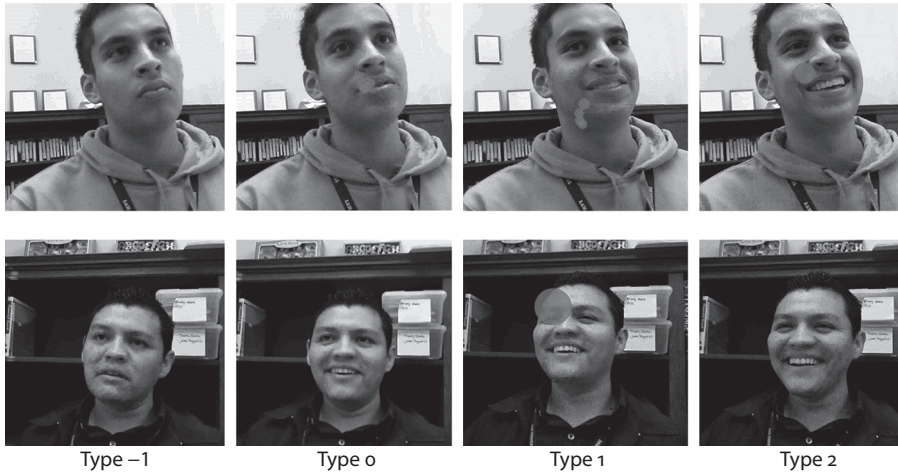

Figure 31. Examples of each joint smiling behavior category

4.4 Smiling patterns during humorous discourse

Going beyond the individual behavior of each interlocutor, which was the focus of Chapter 3, the following sections discuss the smiling behavior of the dyads from the corpus and how interlocutors attune their smiling behavior to each other during humorous discourse. Two specific smiling patterns emerged as characteristic of humorous discourse across dyads: a framing smiling pattern – displayed as a single or

joint behavior – and an accommodation smiling pattern (see also Gironzetti et al., 2018). Additional patterns of smiling behavior, such as peak and deadpan, occurred only rarely. Table 8 summarizes the occurrences and frequency of different smiling patterns and gestures displayed by participants in the corpus, while Table 9 delves deeper into the distribution of these patterns across types of humor, with the most frequent patterns highlighted with a gray background. The characteristics of each pattern are discussed in detail in the following sections.

Table 8. Occurrence and frequency of smiling patterns and gestures

Smiling pattern	Pattern subtypes	Occurrences	Frequency
Framing smiling pattern	Joint with accommodation gesture	17	34%
	Single	15	30%
	Joint	10	20%
Deadpan	–	4	8%
Peak	–	2	4%
Unclear pattern	–	1	2%
Missing data points	–	1	2%
	Total	50	100%

Note. Peak and single framing patterns involve only one of the two speakers and so can co-occur within the same humorous instance. In the corpus, these patterns co-occurred twice in the context of two jablines. For this reason, the total number of patterns (n = 50) does not match the total number of humorous instances (n = 48).

As shown in Table 8, the most frequent smiling patterns that occurred during humorous portions of conversation is a framing smiling pattern (exemplified in Figure 32 and Figure 33 in its single and joint form, respectively). The peak smiling pattern, on the other hand, was only present twice in the whole corpus. This is an interesting finding because this pattern represents what would be the typical behavior of conversational partners according to folk theories of humor. As discussed in Chapter 1, according to folk theories of humor, the delivery of a punchline would be marked in a way that makes it stand out from the rest of the from non-humorous talk. In terms of smiling, this marking would occur as represented in a peak patters, that is, with a sharp increase of smiling intensity that coincides with the delivery of the punchline followed by a sharp decrease of smiling intensity right after the delivery of the punchline. However, in contrast to what predicted by folk theories of humor, the data show that this behavior is, in fact, not at all typical and rather infrequent.

Additionally, Table 9 illustrates that smiling patterns frequency varies depending on the type of humor, with joint framing with accommodation typically occurring during punchlines and single framing during jablines and ironic comments. The significance of this difference is discussed in the following subsection corresponding to the framing smiling patterns and in the conclusions of this chapter.

Table 9. Occurrence and frequency of smiling patterns and gestures per humor type

Humor type	Smiling pattern subtypes	Occurrences (co-occurring)	Frequency
Punchlines	Joint framing w/ accommodation	8	50%
	Single framing	2	12.5%
	Joint framing	5	31.25%
	Deadpan	1	6.25%
	Peak	–	–
	Unclear pattern	–	–
	Missing data points	–	–
	Total	**16**	**100%**
Jablines	Joint framing w/ accommodation	6	30%
	Single framing	9 (x)	45%
	Joint framing	2	10%
	Deadpan	2	10%
	Peak	1 (x)	5%
	Unclear pattern	–	–
	Missing data points	–	–
	Total	**20**	**100%**
Irony	Joint framing w/ accommodation	3	21.5%
	Single framing	4 (x)	28.6%
	Joint framing	3	21.5%
	Deadpan	1	7.1%
	Peak	1 (x)	7.1%
	Unclear pattern	1	7.1%
	Missing data points	1	7.1%
	Total	**14**	**100%**

4.4.1 Framing smiling pattern

The most common smiling pattern that emerged from the analysis of the data is a *framing smiling pattern*, in which one or both interlocutors display an extended and sustained smiling lasting more than one second and framing the instance of humor. This pattern occurred 42 times or in 84% of the total instances of humorous discourse in this corpus. The same occurrence rate of 84% was also reported in Gironzetti et al. (2018) for framing smiling patterns occurring in computer-mediated conversations. This could be just a coincidence. However, these data could also be interpreted to indicate that the medium (computer-mediated vs. face-to-face conversation) does not affect the occurrence rate of smiling patterns, and so that a framing smiling pattern is the most typical smiling behavior in the presence of humor.

Of the 42 occurrences of the framing smiling pattern, 15 instances were in its single form, 10 in its joint form, and 17 in its joint form in combination with the accommodation pattern described in the next section. In the *single* version of this pattern, one interlocutor displays a sustained framing smiling while the other simply increases or decreases their smiling intensity without displaying a clear framing pattern, as illustrated in Figure 32. Single framing smiling patterns were the most frequent type in the case of jablines and ironic utterances, as shown in Table 9.

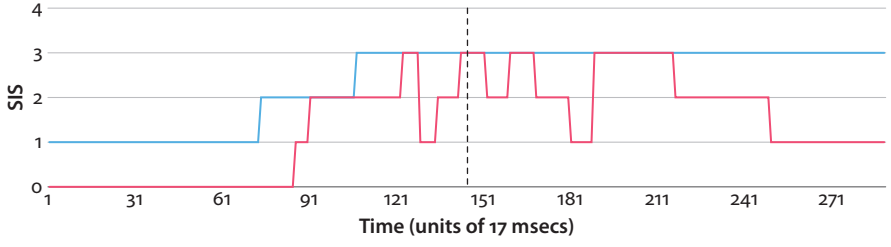

Figure 32. Example of a single framing smiling pattern (Ann and Kate, segment AKH1)

Excerpt AKH1

Kate no tengo tiempo para una novia pero un sapo que habla está padrísimo
[I don't have time for a girlfriend but a talking frog is really cool]
Ann @laughter@ pues no sé
[well I don't know]

In Figure 32, the blue line represents the single framing smiling behavior of one interlocutor, who maintained a smiling intensity at SIS value 3 for about 3060 milliseconds. In this example, the second interlocutor, represented with a red line, is showing an increase in smiling intensity fluctuating between SIS values 2 and 3 – in line with what was discussed in Chapter 3 – but is not displaying a sustained smiling.

In the *joint* version of the framing smiling pattern, both interlocutors display at the same time a sustained smiling, which can be at the same or different levels on the Smiling Intensity Scale. An example of joint framing smiling at different SIS values for each speaker is shown in Figure 33. The pattern displayed by Emma and Jane during segment EJH2 (a transcription of excerpt EJH2 is discussed in Section 6.3.3) was also produced with an accommodation gesture (described in the next section) and represents the most frequent smiling patterns that co-occurred with punchlines (see Table 9).

In Figure 33, each of the two lines represents one interlocutor as they both display a sustained smiling at different SIS values (one interlocutor at SIS value 2 and

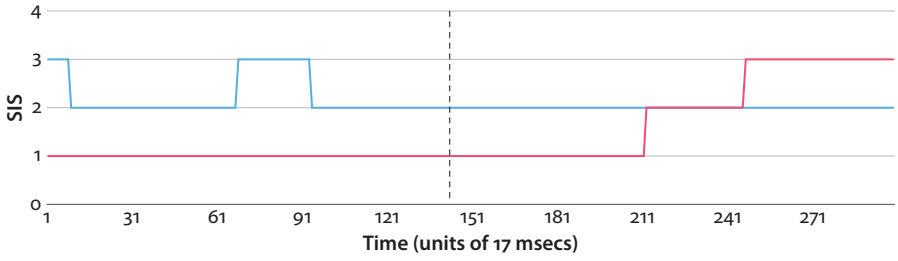

Figure 33. Example of a joint framing smiling pattern (Emma and Jane, segment EJH2)

the other at SIS value 1), lasting for about 3400 milliseconds and 3570 milliseconds, respectively. Together, the interlocutors are jointly framing a portion of discourse as humorous by means of their smiling behavior.

4.4.2 Accommodation gesture

Frequently, in the conversations analyzed, one interlocutor was found to modulate their smiling intensity and duration by mirroring, with a slight delay, the smiling behavior of the other interlocutor. This accommodation gesture appeared a total of 17 times in the corpus (in 31% of the total instances of humorous discourse) in combination with a joint framing smiling pattern, as a gesture that led to either the beginning or the end of a joint framing pattern. The visualization in Figure 34 illustrates an example of an accommodation gesture in which one interlocutor (blue line) is mirroring the smiling behavior of the other (red line) by maintaining, increasing, and finally decreasing their smiling intensity almost at the same time – with a very short delay of approximately 35 milliseconds – and for the same duration. The delay could potentially index the time needed by one speaker to process (recognize and possibly understand) the humorous utterance, or the time needed to visually process the change in the interlocutor smiling behavior.

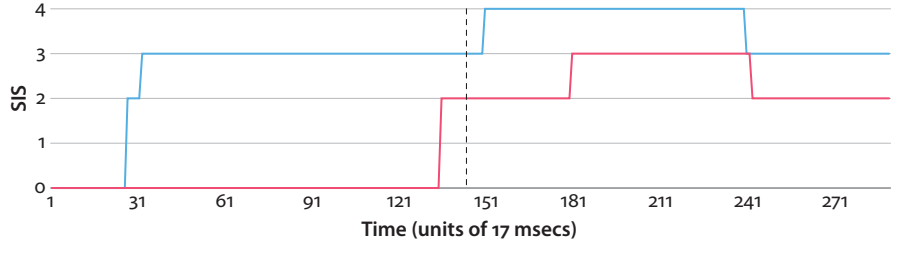

Figure 34. Example of joint framing smiling pattern with an accommodation gesture (Hans and Andy, segment HAH5)

Excerpt HAH5

Andy Lourdes y ansina quiero que le digan @dice@ @laughter@
[Lourdes and this way (*ansina*) I want people to call her, he said]

Together, framing smiling patterns in their joint and single form, with and without accommodation gestures, represent 84% of all smiling behaviors displayed by interlocutors during humorous discourse. Of the remaining eight segments of humor instances, four were examples of deadpan deliveries, two were peak smiling patterns, and one could not be ascribed to any specific pattern.

4.4.3 Deadpan deliveries of humor

A deadpan delivery of humor, such as those analyzed in this section, requires that the speaker show no signs of smiling as he or she is uttering the humorous phrase. Deadpan deliveries were not frequent in the corpus but deserve special attention since due to their lack of smiling at the humorous phrase, the interlocutors, or at least the speaker, could be thought to purposefully avoid marking the humor or engaging in the negotiation of the humorous interpretation. However, as we will show, this is not the case.

The first example of deadpan delivery is a punchline which occurred in a conversation between the speaker, Ann, and the listener, Kate. The punchline was delivered in Spanish as follows: "ya salió quee el ahí estaba un burro en frente del carro, o sea, era [and it turned out that he there was a donkey in front of the car, that is, it was]" (this excerpt is further discussed in Section 6.3.2). Figure 35 illustrates the smiling behavior of both interlocutors, Ann, the speaker, represented with the blue line and Kate, the listener, with the red line.

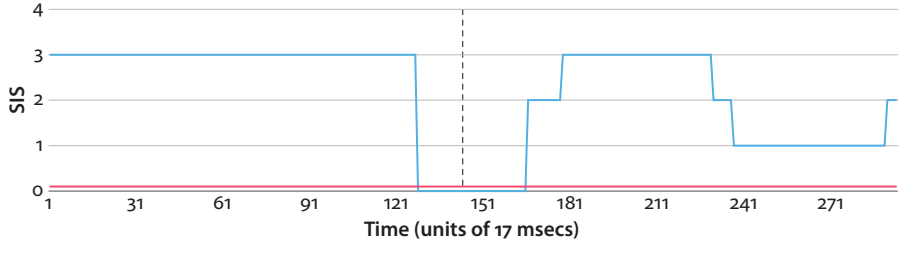

Figure 35. Deadpan delivery of a punchline (Ann and Kate, segment AKH2)

In the example in Figure 35, the speaker marked the humor instance by a lack of smiling, represented by the sharp decline in SIS of the blue line right before the punchline, which contrasted with her smiling behavior prior and immediately

following the punchline. Despite the deadpan delivery of the punchline, it has to be noted that this portion of humorous discourse is still characterized by an overall high smiling intensity on the side of the speaker (SIS 2.17 for segment AK2) with respect to her baseline (SIS 0.56). Regarding the smiling behavior of the listener, Kate, Figure 35 reveals a lack of smiling for the whole duration of this humorous instance. This case will be further discussed in Chapter 6 as an example of failed humor.

Another example of deadpan delivery is an ironic utterance which occurred in a conversation between the speaker, Dani, and the listener, Amy. The irony was delivered in English as follows: "and they said well we [starts imitating thick Texan accent] think he is the best mayor we've ever had aaand." In this example, Dani (whose smiling behavior is represented with a red line in Figure 36) is reproducing what a person said to her, while at the same time separating herself from the ideas that she is quoting by means of using a fake Texan accent. In doing so, Dani is marking the ideas she is reproducing as belonging to others, expressing her negative evaluative stance and at the same time aligning with Amy, the listener, as both have previously explicitly expressed that they share similar points of view on the topic being discussed.

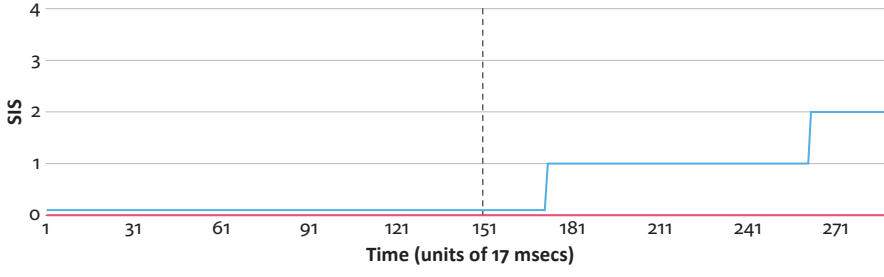

Figure 36. Deadpan delivery of an ironic utterance (Dani and Amy, segment DAH9)

The extract DA9 represented in Figure 36 is not the first case of irony uttered by Dani during the conversation; in fact, she relied on irony to present her ideas about the very same topic of DA9 in other four previous occasions. However, this is the only time Dani delivered the humor without any sign of smiling and a facial expression that has been previously described as a *blank face* (Attardo et al., 2003). Amy, on the other hand, is engaging in the negotiation of humor by means of increasing her smiling intensity gradually, after the delivery of the ironic comment, as a display of her understanding and appreciation of the humor, as well as displaying agreement with Dani's negative evaluative stance.

The two other examples of deadpan deliveries correspond to two jablines in segments JTH7 and JYH3, represented in Figure 37 and 38. In the first case, JTH7, John was retelling a story about a job interview in which the candidate was not

very responsive to the committee's questions: "he seemed like he was dead or like distracted or like doing something else the entire time so we were like oh uh hey man what what's up." During the delivery of the jabline "hey man what's up" both interlocutors displayed lack of smiling, although they did increase their smiling intensity after the jab line, but without displaying a clear pattern, as can be seen from the last part of the graph in Figure 37.

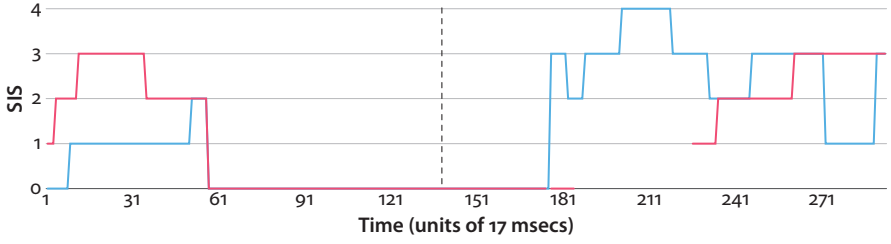

Figure 37. Deadpan delivery of a jabline (Tony and John, segment TJH7)

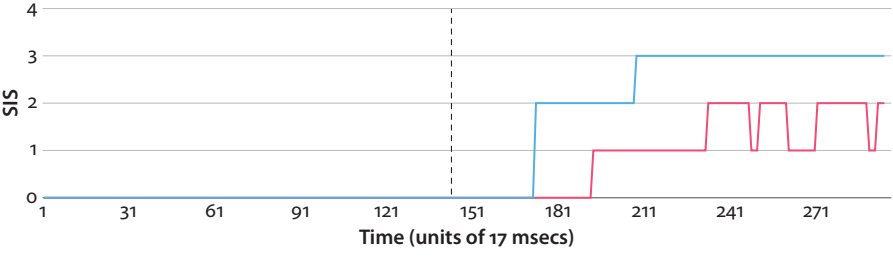

Figure 38. Deadpan delivery of a jabline (Jake and Yoan, segment JYH3)

In the second jabline, JYH3 (Figure 38), the two interlocutors were talking about college exams and prospective jobs when one of them, Yoan, jokingly commented on their age difference of a few months as if this were a relevant factor: "yyyy yo tengo más edad" ("aaaand I am older"). The delivery of this humorous comment occurred when both interlocutors displayed a lack of smiling, similar to the example discussed previously, and the delivery was immediately followed by a gradual increase in smiling intensity for both interlocutors, led by Jake (blue line in Figure 38), but without displaying a clear pattern.[2]

2. In this example, it seems as if the two interlocutors are beginning to engage in a delayed joint framing smiling pattern preceded by an accommodation gesture led by Joan. However, this happened at the end of the humorous segment analyzed and thus was not part of the analysis. Future studies could expand the length of the segments to account for delayed smiling, particularly in the case of spontaneous conversational humor (jablines and ironic comments), which may require more time to be recognized and processed.

4.4.4 Peak smiling pattern

A peak smiling pattern corresponds to the smiling behavior that, according to folk theories of humor, participants would display in a conversation as a way of marking the delivery of a humorous utterance. A peak pattern involves a sudden increase of smiling intensity that co-occurs with the delivery of the humorous phrase, followed by an equally sudden decrease in smiling intensity. In the line graphs, this pattern leads to a visual peak that tends to occur in close temporal proximity with the delivery of the humorous phrase. In contrast to what folk theories of humor predict, however, this pattern is not frequent, as it appeared in our corpus only twice (representing only 4% of the patterns displayed; see also Gironzetti et al., 2018, who reported 7 cases of peak pattern, corresponding to 9% of the total, in a corpus of humorous instances in computer-mediated conversations).

Excerpt JTH9

```
John    oh this guy is really funny (incomprehensible word) you instead
        of an idiot
```

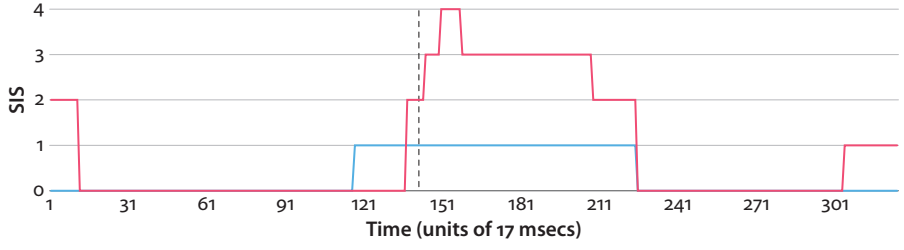

Figure 39. Peak smiling pattern with an ironic utterance (John and Tony, segment JTH9)

The example in Figure 39 is one of the two peak smiling patterns found in the corpus. In this example, the speaker (blue line) is displaying a sustained smiling behavior at SIS 1 (closed mouth smiling) framing the humorous phrase, while the interlocutor (red line) displays a peak pattern that co-occurs at its higher intensity with the delivery of the humorous phrase. In this example, the listener rapidly increased their smiling intensity to SIS 4 as the ironic humorous phrase was being delivered, and then decreased their smiling intensity down to SIS 0 (no smiling) a few milliseconds after the humorous phrase. In this instance, the person marking the humorous event by means of a peak smiling pattern is the listener, but as shown in Figure 40, this is not always the case. Moreover, in the corpus of computer-mediated interactions analyzed in Gironzetti et al. (2018), peak patterns were found to be displayed by both interlocutors and so do not seem to be associated with participants' conversational role.

Figure 40 represents the other case of peak smiling pattern that was produced, maybe incidentally, by the same dyad in segment JTH10. In this case, the speaker (John, blue line) delivered an ironic comment, "cool," and displayed the peak pattern represented in Figure 40 while delivering his comment. The listener, Tony (red line), increased his smiling intensity after John for a brief period of time, possibly as a means to display that he recognized the humorous intention of the speaker.

Excerpt JTH10

John hey you guys won a gold medal at this thing uh? and we were like uh! that cool

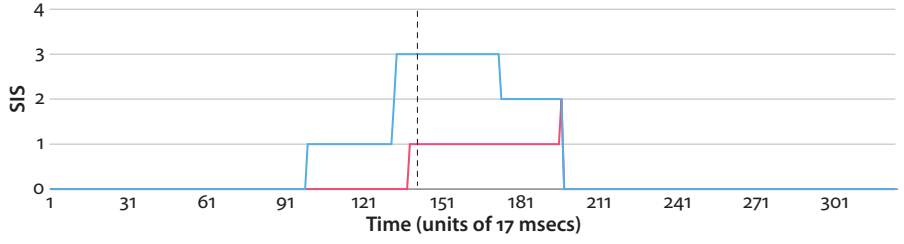

Figure 40. Peak smiling pattern with an ironic utterance (John and Tony, segment JTH10)

Overall, the analysis of participants' smiling patterns reveals how participants' coordinate their smiling behavior in the presence of a humorous phrase, offering a glimpse into the live negotiation of the humorous framing that takes place during these conversations. In contrast to what hypothesized by folk theories of humor, smiling is not used just to mark or announce the delivery of a jabline or punchline, as instances of the peak smiling pattern occurred rarely. Instead, most of the time participants displayed a sustained smiling framing pattern that involved both interlocutors and, in the cases when it involved only one of them (i.e., single framing pattern), the other participant's behavior was still characterized by an increased smiling intensity with respect to their baseline, thus indicating that both participants were actively manipulating their smiling intensity and patterns with respect to what was being said (the humorous utterance) and the behavior of the interlocutor, to jointly co-construct the humorous frame.

The type of humor also seems to be a relevant factor, as joint framing smiling with accommodation were the most frequent patterns produced in the presence of punchlines, while single framing smiling patterns were the most frequent ones in the case of jablines and ironic utterances. While it is not possible here to affirm that these types of humor and smiling patterns are correlated nor that the type of humor causes the display of a given pattern, it is plausible to think that punchlines were more easily and readily recognized as such by both interlocutors, allowing for the display of a joint smiling framing pattern, while jablines and ironic utterances

presented an additional challenge for interlocutors due to their unplanned and unannounced nature (i.e., they were not part of the data collection protocol), and thus made it more difficult for interlocutors to engage in a joint pattern, leading to the display of a higher number of single framing smiling patterns. In the next section, we will explore in more details the extent to which participants synchronized their smiling behavior.

4.5 Smiling synchronicity

The results reported in this section regard the types and degree of behavioral synchronicity in the smiling intensity of the two participants within each dyad, comparing humorous and non-humorous portions of conversation. In order to study smiling synchronicity, the individual smiling intensity scores of the two members of each dyad were used to generate a new code representative of the joint behavior of the dyad, with each score reflecting a different degree of smiling synchronicity. The synchronicity coding was designed to classify the dyad's smiling behavior into four categories outlined in Table 7 and represented in Figure 31: Type −1 (Not smiling); Type 0 (Non-reciprocal smiling); Type 1 (Reciprocal smiling), and Type 2 (Matching smiling). In addition to these categories, the value NA was used for those portions of conversation for which the data from one or both participants were missing due to, for example, participants moving their head or covering their face. For each dyad, the total time participants displayed each of the four types of smiling synchronic behavior during humorous and non-humorous segments is reported in milliseconds as well as a percentage of the total length of the humorous or non-humorous segments.

Figure 41 summarized these data for humorous (red line) and non-humorous (blue line) portions of discourse. At first glance, the data in Figure 41 show that all dyads displayed Type 1 (Reciprocal smiling) and Type 2 (Matching smiling) synchronicity for a higher amount of time with humor, compared with portions of discourse without humor. Conversely, most dyads displayed Type −1 (not smiling) and Type 0 (Non-reciprocal smiling) behaviors for higher amounts of time without humor, compared with humorous portions of discourse. The exceptions were dyad YJ and dyad AK, who displayed Type 0 (Non-reciprocal smiling) behavior for a higher amount of time with humor. In the following paragraphs, each dyad's behavior is discussed in more details.

When humor was present, Tony and John (dyad TJ) displayed higher values of smiling synchronicity (Types 1 and 2) compared to when humor was absent from the conversation (Type 1, humor = 18433, no humor = 2006; Type 2, humor = 10198, no humor = 1377). Conversely, when humor was absent from the conversation, they displayed higher values of asynchronicity (Type 0, humor = 5953,

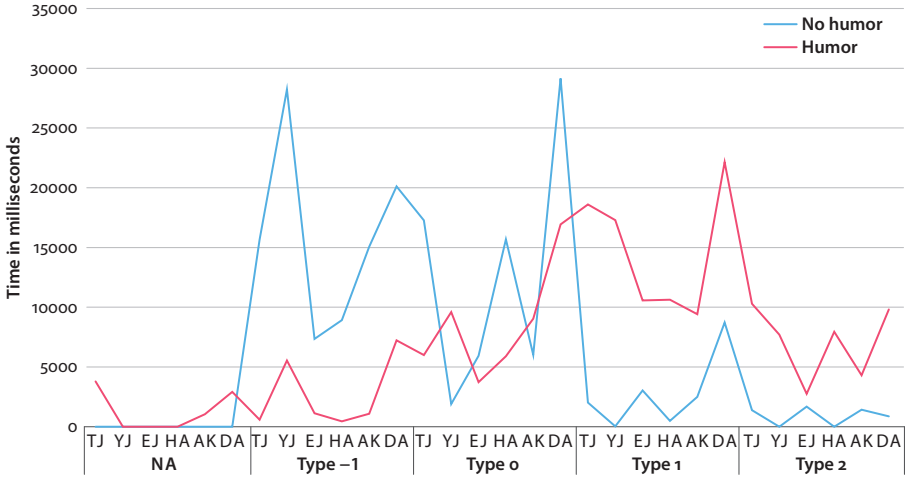

Figure 41. Types of smiling synchronic behaviors displayed (in Milliseconds) by dyads with and without humor

no humor = 17119) and non-smiling synchronicity (Type –1, humor = 528, no humor = 15521).

Dyad YJ behaved in a similar way. When humor was present, they displayed higher values of smiling synchronicity (Types 1 and 2) which were nearly absent during non-humorous segments of conversation (Type 1, humor = 17136, no humor = 34; Type 2, humor = 7650, no humor = 0). On the other hand, when humor was absent from the conversation, the dyad displayed higher values of non-smiling synchronicity (Type –1, humor = 5491, no humor = 27982). As mentioned previously, this dyad diverged from the others with respect to Type 0 behavior (asynchronous behavior), as they displayed for a higher amount of time in the presence of humor (9520 msec) instead of without humor, as the other dyads did. A more fine-grained analysis of each humorous portion of discourse revealed that this result is due to the behavior of Jake when in the role of a listener of two instances of humor, as shown in Figure 42 and 43.

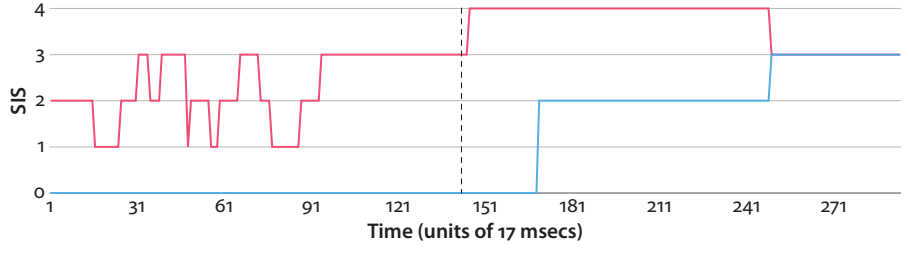

Figure 42. Jake (blue line) contribution to JT type 0 behavior with humor (Yoan and Jake, segment YJH1, Punchline)

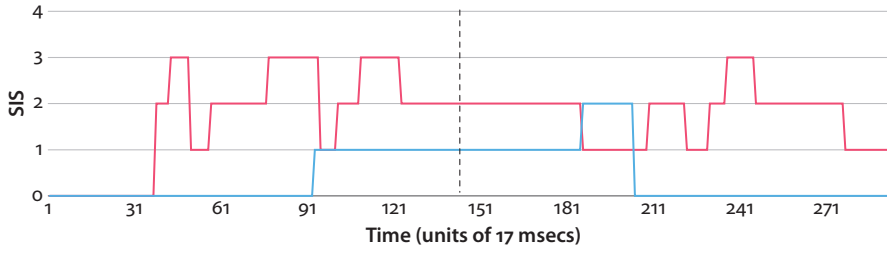

Figure 43. Jake (blue line) contribution to JT type 0 behavior with humor (Yoan and Jake, segment YJH6, Irony)

Excerpt YJH6

```
Jake     saliendo del TEC
         [graduating from TEC[3]]
Yoan     @laughter@
Jake     no más es así como que lo pasaste y que padre y ya
         [so it is just like that, you passed and cool and that's it]
```

Jake behavior in the two segments represented in Figure 42 and 43 differs from the typical behavior of other participants and is responsible for dyad YJ displaying the asynchronous behavior of Type 0 (one participant is smiling while the other is not) in the presence of humor for a higher-than-average time. In segment YJH1, Jake displayed a non-smiling facial expression for 2873 msec, while their interlocutor was smiling. In segment YJH6, Jake again displayed a non-smiling facial expression for 2465 msec, while their interlocutor was smiling. On both occasions, Jake was the listener of a humorous utterance produced by their interlocutor, Yoan. While Jake did engage in the negotiation of humorous framing through smiling, in segment YJH1 his smiling intensity began to increase only after the punchline to finally match Yoan intensity 1700 msec after the delivery of the punchline. In segment YJH6, Jake displayed a peak smiling pattern with a low smiling intensity (average SIS 1) that framed the delivery of the ironic utterance by Yoan. In this excerpt, graduating from the university TEC is discussed, ironically, as being an easy accomplishment.

Dyad EJ displayed a similar behavior to other dyads, with higher values of smiling synchronicity with humor compared to when humor was absent from the conversation (Type 1, humor = 10480, no humor = 3010) and a smaller difference in Type 2 behavior (humor = 2730, no humor = 1660). When humor was absent from the conversation, the dyad displayed higher values of non-smiling synchronicity (Type −1, humor = 1110, no humor = 7280) and asynchronicity (Type 0, humor = 3690, no humor = 5890).

3. TEC stands for Tecnológico de Monterrey, a well-known private university in Mexico.

The fourth dyad, HA, again displayed higher values of smiling synchronicity with humor (Type 1, humor = 10539, no humor = 483; Type 2, humor = 7886, no humor = 0) compared to when humor was absent from the conversation. Type 2 behavior was in fact absent in the absence of humor. On the other hand, when humor was absent from the conversation, the dyad displayed higher values of asynchronicity (Type 0, humor = 5842, no humor = 15540) and non-smiling synchronicity (Type −1, humor = 440, no humor = 8848).

Similarly, dyad AK displayed higher values of smiling synchronicity with humor compared to when humor was absent from the conversation (Type 1, humor = 9340, no humor = 2480; Type 2, humor = 4265, no humor = 1420). When humor was absent from the conversation, however, the dyad displayed higher values of non-smiling synchronicity (Type −1, humor = 1075, no humor = 14925). Asynchronous behavior (Type 0) was displayed during more time in the presence of humor (humor = 89560, no humor = 5960) due to the dyad experiencing one case of failed humor, which caused a misalignment that explains this difference. In segments AKH2 (Figure 35), which refers to the first punchline delivered by Ann, Kate did not smile (SIS 0) at all, as it will be discussed in more detail in Chapter 6, while also displaying other signs to indicate that she failed to appreciate or understand the humor.

Finally, the last dyad, DA, displayed higher values of smiling synchronicity with humor compared to when humor was absent from the conversation (Type 1, humor = 21952, no humor = 8639; Type 2, humor = 9732, no humor = 858). Conversely, when humor was absent from the conversation, the dyad displayed higher levels of asynchronicity (Type 0, humor = 16786, no humor = 28897) and non-smiling synchronicity (Type −1, humor = 7164, no humor = 19942).

Given the small sample that is included in this study and the expected non-normal distribution of smiling synchronicity data following the results reported in Gironzetti et al. (2016b, 2018) for computer-mediated conversations, the data analysis in Gironzetti et al. (2016b, 2018) was partially replicated by performing a non-parametric Friedman's 2-way ANOVA by ranks with multiple pairwise comparisons to analyze smiling synchronicity data. This analysis was performed in order to reveal whether there is a significant difference in the time participants display different synchronic behaviors when humor is present or absent, and also to compare the results of the current study on face-to-face conversation with the data from Gironzetti et al. (2016b, 2018) on computer-mediated interaction. The data are summarized in Figure 44, which shows the total time participants displayed a given behavior during humorous and non-humorous segments of conversation without differentiating by dyads.

The test result indicates that there is a significant difference between the time participants displayed a given synchronicity behavior (Types −1, 0, 1, and 2) during

humorous and non-humorous segments of conversation, $\chi^2(7) = 34.889$, $p < .001$. Wilcoxon tests were used to follow up on these findings. It appeared that the time participants displayed an asynchronous behavior did not differ from humorous to non-humorous segments of conversation, $T = 16$, $r = 0.33$, but did differ in the case of synchronous non-smiling behavior (Type −1), $T = 21$, $p = .028$, $r = 0.63$, in the synchronous smiling behavior (Type 1), $T = .00$, $p = .028$, $r = -0.63$, and the synchronous matching smiling behavior (Type 2), $T = .00$, $p = .028$, $r = -0.63$. Therefore, it seems that there is no difference in the time participants engage in asynchronous smiling behavior if humor is present or absent. However, there are significant differences in the time participants engage in the remaining three types of joint behaviors when humor was present or absent from the conversation, with significantly more time spent engaging in behaviors Type 1 and Type 2 when humor was present, and more time spent engaging in behavior Type −1 when humor was absent.

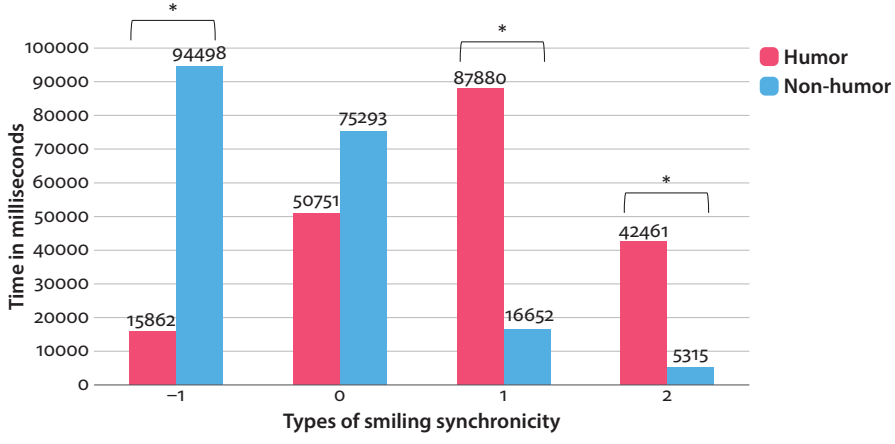

Figure 44. Smiling synchronicity for humorous and non-humorous segments (statistically significant differences marked with *)

4.6 Conclusions

This chapter explored the dynamics of smiling synchronicity and matching and how these relate to the presence and types of humor in face-to-face conversation. In Chapter 3, individual speakers were found to modify the intensity of their individual smiling behavior in the presence of humorous utterances in a conversation as a way to engage in the negotiation of the humorous framing and thus frame the utterance as humorous. The role of smiling as a relevant emotional expression

(Scarantino, 2017) for the negotiation of humor was then discussed, as smiling naturally expresses happiness and mirth, and socially communicates affiliation, appease, and a request for reciprocating the same behavior in the interlocutor.

In the present chapter, the analysis of both interlocutors' smiling behaviors led to the identification of specific patterns of smiling behavior displayed by the dyad, which in turn let to two conclusions. First, the relationship between smiling intensity and humor is not linear in time as hypothesized by folk theories of humor. If this were the case, a peak smiling pattern would be the most frequent smiling pattern, as smiling intensity would increase as the dyad approaches the delivery of the humorous phrase, peak at the delivery, and decrease right after. Second, the relationship between smiling and conversational humor is also not monologic but dialogic. That is to say, when speakers modify their smiling behavior, they do so in relation not only to the humorous utterance, but also in relation to their interlocutor's behavior, in a dynamic fashion that changes from dyad to dyad and from humorous utterance to humorous utterance.

Additionally, the existence of these smiling patterns and their dialogic nature further disproves the possibility of smiling being a discrete linear marker of conversational humor as it is not its mere presence, but the display of a higher smiling intensity coupled with a dialogic synergy between speakers what cues the humorous framing. In fact, by examining the dyads' smiling patterns, it was possible to notice that smiling intensity does not increase only after the humor was produced by the speaker, as a reaction to the humor, or only as the humorous utterance is being produced, in a linear manner (e.g., peak patterns in Figure 39 and 40). Indeed, this phenomenon was quite rare, occurring only twice in the corpus. Instead, participants were found to actively negotiate the pragmatic humorous intention of the text through smiling that was displayed before, during, and after the humorous instance was produced. This negotiation was not necessarily initiated by the speaker of the humorous utterance either, as the listener could be the first one to interpret the text produced by his or her interlocutor as humorous and marking it as such by means of increasing his or her smiling intensity. In this sense, the humorous pragmatic intention was not imposed by one speaker to the other but was negotiated by both speakers in the interaction.

More specifically, the analysis of smiling patterns illustrated how members of each conversational dyad negotiated the humorous framing of utterances in real time: through framing utterances as humorous by way of increasing their smiling intensity (jointly or individually), by means of adjusting their smiling intensity to the interlocutor's through accommodation gestures, and through marking the humorous phrase by contrast with the adjacent discourse (either with a deadpan delivery preceded and followed by smiling or, the opposite, with a peak smiling pattern preceded and followed by no smiling).

As shown in Table 9, joint framing smiling were the most frequent patters in the case of punchlines, while single framing patterns characterized most jablines and ironic comments. It is possible that the predictable structure of jokes, and the fact that both participants knew beforehand that they would tell a joke to each other at the beginning of the conversation, facilitated the display of joint smiling patterns by eliminating or reducing the need to first recognize the humor. Additionally, due to the data collection protocol employed for the study, most punchlines occurred at the very beginning of the conversation and were identified by the researcher as icebreakers. For these reasons, it is possible that participants felt compelled to display their friendliness, availability, and good disposition when the recordings started, and this affected their smiling behavior. On the other hand, the spontaneous nature of jablines and ironic comments could have made it more difficult for participants to display a joint smiling pattern. Thus, it is possible that while one participant was quicker to display their recognition of the humorous potential and frame the utterance as humorous through smiling, the other needed more time and their behavior was not captured in the time frame immediately surrounding the humorous utterance.

The analysis of four possible smiling synchronicity behaviors and their display during humorous and non-humorous portions of discourse showed that, albeit dyads differ among themselves, they all displayed synchronous smiling behaviors (Type 1 and 2) for a significantly higher amount of time during humorous portions of discourse and, conversely, they displayed synchronous non-smiling behavior (Type −1) for a significantly lower amount of time during humorous portions of discourse. Smiling synchronicity, then, appears to be associated with conversational humor, with higher values of smiling matching intensity showing a stronger relationship with humor. Additionally, as the display of smiling synchronicity was often shown to begin before the delivery of the humorous phrase, it seems that it is not a mere reaction to humor, as a potential signal of enhanced cooperation, affiliation, or understanding due to humor. On the contrary, since smiling synchronicity frames the delivery of the humorous phrase, it is possible that this behavior facilitates humor by means of enhanced cooperation, affiliation, and understanding.

The results presented here can be interpreted in light of what proposed by the *dialogue as synergy* model (§ 3.2.2), that is, that synchronization across verbal and non-verbal behaviors depends on the context of the interaction and the intentions of the individual participants and cannot be explained by earlier alignment models. As demonstrated by the numerous examples of purposeful and specific smiling synchronicity that characterized humorous but not non-humorous portions of discourse, interlocutors were not shown to simply align each other's behavior with the purpose to achieve a better understanding of each other, regardless of the context or topic being discussed, as this would have resulted in smiling mimicry,

for example, and could not explain the differences in smiling patterns across types of humor, humorous and non-humorous utterances, dyads, or at different points in time during the interaction. Instead, interlocutors aligned their smiling behavior in a time- and context-dependent fashion that varied based on the type of framing that was being negotiated (the examples of smiling patterns discussed here characterize humorous portions of conversation, but not no-humorous ones) as well as the type of humor and the characteristics of the dyad and individual participants. Although each participant and dyad behaved differently, they all showed a tendency towards *smiling dialogic synergy* when negotiating humorous but not non-humorous utterances, mostly through the display of synchronic smiling behaviors (including smiling intensity matching) and framing smiling patterns.

In line with embodied cognitive theories (see § 3.2.3), the results presented in this chapter support the idea that *smiling dialogic synergy* favors (successful?) humorous communication as interlocutors coordinate, within the constraints of the ongoing interaction, each other' smiling behavior as part of the process of reaching mutual understanding. The virtuous circle hypothesized by Attardo (2019), which would (roughly) have interlocutor A displaying a smiling expression, interlocutor B aligning with A, and as a consequence both experiencing mirth associated with smiling, could then not just be a mechanism to display humor support and favor the production or more humor and sustained humor. Instead, based on the data discussed in this chapter, I propose that this circle could in fact be part of the process by means of which participants negotiate the humorous framing of an utterance. This would be possible because smiling, as an emotional expression in the sense described by Scarantino (2017), can communicate the emotions being experienced by the person, as well as their social and communicative intentions. Facial mimicry, then, could indeed represent the beginning of an attempt to understand the interlocutor, as proposed by the facial feedback hypothesis, and as such could play a role in the negotiation of the humorous framing by means of triggering smiling reciprocity and putting smiling at the forefront of the available resources to interlocutors. However, the data discussed in this chapter show that interlocutors do more than that and rarely simply mimic each other's behavior. Instead, they were shown to continuously adjust their smiling facial display dialogically, at times leading the way and at times adjusting their behavior to the interlocutor, and mostly (or, in the case of some dyads, exclusively) when negotiating the framing of a humorous utterance.

To sum up, Chapter 3 showed that smiling, possibly due to the fact that it naturally expresses happiness and mirth which can be caused by humor, is a key emotional expression associated with conversational humor (e.g., the two tend to co-occur). But smiling also communicates socially relevant information, such as affiliation, cooperation, appease, and so on. Therefore, when smiling co-occurs

with conversational humor, it does not necessarily do so as the expression of an emotional reaction to it, but also, and I argue mainly, as a social signal that serves to facilitate the negotiation of the humorous framing of the utterance and, ultimately, that facilitates the interaction. This function of smiling was linked to changes in individual smiling intensity but not to differences in phony or genuine smiling, nor to the mere presence of smiling (e.g., some smiling was present throughout the conversations analyzed, even in the absence of humor), as individual participants were found to consistently increase their smiling intensity in the seconds immediately surrounding a humorous utterance.

Chapter 4 explored further the relationship between smiling and humor by looking at the dyad's behavior, as it is well known that behavioral synchronization is an important component of human interaction, with multiple social and communicative functions. The data analyzed in this chapter support a *smiling dialogic synergy* model in which smiling synergy serves to facilitate the negotiation of conversational humor. Not only participants were found to increase their individual smiling intensity in the presence of humor, thus placing smiling on the metaphorical table of available resource for the negotiation of the humorous framing, but they also showed greater smiling synchronicity and intensity matching, which decreased in the absence of humor, showing how smiling is acted upon as a dialogical resource in the negotiation of *humorous* framing.

Together, data from Chapter 3 and Chapter 4 illustrate why and how smiling is such a crucial element for the negotiation of the framing of conversational humor. Because smiling is a visual resource (but see Section 3.4.2 for a discussion of the role of smiling voice), then it follows that for interlocutors to be able to modify their individual smiling behavior with respect to the other's, they need to attend to their interlocutor's smiling facial areas. The following chapter, then, explores the relationship between humor, smiling, and interlocutors' gaze behavior by analyzing eye-tracking data from humorous and non-humorous portions of conversations.

CHAPTER 5

Eye movements

5.1 Introduction

This chapter deals with the study of eye movement during instances of conversational humor. The first two sections are meant for a reader who is new to eye-tracking, as there I discuss the basic principles of eye-tracking technology and then introduce the reader to the study of *eye movements* through an historical overview of *eye-tracking* technological and theoretical milestones. The more experienced reader can skip these two sections and move directly to Section 5.2.2, where I discuss how people process static and dynamic faces in light of the latest developments in the field related to social eye-tracking. The chapter then focuses on the functions of eye movements in interaction before moving on to discussing eye movements and their relationship with humor and smiling, and showing, through a data-driven discussion, that the presence of humor and smiling affect eye movements, and that where people look and how they look at each other's faces during humorous conversations supports and contributes to the negotiation of the humorous frame in interaction.

5.2 The study of eye movements

Eye-tracking is a research technique by means of which researchers can observe, record, and analyze eye movements while people perform different tasks. The way in which most modern eye-trackers work is through infrared lights. These lights are invisible to humans and are pointed towards the eye of a person to illuminate it and obtain a reflection. This reflection happens on the cornea, the transparent outer layer of the eye, and so it is called corneal reflection. Eye-trackers record this corneal reflection as well as the pupil of the eye while people move their eyes and estimate the gaze direction of a person relying on these two essential pieces of information (Holmqvist et al., 2011).

The eye position and its movement are then interpreted through a software into *fixations* and *saccades* by applying a set of algorithms. Fixations are eye movements during which the eyes slow down, showing only small gliding movements, so that the eye can acquire content, and are on average between 100 and 600 milliseconds

long. Saccades, on the other hand, are abrupt, fast eye movements that relocate the point of fixation of the eye, with an average length between 20 and 40 milliseconds. This process of interpreting eye movements into fixations and saccades facilitates the study of underlying emotional and cognitive processes linked to each of these movements.[1]

In the following section, I offer a brief sketch of the origins of eye-tracking technology and its latest technical developments. The focus will then shift towards the possibilities offered by modern portable eye-trackers for the analysis of dyadic conversations by first discussing how people look at each other's faces in static (e.g., pictures) and dynamic (e.g., face-to-face interaction) settings. Then, the chapter will move on to exploring how eye-tracking technology fits within an embodied approach to discourse as a coordinated activity by providing access to measures of participants' gaze, defined in this study as "the act of directing the eyes toward a location in the visual world" (Hessels, 2020, p. 856). Gaze data from the corpus will be discussed and analyzed to paint a rich picture of how gaze and smiling contribute to the negotiation of conversational humor.

5.2.1 Brief history of eye-tracking

Early eye-tracking technology dates back to the 1800s, with the first eye-trackers being highly invasive apparatus and difficult to operate. Among the pioneers of eye-tracking technology and research were Javal (1879), Hering (1879), Lamare (1892), Delabarre (1898), and Huey (1898, 1900). The highly invasive eye-trackers that were being employed at the time consisted of very different devices that relied on sounds and the physical movements of the eyes: a rubber tube applied to the open eye which allowed the researcher to listen to the sound provoked by eye muscle contractions (Hering, 1879); a wire that ran from a plaster cap attached to the eye to a lever, which drew horizontal lines as the eye moved (Delabarre, 1898); or a piece of a cup attached to the eye and to a thin aluminum pointer that responded to eye movements and registered them on a drum-cylinder (Huey, 1898, 1900). The first modern and much less intrusive eye-tracker was built by Buswell (1922) and used rays of light that were reflected on the subject's eyes and then recorded to show the subject's eye movements.

What is now known as the most important theoretical advance in the study of eye movements was made by Yarbus (1967), who recognized that saccadic eye movements are connected to cognitive processes and reflect the interest of the subject. In his study, Yarbus recorded for 3 minutes the eye movements of

1. As a side note, since these measures are theoretically defined and then calculated, it is important to note how these are defined in each study (see Hessels et al., 2018; Salvucci & Goldberg, 2000).

participants while they were examining the picture "The Unexpected Visitor" by Ilya Repin. Each time, participants had to complete a different task while viewing the picture: (a) freely examine the picture, (b) estimate the material circumstances of the family in the picture, (c) give the ages of the people, (d) infer what the family had been doing before the arrival of the visitor, (e) remember the clothes worn by the people, (f) remember the position of the people and objects in the room, and (g) estimate how long the visitor had been away from the family. Because people looked at the picture differently depending on the task they were performing, Yarbus was able to claim that eye movement reflect the underlying intentions of the person looking.

This theoretical advance is the basis of modern eye-tracking studies by means of which researchers can infer cognitive processing of subjects from their eye movements. However, it should be noted that attention and eye movements are not always associated in such a direct and clear-cut way, as people can also recur to covert attention to select and process visual information at a cued location without eye movements (Raz, 2004, p. 205). In fact, an object does not necessarily have to be gazed at in order to be perceived (unless we want to perceive it in detail), nor direct fixations on an object are necessary for informational uptake to occur (Gullberg & Kita, 2009). The time-locking hypothesis, according to which the cognitive processing of a stimulus goes on during the time the person is fixating on it (Holmqvist et al., 2011, p. 256), is known not to be entirely accurate. As stated by Rayner, although "it has become evident that eye movements are not a perfect reflection of cognitive processes […] they remain a rather good index of the moment-to-moment on-line processing activities that accompany visual cognition tasks" (Rayner, 1992, p. 2).

5.2.2 How people look at faces

Eye-tracking has been used as a technique for studying how people process their own or other faces for over fifty years since the work of Yarbus, employing different stimuli such as pictures, computer-generated images, videos, avatars, and recording of social interactions. Looking at, or avoiding, other people's faces and eyes are common strategies by means of which speakers negotiate framing and regulate the dynamics of ongoing conversations. Three terms are employed to refer to this set of behaviors: *mutual gaze*, when people look at each other's faces; *eye contact*, when they look at each other's eyes, and *gaze aversion*, when they avoid looking at each other and, more specifically, at each other's faces or eyes.[2] Facial expressions and

2. However, it should be noted that different studies have applied different definitions of gaze aversion, understood as avoiding looking at the interlocutor, their face, or their eyes.

gaze direction and patterns are rich communication channels that are attended to and interpreted along with, or in support of, the content of messages communicated verbally. Generally speaking, the scanning path that people follow when looking at faces resembles the one represented in Figure 45, a triangular or T-shaped path that touches the regions of the eyes and the mouth.

Several studies documented that people rely on this scanning path and tend to have a preferred fixation area when looking at faces, which often coincides with the nose or the eyes. However, the scanning path illustrated in Figure 45 has also been shown to be affected by numerous variables. Among the variables that affect the way people look at each other's face are the type of stimuli (e.g., we do not look at still or moving faces in the same way, Võ et al., 2012) and the task being accomplished (see Hessels, 2020, for a review of how people look at faces). For example, if we just need to adequately recognize a face, it has been shown that only two fixations are necessary (Hsiao & Cottrell, 2008), and that cueing the eyes, but not the mouth, improves facial recognition (Hills et al., 2011). Additionally, we also know that gaze patterns are different when we look at our own or other people's faces (Fu et al., 2012; Hu et al., 2014), and faces of our own and other races (Arizpe et al., 2016). Culture is an additional variable that modulates how people look at faces (Blais et al., 2008; Caldara et al., 2010; Miellet et al., 2013; Haensel et al., 2020). For example, in a recent study by Haensel et al. (2020), which employed a paradigm similar to the one used in the present study, head-mounted eye-trackers were employed to research how people from different cultural backgrounds (UK and Japan) scan each other faces during face-to-face conversations. Their findings showed differences in terms of facial area preference (UK participants focused more on the mouth while Japanese participants preferred the eyes), but also similarities that point towards socialization effects consistent with previous studies on Western

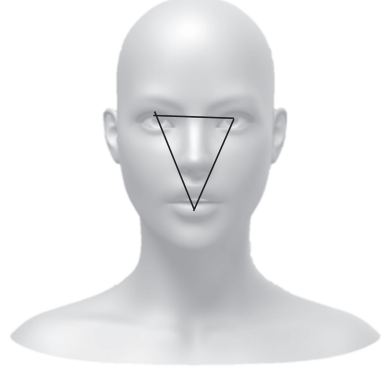

Figure 45. Scanning path during face processing

populations (increased look at the interlocutor's face for listeners vs. speakers, and for introductory tasks vs. storytelling).

Despite these differences, recent studies also showed that individuals display unique and relatively stable scanning paths across tasks and time, thus pointing to the existence of idiosyncratic visual scanning strategies (Mehoudar et al., 2014), and a relatively stable preferred fixation area and gaze patterns – in terms of location and duration of fixations – for each individual (Peterson et al., 2016; Rogers et al., 2018). Thus, based on the studies discussed so far, it seems that every person has their own baseline of gaze behaviors and visual scanning strategies but that these are modulated by a wide range of cultural and contextual variables.

5.2.3 Social eye-tracking

Until very recently, most eye-tracking studies on social attention investigated how people look at faces using static images of faces, often manipulated by the researchers to appear in isolation or to express different emotions. These controlled laboratory studies have been criticized in a call for higher ecological validity in the study of social attention (Hayward et al., 2017; Kingstone, 2009; Smilek et al., 2006). Because these laboratory studies "are so simple and controlled that the situational complexity that is critical to social attention is lost" (Kingstone, 2009, p. 52), they cannot adequately capture how gaze functions in real-life interactions when people are free to look anywhere and their gaze is affected by a wide range of factors, including the interlocutor's gaze. One important limitation of studies that presented participants static images in a laboratory setting, for example, is that their findings cannot necessarily be applied to how people look at real-life, moving faces, as we know that gaze patterns change depending on what the face is doing, such as being silent or speaking (Võ et al., 2012). Nonetheless, this strand of research provided useful insight into how people perceive other people's faces and expressions (e.g., Blais et al., 2008; Jack et al., 2009, on the influence of cultural background on gaze patterns) and built the basis for social eye-tracking research of face perception in interaction.

Instead of simplifying the experimental context in order to control it and, thus, trying to discover causal relationships between factors that could be universally valid, Kingstone (2009) suggest researchers should first study social attention "in the wild," and only at a later stage move to controlled laboratory studies. Following Kingstone' suggestion, the project discussed in this book contributes to filling the gap that currently exists in the study of social attention by looking at gaze behavior in (semi-)naturalistic social situations where people interact with each other face-to-face.

Since gaze behavior is an essential element of social interactions, the need to research gaze in face-to-face interactions and in real-time was recently recognized as one of the pending goals of eye-tracking studies (Pfeiffer et al., 2013). This area of study is currently experiencing a rapid growth and attracting a lot of research attention. In order to understand the value and functions of gaze behavior, then, it is necessary to go past the use of static displays that dominated earlier studies (and is still widely employed in recent experimental ones) and take advantage of the latest technological development to increase the ecological validity of eye-tracking research.

Before non-intrusive wearable or portable eye-tracking devices (such as eye-tracking glasses) became more accessible and easily available, interactions involving people having a face-to-face conversation were studied mostly by recording the participants' gaze using a video camera (e.g., Kendon, 1967; Williams et al., 2009), eye-tracking just one participant in a multi-party interaction[3] (e.g., Vertegaal et al., 2001), or having participants interact through a computer-mediated device, such as video-conferencing (e.g., Raidt et al., 2007). The application of eye-tracking methodology to social settings is a recent and novel development of eye-tracking research (e.g., Brône & Oben, 2015; Broz et al., 2012; Rosengrant et al., 2012) made possible by the availability of wearable and portable eye-trackers, in contrast to traditional eye-trackers that required participants to use a chin rest and have their head strapped in the machine (Duchowski, 2007). New portable eye-trackers have enabled the broadening of eye-tracking methodology to social situations, allowing researchers to study eye movements as they occur in (semi-)naturalistic settings (including when people are playing sports, grocery shopping, driving, etc.) as well as multiple participants' interactions, collecting and examining online measures of interactional dynamics. This new application of eye-tracking technology is often referred to as social or dual eye-tracking (Barisic et al., 2013; Broz et al., 2012; Cheng et al., 2015; Pfeiffer et al., 2012; Gironzetti, 2017a; Macdonald & Tatler, 2018). For the purpose of this study, the term *social eye-tracking* will be preferred in order to emphasize the possibility of studying eye movements in semi-naturalistic social settings, thus increasing the ecological validity of eye-tracking studies, over the number of participants being tracked at the same time.

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3. This technique, known as appearance-based gaze estimation (Zhang et al., 2015) has undergone major improvements in recent years, an example of which is OpenFace, a freely available open-source toolkit (https://github.com/TadasBaltrusaitis/OpenFace) (Baltrušaitis et al., 2016, 2018; Fydanaki & Geradts, 2018). Another recent technological development in the same line is MAGIC, A Multimodal Framework for Analysing Gaze in Communication (https://github.com/ulkursln/MAGiC), a toolkit for integrating gaze, audio, and video data for the study of multimodal communication in face-to-face interactions (Arslan et al., 2018).

One of the foci of attention of early social eye-tracking studies have been the different functions of mutual gaze (when two people look at each other's face) and eye contact (when two people look at each other's eyes) among conversational partners. Results in this area indicate that these two gaze behaviors serve multiple purposes, including that of signaling the intention or willingness to start an interaction (Cary, 1978), regulating turn-taking (Beattie, 1978), distributing conversational roles (Vertegaal et al., 2001), and indicating higher levels of attraction, attention, and familiarity (Kleinke, 1986). In addition, factors such as age, gender, familiarity, conversational role (speaker or listener), type of utterances, and cultural background have been shown to have a strong influence on the gaze behavior of participants in a conversation (Anolli & Lambiase, 1990; Kendon, 1967; Knackstedt & Kleinke, 1991; Levine & Sutton-Smith, 1973).

In the last few years, social eye-tracking studies have begun to attract more interest for the study of interactional discourse within the fields of cognitive linguistics and ecological psychology, among others. A useful and recent overview of eye tracking studies of human interaction, which encompasses early and recent studies including those employing wearable eye trackers and dual eye-tracking ones, is provided in Valtakari et al. (2021). Within this social paradigm, portable eye-trackers have been used to research gaze behavior in a multi-person setup. Broz et al. (2012) researched mutual gaze during face-to-face conversations with the goal of informing human-computer interaction. In their study, the authors found that mutual gaze behavior depends on the characteristics of both partners and that participants spent just 46% of the time displaying mutual face gaze behavior, which may indicate that gaze cues displayed during interaction may be followed covertly and/or may be looked at only briefly but at specific and strategic moments (Macdonald & Tatler, 2018). Ho et al. (2015) employed wearable eye-tracking devices to record and analyze the moment-to-moment temporal characteristics of turn-taking in a natural setting where dyads played two social guessing games and found evidence for a turn-taking regulatory function of gaze during face-to-face interaction, with gaze aversion used to mark the beginning of a turn, and direct gaze, the end of it. Consistent with these results are the findings of Brône et al. (2017), who looked at how speakers used gaze to negotiate their conversational role in dyadic and triadic interactions from the *In Sight Interaction Corpus* (Brône & Oben, 2015) and found that speakers avert their gaze before starting a new turn. Vranjes et al. (2018) expanded this line of research to face-to-face interpreter-mediated dialogues. Their results show that the interpreter's gaze contributes to turn-taking by selecting the next speaker in a tripartite interaction involving extended narrative sequences.

Social eye-tracking has also attracted the attention of humor scholars, as demonstrated by a set of studies focusing on dyadic humorous exchanges (Gironzetti et al., 2016a, 2016b; Gironzetti, 2017a, 2017b, 2021a). Results from these studies showed that the eyes and the mouth areas receive distinct attention by speakers when compared to non-humorous exchanges by the same speakers, a finding that was linked to the function of smiling as a non-discrete cue of conversational humor (Gironzetti et al., 2018). Together, these findings suggest that speakers rely on the visual cues of smiling and gaze to negotiate the pragmatic value of what is being said while it is being said. While speakers tended to look at the interlocutor's eyes and mouth during an interaction, these studies showed that their gaze behavior differs depending on the type of stimuli and task being accomplished.

This line of research has recently been expanded by Brône (2021), who also employed eye-tracking to research the multimodal negotiation of humorous irony in interaction, recognizing that "how interactants jointly manage the complex negotiation operation involved" (p. 117) is a largely unexplored area of inquiry, and even more so if we attend to the role of eye gaze in naturally occurring interactions. To date, Brône (2021) study is the only one, in addition to the work presented in this volume and publications originated at the Applied Linguistics Laboratory at Texas A&M University-Commerce (Gironzetti et al., 2016a, 2016b; L. Pickering et al., 2016; Gironzetti, 2017a, 2017b, 2021a), to address this topic. Two significant differences between Brône (2021) and previous studies should be noted: in this book and previous works by Gironzetti on the same data set, portable non-wearable eye-trackers were used and participants interacted in dyadic conversations; in the study by Brône, wearable eye-trackers were employed, and participants interacted in triadic conversations as part of the *In Sight Interaction Corpus*. The main findings from Brône (2012) concern gaze shifts and mutual gaze as they occur with humorous and non-humorous turns in conversation. Humor was found to co-occur with significantly more gaze shifts by one of the listeners from the speaker of the humorous turn to the other listener, which Brône interprets as a strategy to monitor the other listener response or as a way to engage in the joint humorous pretense. Humor was also found to co-occur with more and longer instances of mutual gaze between listeners (but not with the speaker of the humorous turn) as a strategy to establish mutual understanding and a sense of complicity, and it was not directly linked to the production of more gestures or body movements.

The limited number of studies that successfully implemented a dual or social eye-tracking approach, and more so to study humor, highlights the need of conducting more research in this area to understand the function of gaze in two-person or multi-party interactions. Additionally, the results of social eye-tracking studies underscore the value of conducting research within real-life situations, since

individual gaze behavior varies greatly from one person to another depending on individual characteristics and preferences, as well as the context of the exchange being studied (Rogers et al., 2018). In the next sections of this chapter, different functions of eye movements are explored to then move on to a data-driven discussion on the relationship between conversational humor, smiling, and gaze.

5.3 Social, affective, and cognitive functions of gaze

Kendon (1967) represents a landmark in the study of human gaze direction and functions. Several conclusions from his study, summarized in Table 10, are still very relevant to today's research agenda and central to the multimodal study of humor in conversation, as represented by the sample additional references in Table 10. One of the ways in which people use gaze to accomplish these functions is by means of alternating between mutual gaze and gaze aversion, that is, alternating between looking at each other's face, including making eye contact, or avoid looking at each other's face, including avoiding eye contact with the interlocutor. As seen in Table 10, both behaviors can accomplish different functions, all potentially relevant for producing and processing humor and smiling in conversation.

Regarding the *social function* of gaze, Goffman (1967) already pointed out that mutual gaze is a signal of social availability, indicating someone's willingness to engage:

> If the individual is to become involved in a topic of conversation, then, as a listener, he will have to give is aural and usually visual attention to the source of communication, that is, to the speaker, and especially to the speaker's voice and face.
>
> (p. 123)

Later on, several studies confirmed the importance of gaze for social and conversational purposes, including regulating the length of conversational turns, turn-taking, and holding the floor (Richardson & Dale, 2004; Morency et al., 2006; Cummins, 2012; Kawahara et al., 2012; Andrist et al., 2013; Jokinen et al., 2013), while also showing how gaze behavior of interlocutors varies across different types of activities (e.g., multi-unit turns or turn-by-turn talk, Rossano, 2013). Additionally, gaze aversion has been shown to vary based on the conversational role of participants (i.e., speaker or listener, Goffman, 1981) and the dialogic coordination of actions between conversational partners (Bavelas et al., 2002).

Table 10. Key functions of gaze (based on Kendon, 1967) with examples and sample references

Social: gaze serves a regulatory function of turn-taking and speaker-listener selection	
Examples	Gaze aversion to hold the floor while speaking; listeners gaze at the interlocutor for longer, speakers gaze at the interlocutor more frequently but for shorter periods of time, alternating mutual gaze and gaze aversion.
References	Argyle and Cook (1976); Cook (1977); Duncan and Fiske (2015/1977); Bavelas et al. (2002); Morency et al. (2006); Ho et al. (2015).
Cognitive: gaze serves a monitoring function of the interlocutor attention, emotions, and intentions	
Examples	Gaze aversion to avoid monitoring the interlocutor (reduce visual input) and thus reduce cognitive load, improve cognitive processing, and focus on planning upcoming utterances.
References	Beattie (1981); Glenberg et al. (1998); Doherty-Sneddon et al. (2001); Doherty-Sneddon and Phelp (2005); Markson and Paterson (2009); Abeles and Yuval-Greenberg (2017).
Emotional: gaze serves an expressive function to regulate emotionality and arousal	
Examples	Mutual gaze is inversely related to smiling rate.
References	Kleinke (1986); Kendrick and Holler (2017).

In relation to the *cognitive function* of gaze, also known as the cognitive overload-visual interference hypothesis, several studies confirmed that people tend to look away from the interlocutor's face when they are thinking, planning what to say next, talking about complex topics, or completing demanding cognitive tasks[4] because this allows them to reduce the visual input that would otherwise be processed and so interfere with these complex activities (Glenberg, Schroeder, & Robertson, 1998; Abeles & Yuval-Greenberg, 2017). These patterns of gaze aversion in response to cognitive difficulty were shown to be acquired by 8 years of age (Doherty-Sneddon et al., 2002), as they do not characterize the behavior of younger children. While the cognitive function is not the only function of gaze aversion, it

4. The hypothesis that interlocutors' faces would be interfering with people cognitive processes during conversation, in particular when thinking and speaking, has also been criticized and partially disproven (Ehrlichman, 1981). In this study, through the use of electro-oculography technique to monitor eye movements, subjects were shown to be affected by the display of the interlocutor's face when listening to questions but not when thinking or speaking. Changes in gaze patterns during face-to-face conversations were attributed to two opposing tendencies, the tendency to monitor the other's facial expressions, which explains why people do look at the face of their interlocutor, and the tendency to make saccadic eye movements during thinking and speaking, which explains why they tend to look away (Ehrlichman, 1981, p. 233).

has been often considered to be its primary one, more important than its social or emotional functions (Doherty-Sneddon & Phelps, 2005).

Finally, mutual gaze and eye-contact have also been shown to serve an *emotional function*, such as signal liking and interest (Bayliss et al., 2006; George & Conty, 2008; Bayliss et al., 2007), while negative evidence has been provided for gaze aversion as a marker of insincerity (Vrij et al., 2001; Einav & Hood, 2008). Additionally, gaze direction also affects the recognition of emotional facial expressions, since "when gaze direction matches the underlying behavioral intent (approach-avoidance) communicated by an emotional expression, the perception of that emotion would be enhanced" (Adams & Kleck, 2005, p. 3). For example, facial expressions of fear and sadness tend to be recognized faster and more accurately when paired with gaze aversion, while facial expressions of happiness are recognized faster and more accurately when accompanied by direct gaze (Sander et al. 2007). Adams and Kleck (2005) also found evidence that joy, as an approach-oriented emotion, is more accurately recognized and perceived as more intense when accompanied by direct gaze.

From this brief review of the functions of different types of gaze behaviors, several aspects emerge as potentially relevant for the study of humor and, specifically, conversational humor, since humorous utterances are cognitively complex to process, can occur at any point in the conversation, can be used with affiliative or disaffiliative purposes, and can be associated with positive or negative emotions. Therefore, the study results presented in Section 5.4 below are exploratory in nature, attempting to offer a first description of gaze behavior occurring during conversational humor episodes.

5.3.1 The processing of written irony

Given that the focus of this volume lays on the multimodal study of humor in conversation, this section focuses on the application of eye-tracking to the study of humor in writing and oral exchanges. Although the study of written humor falls outside the scope of this manuscript, this parenthesis is warranted by the relevance of the results, which contribute to our understanding of how humorous texts are processed.

The study of humor by means of eye-tracking is an under-researched area, with the exception of written irony, which has received a fair share of scholarly attention. The study of eye movements while reading has contributed to shed light on the online processes underlying the comprehension of written irony, as attested by the numerous publications on this topic in the last few years (Filik & Moxey, 2010; Filik et al., 2014; Kaakinen et al., 2014; Au-Yeung et al., 2015; Olkoniemi et al., 2016, 2019; Ţurcan & Filik, 2016, 2017; Filik et al., 2017, 2018).

Most of these studies focused on the time course of processes involved in computing the meaning of an ironic statement and consistently found irony interpretation to be more effortful, in late processing measures, than non-ironic interpretation (Kaakinen et al., 2014; Au-Yeung et al., 2015; Ţurcan & Filik, 2017; Olkoniemi et al., 2019), unfamiliar ironic statements to be more costly to process than familiar ones (Filik et al., 2014; Ţurcan & Filik, 2016), and positive irony more costly than critical irony (Adler et al., 2016; Adler, 2018). Olkoniemi et al. (2016) showed that while irony and metaphors processing are similarly effortful to process, difficulties in processing metaphors affected early-measures (e.g., first fixation duration, first-pass reading time) and difficulties in processing irony were evident in late-measures (e.g., rereading). Moreover, while early studies (Filik & Moxey, 2010; Filik et al., 2014) found support for the Graded Salience Hypothesis (Giora, 1997), a more recent study by Filik et al. (2018) found evidence in support of the Default Hypothesis of irony processing (Giora et al., 2015) by showing that non-default interpretations of utterances (i.e., a sarcastic interpretation of an affirmative utterance) required more processing effort (e.g., rereading) than default interpretations. Additionally, Filik et al. (2017) applied eye-tracking to research the emotional impact of ironic versus literal criticism by monitoring eye movements while people read short stories with ironic and non-ironic comments providing the victim or the protagonist point of view. The comparison of early and late measures showed how readers' interpretation changes as text comprehension progresses, moving from an initial response to the negative aspects of ironic criticism towards a more positive interpretation of its functions which considers the speaker's motivations.

Recently, and with the goal of helping the field moving forward by means of integrating the latest findings into the development of updated theories of irony, Olkoniemi and Kaakinen (2021) conducted a comprehensive meta-analysis on eye-tracking studies that looked at the processing of written irony and reported early (e.g., first pass fixation time) and late (e.g., look-back time, look-from time, total fixation time, and regression path duration) processing measures. The 10 studies included in the analysis after initial screenings were coded for study design, number of participants and items, and language used; means and standard deviations for eye movement measures and comprehension scores were extracted for ironic and literal conditions. The authors concluded that the processing of written irony is characterized by increased rereading of the ironic phrases and returns to the preceding text context, which is affected by context-, phrase-, and reader-related factors.

5.3.2 Eye movements and humor

Far less numerous are the studies combining eye movements and humor. On written jokes, Mitchell et al. (2010) employed head-mounted eye-trackers to monitor participants gaze behavior while reading jokes and non-jokes that, however, included idiomatic expressions that had to be processes nonliterally. The goal of the study was to determine the role of context in the processing of humorous texts. Their results, contrary to what predicted by most theories of humor processing, found shorter reading times for jokes than non-jokes, and fewer regressions for jokes than non-jokes.

Similarly, Ferstl et al. (2016) analyzed participants' eye movements while reading jokes and non-jokes requiring a revision to test the two-stage model of joke comprehension (incongruity and resolution) according to which humorous incongruities are more costly to process in terms of time and cognitive effort. For the study, they employed a non-portable eye-tracker with a chin rest. Their results, in line with Mitchell et al. (2010), found that jokes were read faster and with fewer regressions than non-jokes, thus supporting the author's hypothesis that, at least under certain conditions, humor appreciation facilitated text comprehension.

Williams et al. (2009) looked at eye contact during the production of sarcastic statements and found that these were accompanied by greater gaze aversion than sincere utterances with a general decline from each speaker's baseline. Simarro Vázquez et al. (2020) used portable, non-wearable eye-trackers to examine how people processed multimodal tweets that included an image and a written caption. Their results show that the image was the most salient element, and thus was attended to first by most participants, followed by the caption, on which participants spent the most time.

Last, partial results of the current study were reported in Gironzetti et al. (2016a, 2016b) and Gironzetti (2017a, 2021a), in which the analysis of eye movements and humor in dyadic face-to-face conversations led to findings that show that the presence of conversational humor correlates with greater gaze aversion than the absence of humor. The authors hypothesized that these results may be caused by the higher cognitive load associated with processing the humorous incongruity as well as by the type of humor.

5.4 Social eye-tracking for conversational humor

The original results reported in the following sections concern the analysis of participants' eye movements during humorous and non-humorous portions of conversations with the goal of further exploring the relationship between conversational humor, smiling, and eye movements. Eye movements were recorded for each participant by means of two portable eye-tracking devices at a sampling rate of 60 Hz, thus allowing for the study of fixations on two areas of interest (AOIs): the eyes and the mouth (see Figure 5.2). These areas of interest were dynamic, and expert defined (Holmqvist et al., 2011, p. 279) based on previous studies on smiling and facial expressions (see Appendix A for the complete research protocol, and Chapter 3 for a discussion of previous studies on smiling). As a result, for example, the eyes AOIs were drawn to include the crow's feet area on the sides of the eyes, a frequent indicator of FACS AU6 (§ 3.3.1). Each AOI was manually adjusted for size and position in order to follow and accommodate the participants' movements and facial expressions.

5.4.1 Gaze to the interlocutor's smiling facial areas: Eyes and mouth

There are different ways in which one can approach the study of eye movements and conversational humor. In this section, we begin by considering the smiling expression as a whole, thus looking at gaze to the smiling facial areas (the eyes and the mouth) jointly. In the following sections, we will consider gaze to the eyes and, separately, gaze to the mouth.

On average, and despite the fact that the eyes and the mouth are two of the three focal points that interlocutors attend to when processing faces (§ 5.2.2), participants looked more at their interlocutor's smiling areas during humorous segments of conversation (23% of the time) rather than non-humorous ones (21% of the time). In the absence of humor, people also employed longer fixations (186 msec on average) than in the presence of humor (168 msec on average). However, the result of a multivariate test performed on participants' fixation data revealed no significant effects, as the attention that the mouth and the eyes received varied across participants and across humorous and non-humorous segments of discourse. Thus, the presence or absence of humor does not significantly affect participants' gaze duration (humor $M = 4145.5$ msec; non-humor $M = 4048.833$ msec) or fixation duration (humor, $M = 167.61$ msec; non-humor, $M = 186.40$ msec) to the interlocutor' smiling facial areas when considered jointly (gaze, $F(1, 22) = .009 =$, $p = .924$; fixation duration, $F(1, 22) = .161$, $p = .692$). These results indicate that the difference between how participants look at their interlocutor's facial smiling areas with and without humor may be significant only for one of the two facial areas, but not the smiling expression as a whole.

Table 11 summarizes eye movement data per participant with color-coded dyads across humorous and non-humorous segments of conversations. Figure 46 illustrates the percentage of time participants looked at their interlocutor smiling facial areas (mouth and eyes combined) during humorous and non-humorous segments of conversations.

Both Table 11 and Figure 46 highlight the degree of individual variation in the duration of each participant's gaze behavior, consistent with previous studies according to which people display idiosyncratic visual strategies or individual baselines that may differ from one person to the other (see § 5.2.2). In terms of percentage of time spent looking at the interlocutor's smiling facial areas, 7 participants did so more in the absence of humor, while 5 did so more in the presence of humor. In some cases, the difference between humor and non-humor is subtle, as in the case of Andy (humor, 17% or 4195 msec; non-humor, 17% or 4351 msec), while other times the difference is very large, as in the case of Yoan (humor, 45%; non-humor, 12%). Similarly, even though the average fixation duration across dyads is longer in the absence of humor versus its presence (humor, 168 msec; non-humor, 186 msec), each participant again showed high degrees of individual variation (Table 11) with some going against this trend (e.g., Emma displayed longer fixations with humor).

Table 11. Gaze time, fixation counts, and average fixation duration on smiling facial areas (mouth and eyes combined) with and without humor

	Non-humor			Humor		
	Gaze (msec)	**Fixation counts**	**Avg. fixation duration (msec)**	**Gaze (msec)**	**Fixation counts**	**Avg. fixation duration (msec)**
Jake	2807	34	82.55	1838	22	83.54
Yoan	2452	20	122.6	9033	54	167.27
Emma	4225	33	128.03	4533	21	215.85
Jane	2432	22	110.54	4221	26	162.34
Tony	2570	15	171.33	1417	11	120.63
John	5139	48	107.06	7625	43	177.32
Hans	3362	34	98.88	2180	26	83.84
Andy	4351	9	483.44	4195	14	299.64
Ann	7943	44	181.65	4141	26	159.26
Kate	567	6	94.5	1781	30	59.36
Dani	6254	13	481.07	2743	9	304.77
Amy	6484	37	175.24	6039	34	177.61
Avg.	4049	26	186	4145	26	168

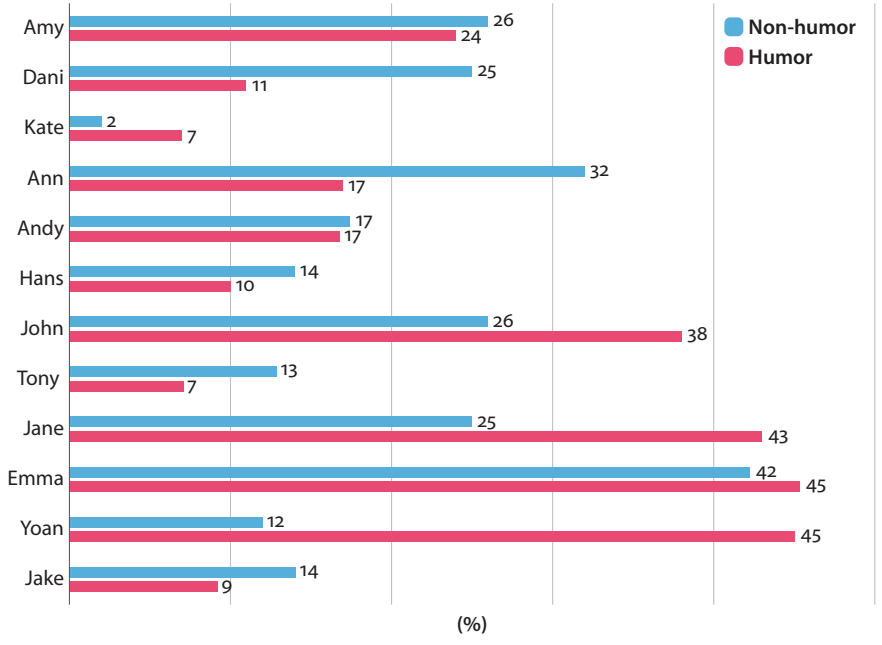

Figure 46. Percentage of time participants looked at their interlocutor smiling facial areas (Mouth and Eyes Combined) during humorous and non-humorous segments of conversations

While we saw that on average participants looked more at their interlocutor's smiling facial areas during humorous segments of conversation rather than non-humorous one (23% and 21% of the time, respectively), this difference was not significant for the smiling expression as a whole, as the attention that the mouth and the eyes received varied across participants and across humorous and non-humorous segments of discourse. This prompted a separate analysis focusing on each area of interest, the eyes and the mouth, separately, to understand how each contributed to conversational humor.

5.4.2 Gaze to the interlocutor's eyes or mouth

When considering only gaze to the interlocutor's mouth, overall, the mouth was attended to alternatively by participants in the same dyad: while participant A was ignoring or paying less attention to the mouth area of participant B, participant B was considering and/or paying more attention to the mouth area of participant A, and vice versa, as shown in Figure 47.

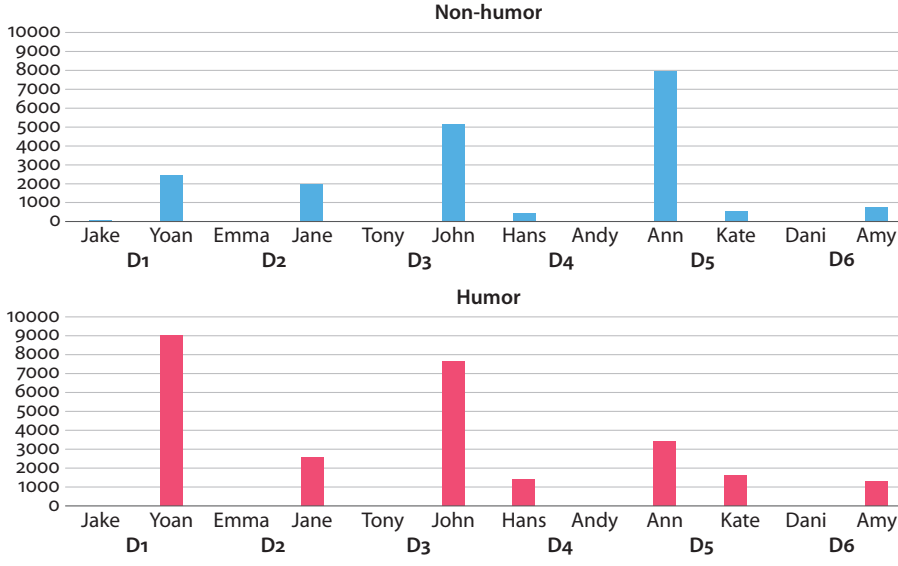

Figure 47. Gaze (in msec) to the interlocutor's Mouth with and without humor

As shown in Figure 47, regardless of the type of discourse, one participant in each dyad tends to spend more time looking at the interlocutor's mouth (namely, Yoan, Jane, John, Hans, Ann, and Amy), with generally more time spent looking at the interlocutor's mouth with humor (humor M = 2243.83 msec; non-humor M = 1615.66 msec). Nonetheless, the total duration of gaze to the interlocutor's mouth is higher for humorous exchanges. The one exception to this tendency is Ann, whose gaze duration values to Kate's mouth are consistently higher than her interlocutor both in the presence and absence of humor (with humor having lower values than non-humor). This behavior will be discussed in more detail in Chapter 6 in relation to failed humor.

A similar phenomenon was observed for the eye's region of the face, with a high degree of individual variation in participants' behavior, ranging from a complete lack of fixations on the eyes (Yoan and John) to high values for total gaze to the interlocutor's eyes in the case of Dani and Amy, as summarized in Figure 48. In this case as well, it seems as while participant A was ignoring or paying less attention to the eyes area of participant B, participant B was considering and/or paying more attention to the eyes area of participant A, and vice versa.

As shown in Figure 48, regardless of the type of discourse, one participant in each dyad except D6 tends to spend more time looking at the interlocutor's eyes (namely, Jake, Emma, Tony, Andy, and Ann), with generally more time spent looking at the interlocutor's eyes without humor (humor M = 1919.58 msec; non-humor

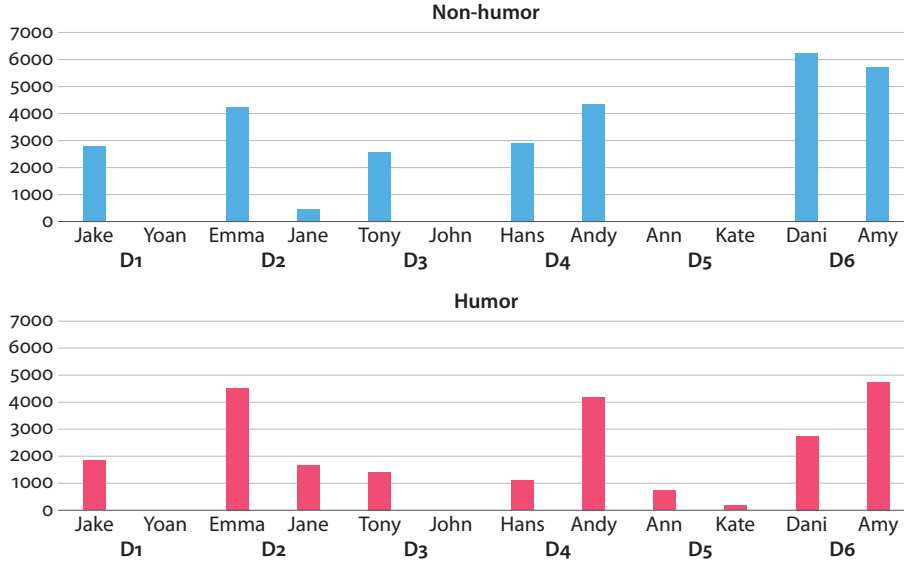

Figure 48. Gaze (in msec) to the interlocutor's Eyes with and without humor

M = 2442.91 msec). Interestingly, this tendence complements what was previously discussed regarding gaze to the mouth, as if while one member of the dyad is gazing to the interlocutor's mouth and the other is gazing at their interlocutor's eyes.

In the case of interlocutors' gaze behavior to the eyes summarized in Figure 48, two exceptions are worth considering. One of them is Ann's behavior in dyad 5, which was mentioned previously with respect to her gaze to the mouth and will be discussed in more detail in Chapter 6 in relation to failed humor. The other is the behavior of dyad 6, Dani and Amy, as they both displayed high values of gaze to the eyes, and more so in the absence of humor, in contrast to the behavior of the other dyads. The overall high values of gaze to the eyes of the interlocutor for both members of this dyad are well above the average values in the corpus (D5 average, 3748.5 for humor, 5994.5 for non-humor; CORPUS average, 1565.8 for humor, 1732.6 for non-humor). This may be an indicator that the two participants got along exceptionally well, and they both search for more opportunities for mutual gaze and eye contact as a display of camaraderie and engagement, in line with previous findings (see § 5.3 and works by Bayliss et al., 2006; George & Conty, 2008; Bayliss, et al., 2007).

5.4.3 The effect of conversational role on gaze

The study of the effect of conversational role on gaze revealed that speakers display higher fixation duration values (M = 700 msec) than listeners (M = 200 msec) when looking at the interlocutors' mouth during humorous segments of conversation, as shown in Figure 49.

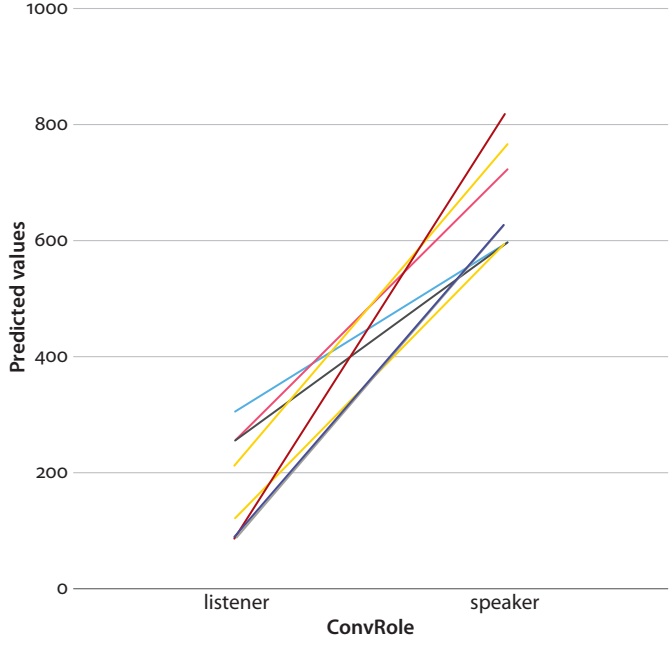

Figure 49. Gaze to the interlocutor's Mouth with humor by participants' conversational role

Figure 49 shows a comparison between the average time participants look at the interlocutor's mouth when they are the speakers or the listeners of a humorous utterance, with each line representing one participant in their two possible conversational roles, speaker or listener. In all cases, speakers' values are higher than listeners' values, which means that in the presence of humor, the same person would modify their gaze behavior depending on their conversational role: when they are the speaker, they would spend more time looking at the interlocutor's mouth compared to when they are the listener.

Based on the initial exploration of gaze data presented in the previous sections, the tendency of each member of the dyads to specialize in gazing to the interlocutor's mouth or the eyes (see Figure 47 and 48) was further explored in relation to

the dominant conversational role as speaker or listener of the humorous utterances. In order to do so, each segment of humorous discourse was coded for speaker and listener role based on who uttered the humorous utterance and each non-humorous segment was coded based on time speaking (the person who spoke the most during the segment was marked as speaker, and the other as listener).

Changes in gaze behavior linked to participants' conversational role can be interpreted as examples of the regulatory function of gaze for turn-taking and speaker-listener selection, as well as a potentially humor-specific function of gaze. Therefore, in order to understand whether this behavior is specific to humor or not, humorous and non-humorous segments of conversation were compared. No significant differences were found when considering non-humorous segments, which indicates that this individual gaze preference is not a feature of conversation in general. When considering humorous segments, the analysis led to significant findings only in the case of dwell time (measured in fixation duration) to the interlocutor's mouth (see Figure 49), $b = 508.29$, $t(46) = 2.586$, $p = .013$.

These findings point to a specialized gaze behavior for humorous discourse and only in relation to the mouth area, modulated by the conversational role of interlocutors: being the speaker of a humorous utterance predicts longer dwell time (total fixation time) to the mouth of the interlocutor. Additionally, the lack of significant results in the case of non-humorous discourse indicate that this specialized gaze behavior may emerge due to the characteristics of humorous discourse and is potentially linked to the role of smiling as discussed in Chapters 3 and 4. If this were the case, that is, if further studies were able to replicate and confirm that speaker's dwell time to the mouth of the interlocutor is significantly longer for conversational humor, then this behavior could be considered a humor *marker* (intentional but not always co-occurring) or even an *indicator* (intentional and always co-occurring, see Table 2). As such, then, longer dwell time to the interlocutors' mouth would be an expected behavior of speakers of conversational humor. The presence of this behavior could serve to make the mouth more salient, possibly due to the relevance of smiling, as discussed in Chapters 3 and 4. By looking for longer at the interlocutors' mouth, the speaker could draw the interlocutor's attention to their own mouth (that is being looked at) to encourage or elicit smiling, and/or draw attention to the speaker's mouth displaying a smile.

The following sections include a more in-depth statistical analysis of the data with the goal of shedding light on the relationship between smiling, conversational humor, and gaze behavior.

5.5 Linear mixed model analyses

In this section, I discuss the last step of the data analysis for gaze, which required the use of a linear mixed models, a statistical procedure that allows to account for a number of characteristics of the present study, including unbalanced data points, correlated measures, and individual variation. Because this statistical procedure is not as widely used as others, this section begins with a general explanation of what linear mixed models are, and then moves on to the actual data analysis. The data analysis will focus on significant results but will also include a discussion of not significant findings with a moderate effect, in line with recent discussions that recognize the use of *p* values as arbitrary thresholds of significance as problematic.

Linear mixed models were used to analyze two eye movements metrics (gaze duration and average fixation duration) for each participant on smiling facial expression (eyes and mouth combined), as well as for each AOI (mouth and eyes) separately. This statistical procedure was chosen in order to account for a number of variables and factors: the unbalanced number of data points collected for each participant (which depended on how many instances of humor were produced in each conversation), the repeated measures design (each participant's gaze data were measured at different points in time, with one data point corresponding to one segment of conversation), the correlated measures (such as the presence of humor and the smiling intensity score of participants), the individual variation in participants' eye movements, the individual baseline of each speaker' smiling intensity score, and the fact that participants were grouped in different conversations. Mixed effects models incorporate fixed effects, which determine the influence of predictor variables (in this case, the presence or absence of humor, the interlocutor smiling intensity score, and their interaction), together with random effects, which treat each individual as having a unique response to the predictors (in this case, inter-individual differences in response to the presence of humor or the interlocutor smiling intensity score).

This statistical procedure was used to determine whether any of the independent variables could predict changes in each of the dependent variables. The dependent variables included in the models were total gaze duration, gaze to the mouth, gaze to the eyes, and total fixation duration, all measured in milliseconds. The independent variables were humor type, language, gender, and interlocutors' smiling intensity score. Measurements were grouped according to the corresponding participant and conversations (the contextual variables), and repeated measures for each segment were indicated.

The fit of each model was assessed by comparing the -2 Log Likelihood value between models and the number of parameters. The change in the -2LL (χ^2_{change})

was interpreted as a chi-square statistic with the degrees of freedom equal the value of df_{change}. The model that explained the most variance within the data (thus, a model with the smaller -2LL value and a significant Chi square value) was selected as the best model. Let us see an example. Imagine that two models are generated with this procedure. In order to determine which model best fits the data, the two models are compared. For the change from the first model to the second to be significant, and so for the second model to best fit the data, the χ^2_{change} value resulting from the comparison would have to be more than 3.84 (the chi-square value for $p < .05$).

The procedure to generate the models was as follows. Each variable was added to the initial model one step at a time, in order to be able to assess at every step the fit of the new model. Moreover, the backwards selection method was also applied to reduce the number of variables in the model while maintaining the same explanatory power, that is to say, once a complex model was identified as a good fit to explain the data, the term with the largest p-value was removed, as long as that p-value was larger than 0.05 (Seltman, 2015, p. 374). This was done as a way to test the fit of the model and attempt to obtain a simpler model while maximizing its explanatory power. The terms were excluded from the model if and only if their absence dis not significantly impact the overall fit of the model.

5.5.1 Gaze duration and smiling facial areas (eyes and mouth together)

The linear mixed-effects model on participants' gaze duration on interlocutor's smiling expressions revealed significant interactions between humor type and interlocutor's smiling intensity (interlocutorSIS), and humor type and language (see Table 12).

Table 12. Type III test of fixed effects for gaze on the interlocutor's smiling expression

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	7.006	5.840	.046
InterlocutorSIS	1	17.419	.582	.456
HumorType	3	22.636	1.004	.409
Gender	1	19.834	.099	.757
Language	1	6.800	3.126	.122
HumorType * InterlocutorSIS	3	25.504	3.498	.030
HumorType * Gender	3	23.492	1.587	.219
Gender * Language	1	7.036	1.929	.207
HumorType * Language	3	22.381	.733	.543

As shown in Table 12, the type of humor alone did not predict participant's gaze, nor did language or the interlocutor' smiling intensity score. The interaction effect of humor type and interlocutor smiling intensity score was broken down by conducting separate multilevel models on each type of humor. The models specified were the same as the main model but excluded the main effect and interaction term involving the type of humor. The test could not be performed on jablines due to the limited number of observations in the data.

These analyses showed that in the case of punchlines there is a significant effect of interlocutor smiling intensity score on participants' gaze duration, $b = -166.432$, $t(6.721) = -4.145$, $p = .005$, as well as a significant effect of language, $b = -576.091$, $t(7.998) = -6.358$, $p < .005$. The relationship between participants' gaze and the two predictors is negative, which means that in the case of punchlines, gaze values were lower at higher values of the interlocutor SIS and for participants who interacted in Spanish. Therefore, people spent less time, overall, looking at the interlocutor's smiling expression if the intensity of their smiling behavior was higher and the conversation occurred in Spanish. It is possible that higher smiling intensity score made the smiling expression easier to recognize and more salient visually and thus required less visual attention to be processed on the part of the interlocutor. In the case of irony, there was no significant effect of any of the predictors, but only a negative trend that associates higher values for gaze with lower values of interlocutor smiling intensity score, as shown in Figure 50. This may indicate that smiling behavior characterized by lower smiling intensity score are in general more difficult to see or process and thus require more visual attention from the interlocutor to the smiling person's face, but further studies are needed to explore this hypothesis.

Figure 50 shows that ironic portions of conversation with an overall lower smiling intensity score were characterized by more time, of gaze to the interlocutor's smiling expression in contrast to other humorous portions of conversation (jablines and punchlines) which, additionally, were characterized by higher values of smiling intensity score. Finally, when humor was absent from the interaction, interlocutor smiling intensity score and language significantly predicted participants' gaze, and a moderate effect of language was also present. Interlocutor smiling intensity score was shown to be in a positive relationship with participants' gaze, meaning that higher values of participants' gaze were associated with higher values of interlocutor smiling intensity score, $b = 665.726$, $t(12.731) = 2.758$, $p = .017$. Language had a negative relationship with participants' gaze, meaning that higher values of participants' gaze were associated with participants who spoke English, $b = -428.196$, $t(39.379) = -1.934$, $p = .060$.

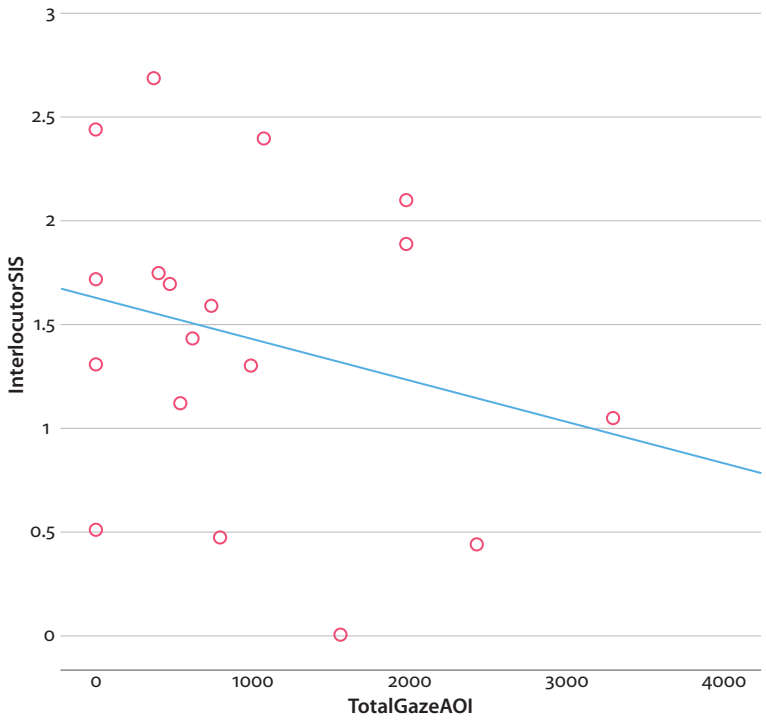

Figure 50. No significant effect of interlocutor SIS on participants' gaze to interlocutor' smiling expression with irony

These results mean that in the absence of humor, a higher interlocutor smiling intensity score is associated with higher gaze value, and that conversations in English tent to be associated with higher values for participants' gaze in the absence of humor. A possible explanation is that this is motivated by the need to determine the meaning of a smiling behavior of high intensity (e.g., a wide-open mouth smiling or SIS 3) in the absence of humor, and so the intentions of the person displaying this type of smiling. In Chapters 3 and 4, we saw that high smiling intensity scores characterize smiling in the presence of conversational humor, but not in the absence of humor. In fact, participants were shown to rarely smile in the absence of humor and when they did smile, they did so by displaying low intensity smiling (such as SIS 1, closed mouth smiling or polite smiling). Then, a smiling displayed with high intensity in the absence of humor would be unexpected and, therefore, more salient, leading to more visual attention to the interlocutor's face. This increased visual attention would be necessary to interpret this smiling behavior that is ambiguous because unexpected in the absence of humor. If this possible explanation were confirmed, then, this finding would support the key role of smiling in the negotiation of conversational humor.

5.5.2 Gaze duration to the interlocutor's mouth or eyes

Gaze values were also analyzed for the eyes and the mouth separately, in order to ascertain the role that each facial area played in the negotiation of conversational humor. The linear mixed-effects model on participants' gaze to the mouth revealed a significant effect of the type of humor on participants' gaze, as shown in Table 13. The Estimate of Fixed Effects indicates that the relationship between each value of the predictor variable and the dependent variable is positive, meaning that a higher value for gaze on the mouth is associated with each type of humor, underscoring the importance of smiling for the negotiation of conversational humor. However, this effect is significant only for irony, $b = 601.98$, $t(7.382) = 8.072$, $p < .001$, the presence of which predicts higher values of participant's gaze to the interlocutor's mouth. It is worth remembering that, as shown in Chapter 3, SIS values for irony tend to be lower than for the other types of humor. Therefore, one possible explanation is that longer gaze duration to the interlocutor's mouth area may be due to the low visual saliency of smiling during irony, which would make these smiling behaviors more difficult to perceive and process. Alternatively, it is also possible that this is a case of gaze aversion (see Section 5.3 and Table 10). People may avoid looking at each other's eyes in the presence of conversational irony to reduce the cognitive load that results from processing irony (see Section 5.3.1) or to mark ironic comments as insincere (Vrij et al., 2001; Einav & Hood, 2008; Williams et al., 2009). Further empirical studies are needed to confirm of disprove these theories.

Table 13. Type III tests of fixed effects for gaze on the mouth

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	11.938	7.422	.019
HumorType	3	7.018	22.294	.001

The linear mixed-effects model participants' gaze on the eyes revealed there was a significant effect of the presence of humor on participants' gaze on the eyes, $b = -218.046$, $t(732.596) = -2.475$, $p = .019$. The relationship between the presence of humor and participants' gaze on the eyes is negative, which means that higher values for participants' gaze are associated with the absence of humor from the conversation. This result is once more pointing towards the importance of the mouth area, in contrast to the eyes, and smiling for humorous discourse, as in the absence of humor more gaze time is spent on the eyes.

5.5.3 Fixation duration and humor

In the previous sections, I discussed the results regarding gaze duration, that is, the time people spent looking at different areas of the interlocutor's face. In this section, I present results on the analysis of fixation duration. This measure is calculated based on the number and duration of all fixations within that target area and is interpreted as a measure of participant's engagement with the visual target, with longer fixations corresponding to a higher engagement and a more careful consideration of the target. The values corresponding to fixation duration for each humorous and non-humorous segment of conversation were analyzed in a separate linear model in order to ascertain the role that the eyes and the mouth played as markers of humor in conversation and the attention each of these received.

The linear mixed-effects model for participants' fixation duration did not yield any significant effect. However, the model shows a non-significant but moderate effect of the interlocutor SIS on participants' fixation duration, $b = -47.573$, $t(18.148) = 2.030$, $p = .057$. The relationship between the interlocutor' SIS and participants' fixation duration is positive, which means that longer fixations were associated with higher smiling intensity scores of the interlocutor, as shown in Figure 51.

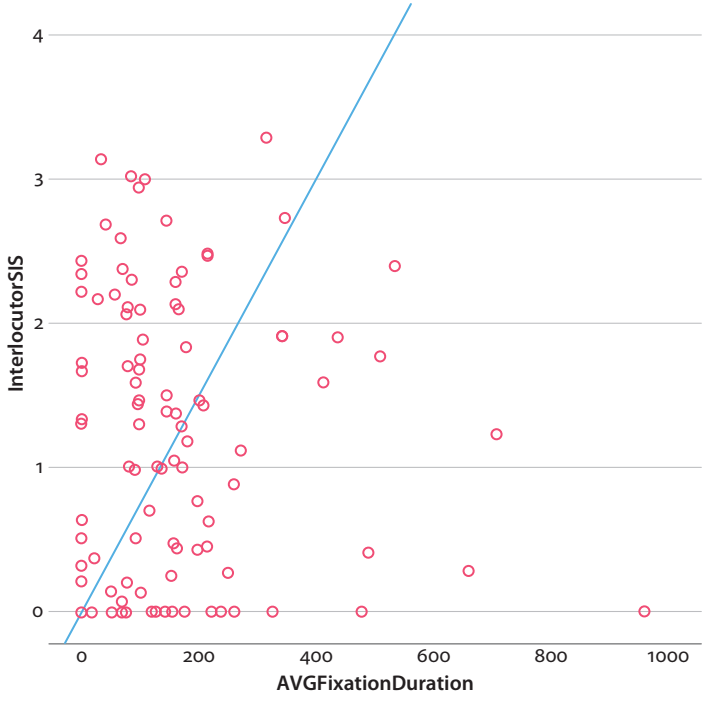

Figure 51. Effect of interlocutor SIS on participants' average fixation duration

This finding points to the fact that, regardless of the presence of humor, smiling at a higher SIS would receive, on average, longer fixations than smiling at a lower SIS as they were more carefully considered by the interlocutor. High-SIS smiling, then, serves as a high-salient visual stimulus that captures the attention of the interlocutor and engages them in a more thorough consideration, in a manner consistent with smiling serving as a marker for conversational humor.

Based on the results of the analyses with linear mixed models, people engaged in a face-to-face conversation display specific eye movements that vary based on whether humor is present or not in that part of the conversation, the type of humor, the language of the interaction (as a proxy for the cultural background of interlocutors), the facial area that is being considered, and the smiling intensity displayed by the interlocutor. In the next section, all these characteristics are brought together and discussed to offer a detailed description of how people use their eye movements to negotiate conversational humor.

5.6 Conclusions

In this chapter, a dynamic approach was adopted to research gaze as one aspect of multimodal dyadic interactions that may serve the purpose of negotiating the humorous framing of utterances in face-to-face conversations. Gaze was operationalized using measures of fixation counts, average fixation duration per participant and dyad, total and total fixation duration per participant and dyad. To do so, measures of gaze were calculated using two areas of interest on the eyes and mouth of each conversational partner and cross-analyzed to ascertain relationship with other aspects such as facial expressions (i.e., presence and intensity of smiling), conversational role of participants, and presence and type of humor. The statistically significant effects of the findings regarding participants eye movements are summarized in Table 14, which shows that the eyes and the mouth receive different attention from participants depending not only on whether the humor is present in the conversation, but also depending on the type of humor, the smiling intensity of the interlocutor, the language in which the interaction is taking place, and the conversational role of speaker or listener of the humorous utterance.

As reported in Table 14, the smiling facial expression as a whole seem to play an important role (i.e., it is gazed at for significant more or less time) in two situations: (a) when Spanish speakers produce a punchline but do not increase their smiling intensity, and (b) when there is no humor in the conversation but nonetheless there is an increase in participants' smiling intensity. In the first case, speakers gazed at each other's smiling facial expressions less, which may be due to the higher predictability of punchlines versus other types of humor that, in turn, may not require

Table 14. Significant effects on participants' gaze behavior

Dependent variable	Significant effects
Total gaze to smiling expression	– The interaction of having a conversation in Spanish, the interlocutor's low smiling intensity, and the type of humor being a punchline predicted decreased gaze time to the interlocutor' smiling facial areas (mouth and eyes considered together). – The interaction of the absence of humor and the interlocutor's high smiling intensity predicted increased gaze time to the interlocutor' smiling facial areas (mouth and eyes considered together).
Total gaze to the mouth	– The presence of irony predicted increased gaze time to the interlocutor's mouth. – Being the speaker of humorous utterances predicted increased gaze time to the interlocutor's mouth.
Total gaze to the eyes	– The absence of humor predicted increased gaze time to the interlocutor's eyes.

additional cues to be perceived as such. This hypothesis is also supported by the low smiling intensity that co-occurs with these punchlines with respect to irony and jablines, which may be due to punchlines predictability and ease of recognition (i.e., the interlocutors may feel no need to increase their smiling intensity) or lack of appreciation for these punchlines. In the second case, the increase in gaze time may be due to the unexpected increase in smiling intensity which does not co-occur with humor, signaling that the interlocutor may be attempting to, or having some difficulties in interpreting this increase in smiling intensity when it does not co-occur with humor.

The separate study of gaze to the interlocutor's mouth and eyes led to different findings linked to the presence of irony or the absence of humor. On the one hand, gaze time to the interlocutor's mouth increases with respect to the baseline when the instance of humor is ironic; on the other hand, when there is no humor in the conversation an increase in gaze time to the interlocutor's eyes can be observed. The first finding underscores the relevance of smiling for the negotiation of conversational humor and, as mentioned previously, the potential difficulty in processing low intensity smiling that co-occurs with ironic statements. The second finding points to the fact that an increase in gaze aversion, that is, avoiding looking at the interlocutor's eyes, may not only accompany sarcastic statements (see Williams et al., 2009) but any type of humorous utterance. Humorous utterances may be accompanied by gaze aversion due to the cognitive load of processing and resolving the incongruity (on gaze aversion as a response to the cognitive difficulty of a task see Doherty-Sneddon & Phelps, 2005; Doherty-Sneddon et al., 2002) or due to the

non bona-fide humorous mode of communication (on gaze aversion and lying see Einav & Hood, 2008; Vrij, 2002). Further experimental studies should be conducted in order to establish a causal relationship between these factors and participants' gaze behavior in the presence and absence of humor.

Lastly, being the speakers of a humorous utterance was found to significantly affect the total gaze time (dwell time) to the interlocutor's mouth, with speakers gazing for longer period of time to the listener's mouth compared to the time listeners gazed at the speaker' mouth. This finding was not significant in the absence of humor nor for the eye's region of the face, and points towards a specialized function of gaze to the mouth for humor, modulated by speaker role. This behavior may be a strategic way for speakers to attempt directing the listener's attention to the mouth, cuing a potential smiling response to the humor through a process of (reciprocal) joint or shared attention in which interlocutors rely on their gaze (i.e., they start looking at an object) to draw the attention of the interlocutor to that same object, and may be aware of their joint attention (for a discussion of shared and joint attention, see Emery, 2000; Pfeiffer et al., 2012). As stated by Emery (2000), these attentional processes may be the basis for mental state attribution or theory of mind, as interlocutors "determine that an individual is attending to a particular stimulus because they intend to do something with the object or believe something about the object" (p. 590). Another possible explanation is that this gaze behavior represents a monitoring strategy by which speakers check the interlocutor's mouth and smiling behavior to determine whether the humorous utterance was recognized, understood, or appreciated. Further experimental studies could compare intentional and unintentional humor and analyze the time scale of smiling and gaze to the mouth to explore these findings.

Overall, the findings discussed in this chapter underscore the humor-specific function of smiling presented in the previous chapters, which is complemented and reinforced by specific gaze behaviors modulated by the presence of conversational humor. Smiling has been identified as a multifunctional signal that serves numerous functions in conversation, including serving as a marker (not essential to the humor, not always co-occurring, but intentional, see Table 2 in Chapter 1). This hypothesis is confirmed by the humor specific smiling intensity of individual speakers, the smiling patterns that characterize humorous discourse, as well as the visual attention the mouth receives in conversations with humor. In the next chapter, we will turn our attention to yet another type of humor, failed humor, to discuss what is failed humor and the different ways in which humor can fail and analyze how the multimodal performance of conversations humor changes to reflect different types of failures.

CHAPTER 6

Failed conversational humor

6.1 Introduction

This chapter begins with an overview of previous studies of failed humor, starting with a discussion of failed humor and humor support and encompassing interactions and texts produced in the L1 and L2. Then, the chapter moves to presenting an in-depth description of the multimodal performance of three instances of failed conversational humor. This description is based on the mixed method study results presented in previous chapters of this volume and integrates qualitative and quantitative data to illustrate how smiling, gaze, and other multimodal features (such as head tilts and other changes in facial expression) interact to characterize a particular instance of humor as a failed one. To do so, the description of failed humor integrates a FACS-based facial expression analysis that goes beyond the study of smiling presented in Chapter 3 and 4. Finally, findings regarding the multimodal performance of failed humor are discussed in light of previous studies to problematize how failed humor is defined and approached, and to propose avenues for future research.

6.2 What is failed humor?

In Chapter 1, humor was described as risky because whenever someone attempts at delivering humor (successfully), they are exposing themselves to a potential embarrassment or humiliation if the humor fails, that is, if the audience does not recognize their attempt at humor, does not understand it, or does not appreciate it (see, for example, File & Schnurr, 2019). The same is also true for the audience, who may find the humor where not originally intended by the speaker, may not get the humor, or may fail to react to it as expected, thus facing similar risks. In all these cases, humor fails on the side of the speaker, the listener, or potentially both interlocutors. The reasons why this happens are numerous, including a clash between the intention of the speaker and the interpretation by the listener (Gibbs, 1999), lack of appropriateness, that is, an attempt at humor that does not occur at the proper time, place, or with the right kind of people (de Jongste, 2013, p. 180), or a simple

misinterpretation of the humorous frame (Bell, 2009, 2013; Priego-Valverde, 2009; see also Laineste, 2013, for computer-mediated communication)

The area of failed humor studies is closely related to the study of humor support, namely, the study of the ways in which interlocutors support each other's attempts at humor. For humor support to occur, or to fail, Hay posited that the humorous utterance has to be recognized, understood, appreciated, and, eventually, agreed upon, with each of these scalar implicatures requiring the successful completion of the previous ones (Hay, 1994a, 1994b, 2001). For example, according to Hay's model, a joke cannot be appreciated (or not appreciated) if it has not been recognized as a joke, first, and understood, second. However, Bell (2015) recommends caution when applying Hay's model as, for example, appreciation does not necessary implicate understanding because someone can genuinely appreciate an attempt at humor while at the same time failing to understand it (Bell, 2015, p. 37). Among the reasons why humor fails, Hay (2001, p. 71) lists the following categories based on a corpus of humor in friendship groups (Hay, 1995):

1. Insufficient contextualization
2. Being to late, or reviving "dead" humor
3. Assuming too much background knowledge
4. Misjudging relation between speaker and audience
5. Negatively teasing someone present
6. Trying to gain membership of an exclusive sub-group
7. Disrupting serious conversation
8. Portraying oneself inappropriately for one's status or gender.

The means by which interlocutors show or fail to show humor support have been largely documented and include three prominent phenomena, among others: laughter, metalinguistic comments (such as, "this is very funny"), and mode adoption[1] (Hay, 2001; Attardo, 2002; Eisterhold et al., 2006). Additional resources for showing humor support that were also documented (albeit not being the focus of the analysis) in previous studies are repetition of the humorous utterance, gestures, and other non-verbal responses (Hay, 2001; Whalen & Pexman, 2017).

1. *Mode adoption* was described by Attardo (2002) as a process by which the listener is aware of the speaker's humorous intention and responds in a way that continues the exchanges, for examples, responding to irony with more irony. In this process, both interlocutors are active participants. Mode adoption has been found to occur more frequently in the case of ironic statements made among friends than among strangers, underlying the role of familiarity for ironic mode adoption to occur (Eisterhold et al., 2006; Kotthoff, 2003). See also Whalen & Pexman (2010, 2017) and Pexman et al. (2009) on mode adoption in children.

In the same way in which interlocutors display their humor support, they can also display their lack of humor recognition, understanding, appreciation, or agreement. Humor, thus, can fail at each of the different stages proposed by Hay (2001): it is possible for someone to not recognize or display lack of recognition for an attempt at humor (failed humor recognition, Priego-Valverde, 2009); to signal recognition but not understanding (failed humor understanding, Bell, 2013); to signal recognition and understanding, but not appreciation (failed humor appreciation, Bell, 2009), and, finally, to display signals of successful completion of all previous steps but failure to agree with the content of the humorous utterance. This would be the case, for example, of political jokes that target the same political opinions held by the listener who, despite having recognized, understood, and appreciated the joke, does not agree with the content of the joke. It is also possible for someone to successfully go through all these stages, but then decide to display a signal of failed humor (e.g., a groan, an eye-roll), or purposefully avoiding displaying any signal of humor support (e.g., avoid increasing their smiling intensity or withdrawing laughter). As such, then, any of these displays or lack thereof should not be interpreted to mean that the person did not actually recognize, understand, appreciate, or even agree with the humor (Drew, 1987), which are all matters of humor competence, but merely as an element of humor performance, a display of the ongoing negotiation of the humorous framing. Therefore, when dealing with the performance of failed humor and humor support, it is important to acknowledge that one can only study what interlocutors overtly manifest through their behavior (e.g., their humor appreciation or lack thereof), which may not adequately represent their actual thoughts.

6.2.1 Models and empirical studies on failed humor

Studies on failed humor that looked at the characteristics of failed humor in monolingual L1 contexts and texts, considered how native speakers (NSs) respond to instances of failed humor, documenting their verbal and non-verbal responses that, in many cases, were the very same means used to display humor support (e.g., laughter). Further studies on failed humor in L2 interaction documented the types and rates of failure that characterize L2 humorous discourse as well as the resources that L2 speakers employ to negotiate humorous discourse when it is successful as well as when it fails.

When analyzing taboo humor used in L1 advertising, Dore (2020) defined failed humor as advertisements that "encountered the opposition of part of their receivers to the extent that some had to be withdrawn" (p. 105) and identified the cause of the failure in the activation, through conscious or unconscious references, of targets and scripts that the audience found offensive. Similarly, earlier studies documented cases of humor in advertising targeting men and women that failed

because they relied on gender-based stereotypes (Dore, 2018) or themes and stereotypes about race and sex (Gulas & Weinberger, 2006). In all these examples, the humor fails at the appreciation or agreement phase, since it was recognized (as an attempt at humor) and understood by the audience, but then rejected as the audience overtly displayed their lack of appreciation or agreement with its message.

The first study to look at failed humor from the perspective of non-native speakers (NNSs) was Bell and Attardo's (2010), who collected a corpus of diaries of six advanced non-native speakers of English over an eight-week period and a set of follow-up group meeting in which participants discussed their experiences with humor in the L2. The working definition of failed humor employed in this study is as follows:

> any instance of speech production in a communicative setting in which any of the participants fails to notice the (potential) perlocutionary intention to amuse (be funny, elicit mirth, etc. as per Raskin, 1985), or fails to process the text/situation in such a way as to be able to access the information whereby one of the other participants considers the situation (to have been intended or be potentially interpretable as) funny. (pp. 426–427)

The analysis of the instances of failed humor in their corpus led to the formulation of a typology of failed humor that identifies seven non-mutually exclusive levels at which someone may fail to successfully engage in a humorous exchange (p. 430):

1. failure to process language at the locutionary level
2. failure to understand the meaning of words (including connotations)
3. failure to understand pragmatic force of utterances (including irony)
4. failure to recognize the humorous frame
    a. false negative: miss a joke
    b. false positive: see a joke where none was intended
5. failure to understand the incongruity of the joke
6. failure to appreciate the joke
7. failure to join in the joking (humor support/mode adoption)

Each of these types of failure is likely to elicit different responses from the person experiencing the failure, from lack of acknowledgement (Priego-Valverde, 2009) to explicit expressions of non-understanding or even laughter (Bell, 2013). Additionally, Bell and Attardo suggest that native speakers and non-native speakers' humor failures differ quantitatively but not qualitatively, as both groups can and do fail on any of these levels and none of these types of failure is specific to non-native speakers: "data suggest that NNSs do not fail differently, they just fail more." (p. 441)

Building on Bell and Attardo (2010) and Hay (2001), and integrating new insights from miscommunication studies (Weigand, 1999; Bazzanella & Damiano,

1999; Schlesinger & Hurvitz, 2008), Bell (2015) expanded and refined the categorization of failed humor as miscommunication to include 10 different possible sources and types of failure (p. 51):

1. Locutionary factors
2. Linguistic rules
    a. Phonology
    b. Morphosyntax
    c. Semantics
3. Ambiguity
    a. Lexical
    b. Syntactic
4. Pragmatic force of utterances
5. Message form (e.g., register, code-switching, rhyming)
6. Humorous frame or key
    a. False negative: miss a joke
    b. False positive: see a joke where none was intended
7. Joke incongruity
8. Joke appreciation
9. Joke (meta)messages
    a. Social functions such as attempts to get others to change their behavior or attitudes
    b. Discourse functions, that is, attempts to change the topic, keep talking, etc.
10. Appropriate humor support

In her discussion of each of these 10 types of failed humor, Bell considers the side of the hearer as well as the side of the speaker, acknowledging that the typology in Bell and Attardo (2010) was biased toward hearer-related problems, despite the fact that the authors recognized that both successful and unsuccessful interaction are jointly constructed. Thus, in the 2015 typology she explains that, for example, in the case of type 6 (humorous frame or key), it is possible that the humor fails because the speaker did not use clear or appropriate cues to signal a play frame (although these cues are recognized by the author to be used flexibly and always requiring some negotiation to be interpreted, see Bell, 2015, p. 33), or because the speaker is unable to properly interpret these cues. Nonetheless, two types of failure seem to be ascribed entirely to the hearer. Type 8 (a failure in joke appreciation) is described as stemming from the hearer's failure to appreciate the joke told by a speaker, although no explicit consideration is given to the lack of appreciation that the speaker may have for the joke they told, for example, an aspect that will be discussed in Section 6.3 in this chapter. Finally, type 10 (failure in appropriate humor support) is also ascribed solely to the hearer who fails to join in the joking

or provide appropriate feedback (p. 55), and no explicit consideration is given to the presence or lack of humor support from the speaker in cases of unintentional humor or failed seriousness.

In a later publication, Bell (2017) more clearly frames failed humor as an instance of miscommunication that "can arise from any level of language (…) unsuccessful communication and its repairs are jointly negotiated, although the actual trigger for the conversational trouble can often be identified in either the speaker's or hearer's behavior." (p. 358) This view is more closely in line with the perspective adopted in the present volume, as failed humor is approached as a form of miscommunication that is necessarily identified through observing the cues displayed by the speaker of the listener of the humorous utterance.

Based on the works discussed in this section, the categorization adopted in the present study considers humor as a co-constructed and negotiated framing of utterances (Davies, 1984) that emerges through joint, collaborative interactions (Haugh, 2008, p. 46; Gironzetti et al., 2018). Therefore, for the purposes of the present study, cases of "failed seriousness" (Chovanec, 2021, p. 210) or what others called non-intentional humor[2] (that is, utterances to which the speaker does not, initially, attaches a humorous interpretation) will not be considered, *a priori*, a case of failed humor, but approached as a humorous utterance as any other.

6.2.2 Failed humor: Cues, signals, and responses

As it emerges from the studies discussed in the previous sections, failed humor has typically been studied by looking at hearers' responses to a speaker's attempt at humor, while often ignoring cases in which the humorous interpretation is first attached to an utterance by the hearer, rather than the speaker, and the speaker is the one who (initially) fails to recognize it, understand it, appreciate it, or agree with it. Speakers' failed attempts at humor have been shown to elicit different responses from listeners, including laughter (notably, one of the most frequent responses to failed humor, Bell, 2009), fake laughter, groans, metalinguistic commentaries, repetitions, silence, and explicit evaluations of the speaker or the utterance. These responses were found to vary based on the social relationship among interlocutors, with close friends displaying negative reactions to failed humor more commonly than acquaintances or strangers, who preferred neutral responses (Bell, 2009,

2. The term *unintentional humor* has been employed extensively to indicate cases in which the speaker did not have any humorous intention. Here, the term is employed while also acknowledging that it is not appropriate (echoing Attardo, 2020, pp. 170–174), since the humorous intention can be first attached to an utterance by the hearer as well, making it intentional (but on the hearer' side).

2009b), as well as gender, with males correcting, and females either objecting to the content of the humorous utterance (Hay, 1994b) or preferring explicit statements of incomprehension (Bell, 2013). Additionally, the type of humor also affect the response displayed by hearers: with teasing, laughter can be used to display recognition followed by a serious response to display lack of appreciation or agreement (Drew, 1987); in the case of jocular abuse, interlocutors often ignored the abuse or reacted seriously to its content (Hay, 1994a, 1994b); with jokes, fake laughter, groaning, metalinguistic comments, and interjections are used to display recognition but lack of appreciation (Sacks, 1974; Chiaro, 1992; Norrick, 1993; Bell, 2009).

Several additional non-verbal responses have also been noted as being employed by interlocutors in response to, or as part of the negotiation of failed humor, although these were not the main focus of the analyses: eye rolling, walking away, lip pursing, head nodding, head shaking, confused look, and brow furring (Bell, 2009, 2013). Notably, smiling was also mentioned as one of the possible cues to failed humor, albeit only in a few studies. For example, Bell (2009) mentioned smiling as the most frequent non-verbal response to failed humor due to a lack of comprehension and indicated that smiling could serve to "demonstrate the hearer's acknowledgment of the joke and perhaps provide a small measure of support for the attempt" (p. 181). Bell also acknowledged that smiling quality varies a lot, but these differences were not noted during the data collection.

It is possible that in many studies, due to the focus on verbal responses, smiling was either not attended to or considered as part of, or a form of (subdued) laughter. When smiling was recorded as a response to failed humor understanding, it was described as "slight," "puzzled," "blank," "hesitant," and conveying "uncertainty and lack of understanding" (Bell, 2013, pp. 181–183). In another example, a participant smiled to feign appreciation of a joke they failed to hear (Bell & Attardo, 2010) as they recognized the attempt at humor and thought that not acknowledging it would have been considered impolite (Bell, 2015, p. 63). On other occasions, Bell (2013, 2015) reported examples in which smiling was recorded as part of someone's response to failed humor, occurring 31 times or 11.1% of all cases in her study, but these were not analyzed in depth and no further details were provided because the data collection protocol was not designed for this purpose (i.e., smiling was only noted as occurring, but not recorded nor specifically described).

Nonetheless, despite smiling and other facial expressions were only marginally addressed in previous studies of failed humor, the importance of facial expressions for the negotiation of conversational humor has been widely recognized. An interesting example from Mak, Liu, and Deneen (2012, p. 169), also discussed in Bell (2015), contributes to illustrate this point. This example occurred in English and involved three people; two of them, David and Gavin, who can also speak Cantonese, and one, Emma, who cannot. In their conversation, the humor stems

from the use of a company name (*Fei Cai*) that resembles the pronunciation of the words "fatty" and "hooligan" in Cantonese. The humor was appreciated but not understood by Emma, due to her lack of proficiency in Cantonese, while it was clearly understood and appreciated by the other two people, who laughed about it for a few turns. Later, in an interview with the researchers, Emma explained that while she did not understand the words, she guesses what was happening "by looking at their facial expressions" (Mak et al., 2012, p. 170) and then joined in by displaying her appreciation through laughter.

Another example, originally presented in Bell and Attardo (2010) and later discussed in Bell (2015), was employed to illustrate a case of failed humor within the locutionary problem type. In this example, the listener, Harumi, fails to hear an attempt at humor produced by the speaker and so relies on the facial expression of the speaker to try and understand what had just happened. After having identified the previous utterance as an attempt at humor, Harumi smiled. In an interview with the researcher, Harumi explained that "his face was like the face that somebody shows just after he has finished a joke … when I saw his face uh it's like he just said something funny … I thought that it was not nice that I didn't smile so I just like like made smile." (Bell, 2015, p. 62) Both examples are significant not only for the role of facial expressions (notably, smiling and laughter) in displaying a variety of degrees of humor support, but also because they illustrate that humor appreciation does not always stems from humor understanding.

6.3 Multimodal cues of failed conversational humor

The studies discussed so far shed light on the variety of strategies and resources interlocutors mobilize to display signals of humor support or failure in a variety of texts, including face-to-face conversations. From a conversation analysis and discourse analysis perspective, the study of failed humor is particularly difficult because if humor identification relies on the presence of one or more humor markers identified in the literature (§ 1.4), then failed humor, by definition, could not be identified by the presence of any of the markers employed in the literature. However, we have also seen that many of the resources employed to signal humor support, such as laughter, are also frequently employed to signal failed humor, therefore simply attending to the presence or absence of these cues would not allow us to discriminate between successful and failed humor instances.

In this volume, through the study of humorous dyadic conversations, I have argued that framing an utterance as humorous entails a process of negotiation that engages both interlocutors and relies on multimodal cues (verbal and non-verbal), including smiling and gaze. These cues operate as markers or indices in the sense

explained in Table 2, that is, markers as non-essential, not always co-occurring, and intentional cues of conversational humor, and indices as non-essential, not always co-occurring, and not intentional cues of conversational humor. As such, these cues are manipulated by interlocutors with respect to their own individual baseline, the dyad internal dynamics and baselines, and the context in which the utterance occurred. In cases of successful humor in dyadic conversations, as shown in previous chapters, both interlocutors join the negotiation, participate in it, and reach some sort of agreement with respect to how the utterance is interpreted. This negotiation can be observed through changes in their behavior as they align or synchronize across modalities, framing the utterance as humorous. Failed humor, then, should be characterized by a different, possibly opposite behavior.

6.3.1 Failed humor as misalignment

Based on previous results, failed humor can then be approached and identified on the basis of a *misalignment*. For humor to be categorized as failed humor, one or both interlocutors should display signals that are not aligned with each other's and/or possibly also not aligned with the interlocutor's humor baseline. This definition of misalignment, then, presupposed that people are aware, under the threshold of consciousness, of each other's humor baseline. At this stage, this is just a hypothesis that will need to be empirically verified. Nonetheless, since people react to each other's presence or lack of humor cues and monitor them as the conversation unfolds (as shown in Chapter 5 and by the failed humor examples discussed in the previous section), it is plausible to think that they are aware, to a certain degree, of each other's baseline.

The concept of humor baseline deserves some additional explanation before moving forward. Someone's humor baseline refers to the typical behavior of this person in the presence of humor. As we saw in previous chapters, each person displays varying degrees of individual variation regarding the ways in which they smile, for example, during instances of conversational humor. For example, in Chapter 3 we saw that Andy's humor baseline was around 3 on the SIS (that is, a wide, open-mouth smiling) while the humor baseline of his interlocutor, Hans, was 2 on the SIS, which represents an open-mouth smiling. Additionally, despite individual variations, we also saw in previous chapters that people tend to behave in a similar way in the presence of humor, increasing their smiling intensity (as shown in Chapter 3), aligning their smiling behaviors in a process of smiling synergy (as in Chapter 4), and displaying specific patterns of eye movements (as shown in Chapter 5). Therefore, it is also possible that people are able to estimate each other's humor baseline not only by being aware of the behavior of their interlocutor at that specific point in time, but also by taking into account these general tendencies

that they have likely observed several times. For example, if I were engaged in a conversation with an acquaintance and were to attempt to deliver a joke, I could estimate my interlocutor's baseline on the basis of their behavior in the conversation we had so far (e. g., were they smiling a lot, or not at all, were they looking at my mouth, etc.), as well as my previous experiences with conversational humor that, under the threshold of consciousness, would make me aware of the fact that, for example, people tend to increase their smiling intensity in the presence of humor.

The definition of misalignment proposed here can encompass verbal misalignment (as when, for example, one interlocutor verbally expresses their lack of appreciation of a humorous utterance), as well as behavioral misalignment, which is the focus of this chapter. One way in which behavioral misalignment can be displayed is as follows: one of the two interlocutors would start the negotiation of the humorous framing by modifying their behavior to signal that they attach a humorous interpretation to the utterance, while the other would either not join the negotiation (e. g., they could refuse to participate in this negotiation by not acknowledging the attempt at humor and walk away or ignore it) or join the negotiation but display some cues in contrast with the interlocutor's or their own previous cues. This would indicate that, for example, the humor has been recognized but not understood, appreciated, or agreed upon. Another possibility, which will be discussed later in the chapter, is for both interlocutors to engage in the negotiation of the humorous framing and display cues to indicate a lack of appreciation, understanding, and/or agreement. In this case, however, the two interlocutors could align with each other but, crucially, misaligning with their own humor baseline to jointly frame the humor attempt as a failed one. Therefore, based on these two possible scenarios, a case of failed humor could co-occur with smiling for one interlocutor and lack of smiling for the other interlocutor, or even smiling from both interlocutors accompanied by a verbal cues indicating, for example, lack of agreement.

The concept of misalignment, then, is used here to describe a portion of discourse in which the two interlocutors display behaviors that are not aligned with respect to each other and/or the interlocutor's baseline and are in contrast to the trend described in the previous chapters regarding smiling intensity, smiling synchronicity, and gaze behavior. Depending on who misaligns and what cues they display, misalignment can help identify different ways in which humor fails in dyadic face-to-face conversation. For example, a misalignment can occur when the delivery of a humorous utterance is accompanied by the interlocutors displaying different facial expressions, one smiling while the other is not (what was categorized as Type 0, Non-reciprocal smiling, in Chapter 4). This type of misalignment indicates that both interlocutors are engaged in the negotiation of the humorous framing but displaying cues that point to different framing (e.g., one humorous and one not), hence indicating the possibility that the humor may have failed at some

level. This type of misalignment. then, would indicate that the negotiation of humor failed, as one of the two interlocutors would display signals of failed humor understanding, while the other would display signals of successful humor appreciation.

Another type of misalignment could occur when one interlocutor displays cues to indicate a lack of humor recognition while the other is displaying cues of humor support at any level (recognition but also understanding, appreciation, or agreement). This case, in which one of the interlocutors displays cues that indicate a lack of humor recognition, would be the most common type of failed humor in a conversational setting based on previous studies of failed humor.

In the next sections, the analysis of three cases of failed humor will illustrate how interlocutors perform failed humor multimodally, by looking at their verbal and non-verbal behavior across modalities. While three may seem very few cases, it should be noted that examples of failed humor observed in naturally occurring everyday interaction are extremely rare and elicitation methods are often employed to gather more numerous examples (Bell, 2009, 2009b, 2017). While elicitation allows researchers to collect numerous examples of failed humor and control for a variety of intervening factors (such as the type of failure, or subjective perception and interpretation of whether the humor has failed or not), it does not allow for the collection and analysis of examples of naturally occurring instances of failed humor. Ultimately, the goal of this part of the study is to provide a detailed description of how these instances of failed humor are performed, multimodally and dialogically, in semi-naturalistic face-to-face conversations, and thus contribute a set of new features for the identification of failed humor in a conversational corpus. Methodologically, this would allow the field of humor studies to include failed humor in the analyses and avoid limiting future studies to just successful instances of conversational humor. While the analysis of just three cases of failed humor does not allow us to draw any definite conclusions, this chapter represents the first step towards a systematic treatment of multimodal cues, typically not accounted for or understudied, for the analysis of failed conversational humor.

The identification of instances of failed humor in the corpus was based on the same criteria mobilized for the identification of (potentially successful) instances of humor, that is: each instance of humor was found to be compatible with two different and at least partially opposed scripts (Raskin, 1985) and could also be accompanied by any humor cue as described in previous studies (e.g., there could be laughter or metalinguistic comments such as "this is not funny"). The analysis of these instances builds on previous findings regarding how smiling and gaze are mobilized by interlocutors to negotiate the humorous framing of an utterance. Thus, a humorous instance was classified as an instance of failed humor based on the presence of verbal cues (such as one of the speakers explaining the humor), and the analysis of how smiling and gaze were mobilized by interlocutors, which

highlighted whether there was a *misalignment* with respect to their behavior towards each other or in comparison with the interlocutor's baseline. Additional multimodal cues such as eye rolls, head tilts, and lip bites were also considered through a FACS-based analysis.

It should be noted, however, that interlocutors in a conversation can display multiple cues at the same time. It is therefore possible that they could display cues of successful humor at one level (e.g., that they recognized and understood the humor), while displaying cues of failed humor at another level (e.g., that they did not appreciate the humor). This possibility points towards a more nuanced definition of failed humor that would not be a binary concept (failed or successful), but rather a graded one: humor can be framed as being partially successful or as having failed partially. This idea will be examined further in the conclusions of this chapter after having discussed the examples of failed humor in the corpus.

Additionally, we will see that interlocutors can also display signals of humor appreciation despite not having understood the humor, as in the cases described in Section 6.2.2. This reminds us that while the four underlying stages of humor support or failed humor proposed by Hay (2001) are part of a linear process, the actual humor performance may entail people displaying cues that do not necessarily follow this lineal sequence, as people can display cues of agreement without having in fact understood the humor. Finally, this chapter also looks at one case of joint failed humor, that is, when both interlocutors displayed signals of a lack of humor appreciation. This situation may be atypical in a natural occurring conversation, as speakers tend to tell jokes they appreciate and think others would also appreciate and was brought upon by the design of the study, that required interlocutors to tell a specific joke despite the fact that they may not find it particularly humorous.

6.3.2 Failed humor understanding

The first case of failed humor accompanied by the display of multimodal misalignment (see Figure 52) corresponds to segment AKH2, a punchline, the same portion of humorous discourse that was analyzed in § 4.4.3 with a focus on the deadpan delivery of Ann. This instance of failed humor was classified as a case of failed humor understanding because it corresponds with the delivery of the punchline of one of the two jokes randomly assigned by the researcher as part of the data collection protocol, the donkey joke. Kate delivered the first joke, and Ann the second. Both interlocutors knew that at that point in time Ann was about to deliver a joke, as it had been previously discussed with the researcher and announced as part of their conversation, therefore this could not be considered a case of failed humor recognition, because the joke was announced. As shown in Excerpt AKH2, while Ann delivered the punchline, Kate remained silent, and Ann, after a brief pause, felt the need to begin to offer some sort of explanation of the joke ("o sea era…"), which indicates that she realized that her joke had just failed because Kate did not understand it.

Excerpt AKH2

Ann Y salió quee el ahí estaba un burro enfrente del carro (…) o sea era
[And it turned out that it there was a donkey in front of the car (…) I mean it was

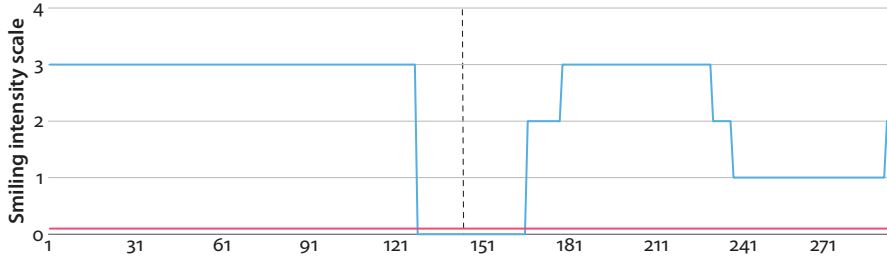

Figure 52. Misalignment during the delivery of a punchline (Ann, blue line, and Kate, red line, segment AKH2)

Here, the analysis will start by focusing on Kate, the hearer of the joke. Excerpt AKH2 shows that her immediate response to the punchline was silence. Additionally, as shown in Figure 52, she displayed a lack of smiling for the whole duration of the humorous segment (Kate, red line at SIS 0), thus misaligning with Ann (blue line), who, despite the precise deadpan delivery of the punchline, displayed an overall high intensity smiling behavior.

A more detailed analysis of Kate facial expression reveals that her silence and non-smiling behavior (at level zero o the Smiling Intensity Scale) were accompanied by lid tension – AU7 in FACS – and a frown – AU4 in FACS – which causes the brows to lower and draws them together, as shown in Figure 53. The presence of these AUs, together with the lack of verbal response and lack of smiling, indicates that Kate had (or was displaying signals that indicated) troubles with understanding and appreciating the humor. To further strengthen this interpretation, the analysis

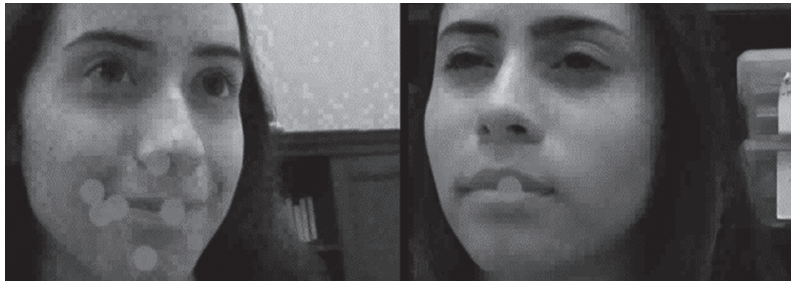

Figure 53. Ann (Left) and Kate (Right) facial expression and fixations (gray dots) signaling failed humor understanding

of Ann's gaze behavior shows that she displayed a scanning pattern (see Figure 54) with numerous short fixations (*M* = 25 milliseconds) concentrated on Ann's mouth area while Ann was smiling. This gaze behavior has been associated with difficulties in processing the visual stimulus, as if Kate were having troubles linking Ann's smiling with the content of her utterance. Ann, on the other hand, displayed much longer fixations (*M* = 181 milliseconds) concentrated on Kate's mouth area, in line with her overall behavior during other portions of conversation.

Ann's behavior illustrates the other side of this failed negotiation. As showed in Figure 52 and 53, she delivered the joke with an overall high smiling intensity combined with a precise deadpan expression that matched the delivery of punchline. Right after the punchline she went back to smiling at SIS 3; however, this smiling intensity was not sustained and started to decrease from SIS 3 to SIS 1, moving from a wide open-mouth smiling to the polite, closed-mouth smiling showed in Figure 53 and 54. At the same time, she kept looking at Kate's face, alternating between the eyes and the mouth, as if waiting for Kate to display a signal of understanding or appreciation. The delivery of a bad joke, a failed joke, is face-threatening for both speaker and hearer and in this case, in Excerpt AKH2, we can observe how both are navigating this situation while trying to find a solution: Kate trying to understand the humor through careful consideration of Ann's facial expression, and Ann by means of patiently waiting for Kate to succeed in doing so while displaying a polite smiling expression.

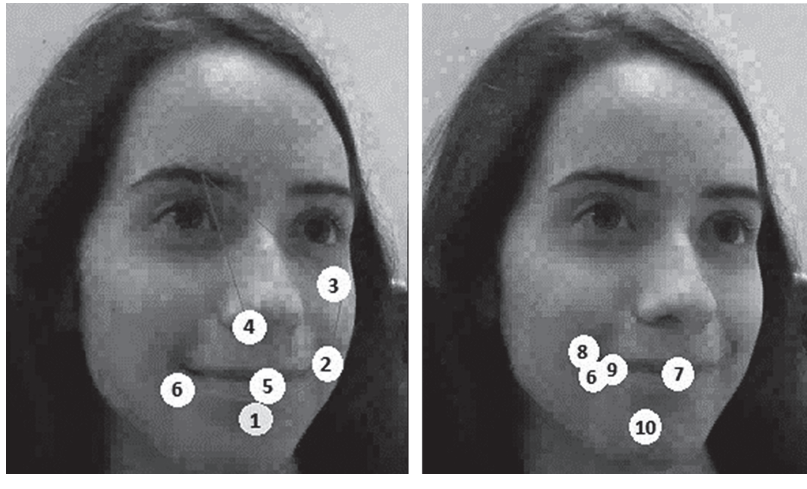

Figure 54. Kate' scanning path on Ann's Mouth area after Ann delivered the punchline

6.3.2 Failed humor appreciation or agreement

The second case of failed humor characterized by multimodal misalignment occurred in the conversation between Dani and Amy in a portion of discourse, Excerpt DAH11, during which Dani made a humorous comment regarding the price of food in a city in California where the listener, Amy, would like to work and live in the future (Figure 55 and 56). In order to better understand this example, it is important to know that both interlocutors are originally from California and relocated in rural Texas for work (Dani) or study (Amy) in the years prior to their conversation. Moreover, Dani is a professor at the same university where Amy is an undergraduate student about to graduate. A large part of their conversation dealt with topics such as comparisons between California and Texas, politics, and future opportunities and goals, and they both frequently displayed affiliation and agreement throughout the interaction by means of verbal and non-verbal behaviors.

Excerpt DAH11

```
Dani      of course it costs like 25 bucks to have lunch in @Palo@ @
          Alto@ @laughter@ it's really expensive
```

At the point in the conversation when Excerpt DAH11 occurred, the topic being discussed was the professional future of Amy, and she had just mentioned that a certain company for which she would like to work paid $10 or more per hour. She also added that this amount seemed, to her, like a lot of money, to which Dani replied with the humorous comment above. The example discussed here is similar to other cases of humor that occurred during the same conversation, in which the two speakers uttered witty comments to make fun of each other or other people. In Excerpt DAH11, Dani delivered her humorous comment with laughter while speaking ("Palo Alto" was uttered while laughing, as marked in the excerpt) and more laughter after it, while Amy remained silent in the same way as Kate did in the example AKH2 discussed in the previous section. Amy's non-verbal behavior, however, largely differs from Kate's, as shown in Figure 55 and 56.

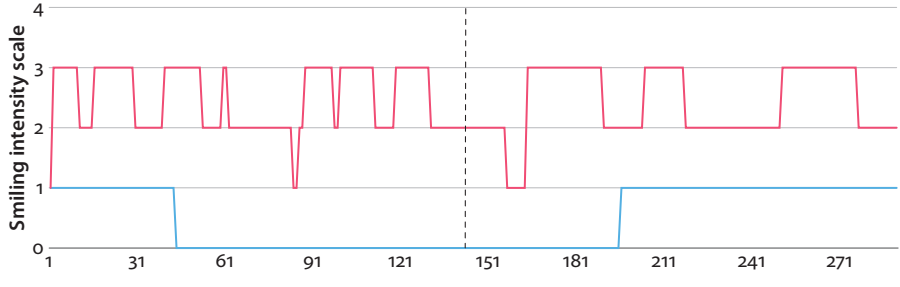

Figure 55. Smiling misalignment during a humorous utterance (Dani and Amy, segment DAH11)

Amy' smiling behavior (blue line) contrasts with Dani' smiling (red line) throughout this excerpt: while Dani displayed an overall high smiling intensity moving between SIS 2 and SIS 3, Amy remained mostly serious during the delivery of the comment, displaying only a closed-mouth, polite smiling before and after the comment.

Segment DAH11 is the only humorous occurrence in the whole interaction between Amy and Dani that seems to have failed: Dani is using her smiling intensity to frame her comment as humorous, while Amy seems to reject her intention by displaying a closed-mouth polite smiling, followed by a non-smiling expression that negatively frames the humor instance, after which she goes back to displaying a closed mouth smiling. Moreover, right at the time of the delivery of the humorous comment, Dani's smiling intensity dropped from SIS 2 to SIS 1, despite the fact that she delivered the comment with laughter. This may have happened for a variety of reasons including having perceived the effect her comment was having on Amy, not having obtained the expected response from Amy, or simply not being able to sustain a SIS 2 smiling intensity while speaking. Figure 56 illustrates the facial expressions and gaze patterns of the two interlocutors at three representative moments during Excerpt DAH11: before the humorous comment, at the delivery of the comment, and right after it.

Dani, on the right side of each frame in Figure 56, smiled during the whole duration of excerpt DAH11 and alternated between looking at Amy and looking away to show engagement and participation. On the other hand, Amy (on the left side of each frame) displayed a wider range of behaviors. At the beginning of Excerpt DAH11, she displays a polite, closed mouth smiling and alternates between looking at her interlocutors and away, indicating that she is engaged and is actively listening at Dani.

As the delivery of the humorous comment is ongoing and Amy is understanding its content, she stops smiling and starts biting her lips, pressing them both inwards (frame 3 in Figure 56) and later only biting the lower lip (frame 4). At this point, Amy's gaze also starts to drift away from Dani, as she begins averting her face while focusing her eyes on a single spot on the left of Dani's head. At the delivery of the humorous phrase, Amy is in fact looking away and biting her lower lip. After the delivery, she starts smiling again at SIS 1 while also tilting her head to the right and alternating moments of gaze aversion with brief looks at Dani's face.

From the analysis of Amy and Dani's behaviors, Excerpt ADH11 emerges as a case of failed humor appreciation or agreement. Amy recognized and understood Dani's attempt at humor, as indicated by her facial expression right after the delivery of the comment (low-intensity polite smiling, gaze aversion). However, possibly because the humor targeted herself, her future plans, and her previous comment on $10 an hour being a good salary for someone living in California, she could not

Figure 56. Amy and Dani facial expressions and gaze behaviors

fully appreciate it or agree with it or decided to display her lack of appreciation and agreement (lip-biting, no smiling, gaze aversion). This example is particularly relevant for the study of non-verbal behaviors that co-occur with humor because it highlights the importance of a fine-grained and detailed qualitative analysis of how these behaviors unfold over time.

6.3.3 Joint failed humor appreciation

The third and last example of failed humor from the corpus comes from the delivery of a punchline in the conversation of Jane and Emma. In contrast with the previous two examples, in which only one member of the dyad displayed their lack of humor understanding, appreciation, or agreement by means of misaligning their non-verbal behavior, this time, both interlocutors displayed cues to signal their lack

of appreciation. Because in real life people do not often engage in humorous conversation that fail on both sides (i.e., the side of the listener and the speaker), further explanation is necessary to contextualize this example. Due to the design of the study, interlocutors were required to tell a specific joke regardless of whether they would find it humorous. This situation is not common in real life, as people tend to avoid the embarrassment of telling bad jokes that even they do not appreciate, on purpose to strangers. However, due to the experimental setting of the study, in segment EJH2, neither Emma nor Jane appreciated the joke delivered by Emma or, at least, displayed signals indicating their lack of appreciation.

Similar to what discussed for Excerpt AKH2, this instance of failed humor was classified as a case of failed humor appreciation because it corresponds with the delivery of the second punchline of the two jokes assigned by the researcher as part of the data collection protocol, therefore this could not be considered a case of failed humor recognition. Additionally, the non-verbal behavior of both interlocutors did not indicate a lack of understanding, as they both reacted (negatively) to the content of the humorous utterance, which indicates that they both recognized and understood the humor.

In Excerpt EJH2, Emma delivered the punchline of the donkey joke (see Appendix D for the full text of the joke). The joke was received by Jane with an "OK" uttered out loud with a raising intonation indicating doubt and incredulity, thus framing the joke as bad and not funny, to which Emma responded with laughter. Figures 57 and 58 illustrate the nonverbal behavior of the two interlocutors during Excerpt EJH2.

In contrast with the two previous examples of failed humor discussed in Section 6.3.1, the smiling behavior of the interlocutors during excerpt EJH2 is mostly synchronized, showing a pattern of joint framing smiling behavior at SIS 1 surrounding the punchline, followed by a gradual increase of smiling intensity by both interlocutors in parallel, with Jane (red line) leading the way and Emma adjusting her smiling intensity displaying an accommodation gesture (see Chapter 4). This behavior indicates that both interlocutors were able to successfully engage in the negotiation of the humorous framing of the utterance and, without considering other elements, one could also assume this to mean that they appreciated the humor and that the humor did not fail. To illustrate that this is not the case, their facial expressions displayed during Excerpt EJH2 right after the delivery of the punchline are reproduced in Figure 58 and 59 and then discussed.

Excerpt EJH2

```
Emma     … on the ground it was a donkey
Jane     OK ↑
Emma     @laughter@
```

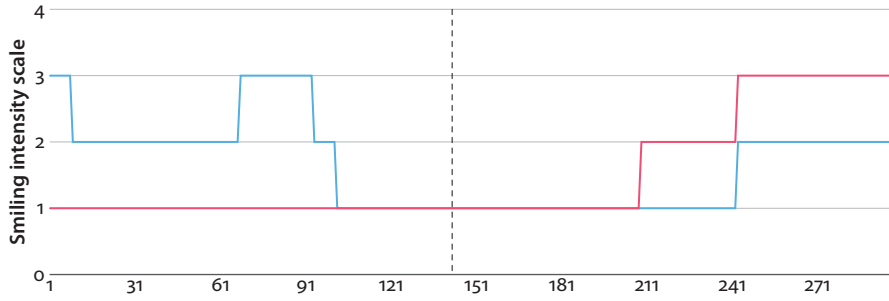

Figure 57. Emma (blue line) and Jane (red line) smiling behavior during excerpt EJH2

Figure 58. Jane facial expressions at frames 10, 15, and 30 after the delivery of the punchline

As shown in Figure 58, Jane maintained a closed-mouth SIS 1 smiling accompanied with a pronounced raising of her brows and a wide opening of her eyes after Emma delivered the punchline. Jane's facial expression indicates surprise and disbelief while at the same time she is also avoiding the display of any signal of humor appreciation (her smiling intensity does not increase until later in the conversation).

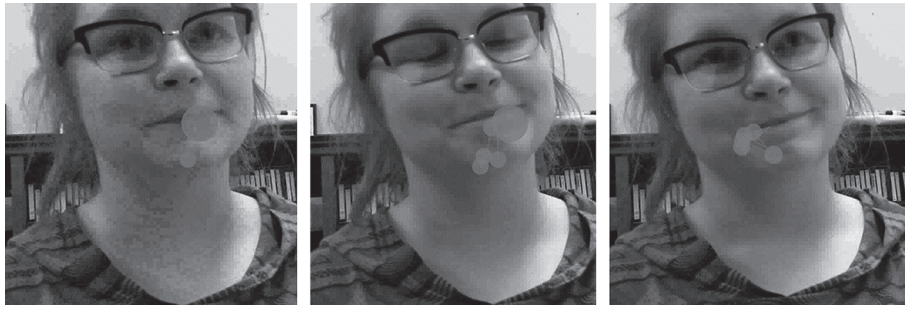

Figure 59. Emma facial expressions at frames 10, 15, and 30 after the delivery of the punchline

Emma facial expression right after the delivery of her punchline included closing her eyes for about 5 frames (85 milliseconds), pressing her lips together for about 38 frames (646 milliseconds), while displaying a closed-mouth SIS 1 smiling and tilting her head to the right. This nonverbal behavior indicated lack of appreciation for the punchline she just delivered, similar to Amy's behavior in Figure 56 discussed previously.

Overall, the joint smiling pattern displayed during Excerpt EJH2 combined with the joke-telling requirements of the experimental setting, indicates that both interlocutors recognized the humor and understood it, while their facial expressions convey that neither of them appreciated the humor. Previous studies tell us that conversational dyads may display higher levels of non-verbal synchrony during disagreements (we agree to disagree, e.g., Paxton & Dale, 2016, but see also Tschacher, Rees, & Ramseyer, 2014), which would explain participants' smiling behavior in the case of joint humor de-appreciation described here.

6.4 Conclusions

In this chapter, the discussion of previous studies on humor support and failed humor led to problematizing how failed humor is defined and operationalized for its identification in a conversational corpus. The concept of *misalignment* was proposed as a means to characterize failed humor from a multimodal standpoint and then applied to the identification and characterization of three examples of failed humor in conversation. These examples have been discussed and analyzed with the purpose of offering a first, detailed description of the nonverbal behavior that accompanies and potentially signals the different ways in which humor can fail in conversation. The three examples are representative of different types of failure: failure to understand and appreciate the humor, as in Excerpt AKH2; failure to appreciate or agree with the humor, as in Excerpt DAH11, and joint failure to appreciate the humor, as in Excerpt EJH2. In each case, interlocutors were shown to mobilize their verbal resources, facial expressions, head position, smiling intensity, and gaze patterns to negotiate and manage failed humor at different levels, while showing humor support at others. These examples, together with the data presented in previous chapters, underscore the fact that conversational humor is a complex, social achievement not only when it is (fully) successful and gets appreciated and agreed upon, but also when it fails.

The discussion of a case of joint humor failure, in which both parties display lack of appreciation while also engaging in synchronic smiling behaviors, is particularly relevant and adds to the discussion of what it means to engage in

the negotiation of (failed) humor. It is possible, in fact, that the different semiotic resources discussed thus far (e.g., increasing one' smiling intensity, displaying synchronic smiling behaviors, fixating on the mouth and eyes regions of the interlocutor's face) indicate that interlocutors are engaged in humor negotiation without implying that the negotiation be fully successful. In fact, these signals may indicate humor support at one level, while humor failure at another, and lead us to question the concept of failed humor as a binary one.

If the humor is successfully negotiated by both participants at the recognition level, but then fails at the understanding level, then has the humor failed? What if the humor is recognized and understood but not appreciated? What if it is appreciated but not agreed upon? What if each interlocutor shows signals of different stages of humor support? In the particular case of excerpt EJH2, the negotiation was successful in the sense that both interlocutors seemed to have recognized and understood the punchline, but not appreciated it. In Excerpt AKH2, the negotiation was not successful since Kate was not able to understand the punchline delivered by Ann, while in Excerpt DAH11 the negotiation was also unsuccessful, not because the humor was not understood, but because Amy did not appreciate or, possibly, agreed with the humorous comment made by Dani.

On the basis of the results presented here, and from a dialogical perspective that looks at the negotiation of framing in conversation, the term *failed humor* emerges as an effective umbrella term for the broad category of humor failures discussed in this chapter, but inappropriate to adequately represent the different ways in which people (fail to) engage in the (failed) negotiation of humorous framing, as it reflects a speaker-centered view and does not allow us to distinguish between failed negotiation or lack of engagement in the negotiation of humorous framing. In the following paragraphs, I propose that the distinction between failed humor and successful humor is a matter of degrees and introduce three new categories with the goal of moving towards a more nuanced and dialogic categorization of conversational humor that can complement previous proposals centered on the different levels at which speakers may fail.

In this chapter, we saw that people can display at the same time different cues that point to different levels of humor success or failure. People can display their understanding but lack of appreciation, for example, or even appreciation with a lack of understanding. Therefore, a binary distinction between successful and failed humor does not capture the nuances of this process nor does it adequately represent the different ways in which people frame an utterance as humorous. Such a binary distinction is problematic to apply to the examples described in this chapter, as in all of them, each interlocutor is displaying cues of humor success at one level and humor failure at another. Instead, I propose in Table 15 four categories that reflect

a graded approach to failed humor based on the four levels proposed by Hay (2001) as well as the cues displayed by any of the two speakers in a dyadic face-to-face conversation.

The category of *upfront humor failure* is introduced in Table 15 to represent those cases in which one of the interlocutors fails to engage in the negotiation of humorous framing, that is, displays cues that indicate failure to recognize the attempt at humor, either because they did not actually recognize the attempt or decided to ignore it and not acknowledge it. The scope of this category is broad enough to cover cases of upfront humor failure brought about by any interlocutor in the conversation, including the speaker who may fail to attach a humorous interpretation to the utterance they produced. The defining characteristic of this category, then, is the absence of negotiation as one of the interlocutors is not taking part in the process while the other is attempting to engage in a negotiation.

Table 15. Cues and degrees of failed humor

Cues of speaker A	Cues of speaker B	Degree of failed humor	Description
No recognition	Recognition and any cue of support at any other level	*Upfront failure*	Humor is not recognized or not negotiated because it is not acknowledged by Speaker A.
Recognition and cue of failure different from Speaker B	Recognition and cue of failure different from Speaker A	*Failed humor negotiation*	Humor is recognized and negotiated but speakers display signals of support and failure at different levels.
Recognition and cue of failure at the same level as Speaker B	Recognition and cue of failure at the same level as Speaker A	*Joint failed humor*	Humor is recognized and negotiated and speakers agree on humor failure at the same level.
Recognition and cue of support at the same level as Speaker B	Recognition and cue of support at the same level as Speaker A	*Successful humor*	Humor is recognized and negotiated and speakers agree on humor success at the same level.

The second category, *failed humor negotiation,* is introduced to describe those cases in which both interlocutors engage in the negotiation (typically, after they have both displayed signals of having recognized the humor, but see Section 6.2.2). However, in this case the negotiation is not successful. A failed humor negotiation means that even though humor is recognized and acted upon by all interlocutors, they fail or display signals to indicate failure to understand, appreciate, or agree with the humorous utterance and its message. Crucially, their cues of failed humor are at different levels of the process described by Hay (2001): one speaker may display

cues of successful humor understanding but failed humor appreciation, while the other may display cues of failed humor understanding. This term represents the cases discussed in Section 6.3.1 with respect to Excerpt AKH2 and in Section 6.3.2 with respect to Excerpt DAH11. Failure, in this case, indicates that the interlocutors display signals that indicate they have not framed the humorous utterance in the same way, as one may display agreement but not the other, or one may display appreciation but not the other. A failed humor negotiation, then, would include cases of partial humor success or failure in which humor is successful at one level but not at another.

The third category, *joint failed humor*, is introduced to reflect the uncommon case in which interlocutors are successful in their negotiation of the humorous framing, having both recognized the humorous potential and understood the humorous utterance, but the outcome of this negotiation is negative, that is, they jointly do not appreciate or do not agree with the humorous utterance, but do agree among themselves and so the negotiation can be considered to have been a successful one. This term represents the case discussed in Section 6.3.3 with respect to Excerpt EJH2. An instance of joint failed humor, then, would entail both speakers displaying cues of successful and failed humor at the same level. For example, humor could be understood but not appreciated by both speakers or could be appreciated but not agreed with by both speakers.

Finally, the last category, *successful humor*, would apply to instances of successful humor, that is, instances in which both speakers display cues of humor support at the same level. It should be noted that the humor may still have failed at a certain level, but speakers are not displaying cues of humor failure.

From a dialogical and multimodal perspective of humor performance, then, while the process of humor support is linear, as hypothesized by Hay (2001), the process of humor framing is not, as displaying cues of humor understanding is not a prerequisite for an interlocutor to display cues of humor appreciation. In the same line, the display of cues of humor recognition does not necessarily stem from characteristics of the text itself but can derive from an interlocutor processing the behavior (i.e., facial expression) of another (see the example discussed in Section 6.2.2), and so can occur a posteriori, after one interlocutor has overtly manifested their humorous interpretation of the text.

Humor understanding, appreciation, and agreement emerge as possible outcomes of a process of negotiation of framing and can be either successful or unsuccessful depending on whether interlocutors display cues of having reached the same conclusion or framed the humorous utterance in the same way (that is, if they both display cues of appreciation and withdraw or do not display cues of failure, for example, the negotiation could be considered to have been successful). In this

case, if the negotiation is successful, it can have a positive or negative valence as, for example, participants can both display cues of lack of appreciation as in Excerpt EJH2 discussed in Section 6.3.3.

As seen in this chapter, the study of failed humor provides useful insight that contribute to shaping the steps of the process of framing conversational humor based on the contribution of both interlocutors. The negotiation of the humorous frame occurs only when both interlocutors recognize (or display cues to indicate that they recognize) the humor and can be successful when interlocutors agree on an outcome, positive or negative, or unsuccessful when they do not agree on an outcome. Misalignment can occur at the recognition stage, thus differentiating between upfront humor failure (in which case there is no negotiation of framing as one interlocutor does not recognize or display cues of not having recognized the humor) and all other cases in which there is a negotiation of the humorous frame. Furthermore, misalignment can occur between interlocutors, leading to a failed negotiation of humor, or with each interlocutor's humor baseline, leading to joint failed humor.

As discussed throughout this volume, the negotiation of the humorous frame does not necessarily occur by means of spoken language, as facial expressions, gaze, and other body movements and gestures are mobilized by conversational partners even when no verbal comments are made with respect to the humorous utterance. The analysis of failed humor presented in this chapter expands previous models of failed humor in two ways. First, in contrast to previous models that focused primarily on what is here termed upfront humor failure, this analysis shifts the focus from the single speaker to the dyad (or multiparty interaction). Second, this analysis does not focus on the verbal component of failed humor, but on the non-verbal one, thus adding new dimensions that can complement earlier, verbocentric models. Finally, it should be noted that this analysis also has an important limitation: since the study was based on dyadic conversations, it accounts only for interactions between two interlocutors, although in principle, it has the potential to be adapted and applied to interactions with three or more participants.

CHAPTER 7

Conclusions

Looking backwards and looking forward

7.1 Introduction

The work I presented in this book builds on the research of Attardo, Pickering, and colleagues (Attardo et al., 2013; Gironzetti et al., 2016a, 2016b, 2018) and looked at the interactional dimension of conversational humor to understand how people mobilize different non-verbal resources to negotiate the humorous framing of an utterance. Several studies on conversational humor note the co-occurrence of smiling with humor, which makes smiling a good candidate for humor marker. However, what seemed a pretty straightforward idea, that smiling could, just by virtue of its co-occurrence with humor, be a good marker for conversational humor, was found to be a much more complex issue. Smiling is in fact far from being a homogeneous and static phenomenon, and so in order to be studied it first needs to be clearly defined from a quantitative and qualitative perspective.

The study of the individual smiling behavior of conversational partners revealed that people, regardless of the interlocutor they are talking with, cultural background, gender, and type of humor, tend to display a higher smiling intensity in the presence of conversational humor. The analysis of each individual' smiling behavior led to the identifications of many parallelisms between how two people within a dyad behave. These parallelisms were further researched within the framework of behavioral studies on synchronicity with the goal of understanding, first, what kind of relationship there was between the behavior of each member of a dyad, and second, whether any of these dyadic behaviors were characteristic of conversational humor.

The SIS, discussed and employed to analyze smiling data (see Chapter 3), was only useful to quantify changes in smiling intensity at the individual level and could not (nor was intended to) account for the dyad dynamics, that is, how the behavior of one person affected and responded to the other's behavior and vice versa.

In order to research the interactional dimension of humor framing, then, the smiling behavior of each member of a dyad was plotted on a line graph that allowed me to conduct a moment-by-moment comparison. From the analysis of these graphs, it emerged that dyads' smiling behavior in the presence of humor

tends to follow certain regular patterns, of which framing patterns are the most frequent ones. In fact, dyads were shown to frame an instance of humor through a sustained smiling of a higher intensity compared to the surrounding discourse. Due to these similarities and patterns, the dyad smiling intensity was further coded for synchronicity into four mutually exclusive categories ranging from synchronic non-smiling (both members of the dyad display a non-smiling facial expression) to smiling intensity matching (the two members of the dyad display the same smiling intensity behavior at the same time). This categorization allowed me to compare the joint smiling behavior across humorous and non-humorous portions of conversation to discover that conversational humor is also framed through a relative increase in smiling intensity matching.

Successful humor framing emerged as characterized by a dialogic smiling synergy, and, in contrast, behavioral misalignment emerged as a possible feature of failed humor. This led to problematizing the ways in which failed humor had been previously categorized since, non-verbally, interlocutors were displaying a range of cues that supported a successful humor negotiation on one level (i.e., recognition and understanding) and failed humor on another (i.e., appreciation). Additionally, as the data confirmed the existance of a specific, humor-related set of dyadic behaviors, namely, an increase in the time dyads displayed reciprocal smiling and smiling intensity matching and a decrease in the display time of non-smiling synchronicity, then the question of how people were able to achieve this level of synergy is introduced.

Because smiling belongs to the visual world, with the exception of smiling voice, I initially hypothesized that for smiling to function as a humor marker, then it would have to be perceived by interlocutors and so looked at. Portable eye trackers were employed to record people's eye movement as they interacted with each other. Findings from this part of the study revealed that the mouth, the primary facial area responsible for smiling, is looked at for longer period of time when humor is present in the conversation, supporting the idea that smiling plays a key role in the negotiation of the humorous framing of an utterance. This was true in all conversations analyzed, but statistically significant only in the case of speakers and for instances of ironic humorous comments. Additionally, interlocutors avoided looking at the eye region of the face of the person in front of them during humorous portions of conversation and compared to their baseline, indicating that gaze aversion may characterize all types of conversational humor.

7.2 How conversational humor is performed multimodally

Throughout the six chapters of this manuscript, I have presented and discussed empirical data that illustrate how conversational partners perform humor when interacting face-to-face. The data included speech samples, multimodal analysis of smiling and smiling intensity, eye tracking data regarding participants' gaze behavior, and a FACS-based discussion of other behaviors (such as lip-biting and head tilts) displayed by participants.

The analysis of speakers' individual smiling intensity using the SIS revealed that a higher smiling intensity functions as a cue of humor in conversation. Smiling intensity was found to be higher in the presence of humor with respect to each speaker's baseline, indicating that a speaker had recognized the humor and was engaging in the negotiation of the humor framing.

At the dyad level, the higher smiling intensity displayed by each speaker was further mobilized to jointly negotiate the humorous framing of an utterance. Speakers were shown to manipulate their smiling intensity jointly before, during, and after the delivery of the humorous utterance in a sort of coordinated smiling dance. This dyadic coordination resulted in the display of humor-specific smiling patterns that serve to co-construct the humorous framing. Additionally, the process of aligning their smiling behavior with each other resulted in an increase of the amount of time they match each other smiling behavior in the presence of humor. Smiling synergy emerged as an important feature of the process of jointly co-constructing the humorous framing.

The study of speakers' eye movements revealed that all types of conversational humor (that is, punchlines, jablines, and ironic comments) are characterized by an increase in gaze aversion (avoiding looking at the interlocutor's eyes) with respect to each participant's baseline. In the specific case of conversational irony, there was also an increase in the time speakers spent gazing at their interlocutor's mouth with respect to their own baseline.

Last, the in-depth discussion of cases of failed humor led to the identification of behavioral misalignment as a feature of failed humor, as well as to the problematization of failed humor as a binary concept. Different types of failed humor were found to be accompanied by cues that could indicate humor support at one level and humor failure at another, thus pointing towards the existence of degrees of failure in conversational humor.

In what follows, I integrate these findings regarding the multimodal resource analyzed to offer a description of the typical behaviors of speakers engaged in the negotiation of conversational humor. These generalization are based on the discussion of four data-based scenarios and consider the most common behaviors observed in the corpus, without necessarily depicting the behavior of any participant

in particular. The scenarios are (a) successful negotiation of punchlines, (b) successful negotiation of jablines, (c) successful negotiation of ironic comments, and (d) failed humor. In order to simplify the creation of the scenarios, all dyads are assumed to be homogenous (e. g., two male, Mexican speakers or two female, North American speakers). Also, for simplicity's sake, in all scenarios I assume that the speaker intentionally produces a humorous utterance, understanding that this is not always the case as the listener of the utterance may be the first to attach to it a humorous interpretation. Finally, while the first three scenarios focus on the successful negotiation of the humorous framing for punchlines, jablines, and ironic comments, the last one gives an overview of what we could expect from interlocutors if any of these types of humor failed, with the understanding that failed humor is a matter of degree and so, depending on the type of failure, interlocutors could display a variety of cues from these scenarios.

Regardless of the scenario, a few conclusions that can be drawn from the data apply to successful conversational humor in general and will be assumed to be true in all scenarios unless stated otherwise. Interlocutors engaged in the negotiation of conversational humor are expected to: (a) increase individual smiling intensity with respect to their baseline; (b) alternate gazing at the eyes and the mouth region of the other interlocutor, with one interlocutor attending mostly to the mouth and the other attending mostly to the eyes, based on individual preference; (c) display higher fixation duration values when gazing at the interlocutor's mouth and having the role of the speaker, and (d) look at the eyes of the other for a reduced amount of time compared to non-humorous conversation.

7.2.1 The multimodal performance of successful punchlines

This first scenario hypothesizes a situation in which Speaker A says something humorous in the form of a punchline of a joke, and Speaker B successfully recognizes, understands, and appreciates (and, possibly, agrees with) the humor. In this situation, based on the data analyzed in this manuscript, we would expect both participants to significantly increase their smiling intensity with respect to their baseline, typically in the range of SIS 2 (an open mouth smiling) or SIS 3 (a wide, open mouth smiling). This increase in smiling intensity would usually be initiated by one interlocutor, the one to first attach a humorous interpretation to the utterance (who could be either the speaker or the hearer of the humorous utterance). The other interlocutor would follow the behavior of the first, mirroring it to display the same smiling intensity. This would result in the display of a joint framing smiling behavior with an accommodation gesture, as described in Chapter 4. That is, the joint increase in smiling intensity would typically begin before the delivery of the

punchline and be sustained for over one second by both interlocutors as to frame the humorous instance through the display of a joint framing smiling pattern.

As in all instances of humor in general, the gaze behavior of speakers engaged in the successful negotiation of punchlines is expected to have the general characteristics described at the end of Section 7.2. Additionally, in the case of punchlines, their gaze will also be affected by an interaction of two factors: when interlocutors are Spanish speakers of Mexican descent and the other interlocutor is displaying a low smiling intensity, we expect speakers to gaze to the interlocutor' smiling facial areas (mouth and eyes considered together) for a reduced amount of time.

7.2.2 The multimodal performance of successful jablines

The second scenario hypothesizes a situation in which Speaker A says something humorous in the form of a jabline, and Speaker B successfully recognizes, understands, and appreciates (and, possibly, agrees with) the humor. In this scenario, we would expect speakers to increase their individual smiling intensity and display an open mouth smiling (SIS 2). In contrast to the first scenario, jablines are more typically accompanied by the display of a single framing smiling pattern in which only one of the two interlocutors sustains a smiling behavior for over one second to frame the humorous instance.

This single framing, in contrast to the joint framing pattern typically displayed for punchlines, could indicate that jablines are more difficult to process, that is, they require more time to be processed and so more time for participants to start increasing their smiling intensity. As a consequence, jablines also require more time for people to display a reaction, because they are spontaneous, less structured, and less verbally marked than punchlines, that is, people may not be able to determine that a jabline has started as easily as they can often tell that a joke has started.

As in all instances of humor in general, speakers engaged in the successful negotiation of jablines will be expected to display the general gaze behaviors described at the end of Section 7.2. Additionally, when interlocutors are Spanish speakers of Mexican descent, we would expect speakers to gaze to the interlocutor' smiling facial areas (mouth and eyes considered together) for a reduced amount of time.

7.2.3 The multimodal performance of successful ironic comments

The third scenario hypothesizes a situation in which Speaker A says something humorous in the form of an ironic comment, and Speaker B successfully recognizes, understands, and appreciates (and, possibly, agrees with) the humor. Ironic

humorous utterances would typically be marked with a lower smiling intensity than jablines and punchlines, in the SIS 1 (closed mouth smiling, also known as polite smiling) and SIS 2 (open mouth smiling) range. Additionally, similar to jablines, ironic utterances would be framed by an increased and sustained smiling intensity displayed only by one of the interlocutors, resulting in a single framing smiling pattern. As mentioned before in the jablines scenario, this single framing could indicate that jablines and irony require more time to be processed and so more time for participants to start increasing their smiling intensity.

As in all instances of humor in general, the gaze behavior of speakers engaged in the successful negotiation of ironic humorous comments is expected to have the general characteristics described at the end of Section 7.2. However, in the case of successful conversational irony, we would also expect a significant difference with punchlines and jablines, as ironic humorous statements were associated with an increased gaze time to the interlocutor's mouth, possibly linked to the lower smiling intensity that characterizes irony versus punchlines and jablines.

7.2.4 The multimodal performance of failed humor

In a scenario in which the humor fails, we hypothesize that Speaker A says something humorous (either a punchline, jabline, or ironic comment) and Speaker B either does not recognize the humor, does not understand it, does not appreciate it, or does not agree with it. In any of these situations, we would expect interlocutors to show signs of misalignment in their non-verbal behavior. They may misalign with each other, for example, by not displaying joint and sustained increases of smiling intensity but mismatching behaviors such as non-smiling (SIS 0) and polite smiling (SIS 1) facial expressions, or they may misalign with their own typical humor behavior, for example by increasing their smiling intensity to a lower degree or not at all. This misalignment, then, would happen mostly with respect to individual smiling intensity and dialogic synergy, but is also expected to be accompanied by additional cues of failed humor such as lip biting, head tilting, eyebrows raising, and a wide opening of the eyes. As we saw in Chapter 6, it is also possible that both interlocutors display cues of failed humor in what I called a case of *joint failed humor*.

In terms of eye movements, these would be likely affected by the facial display of the interlocutor and may include mouth scanning with numerous but short fixations, as the person may experiencing some difficulties when interpreting the smiling display of the interlocutor, or increased face and gaze aversion, to show disengagement, which may indicate lack of appreciation of, or agreement with the humor.

7.3 Implications for applied humor research

There is growing evidence that verbal and non-verbal communicative modalities are interrelated, complementary, and part of the same integrated system (Seyfeddinipur & Kita, 2001; Goldin-Meadow, 2005; Louwerse et al., 2012), and dyadic face-to-face humorous conversations are an example of such a complex and dynamic model. A theory of humor performance should necessarily account for the role of non-verbal signals and offer an integrated account of how speakers rely on verbal and non-verbal resources to frame an utterance as humorous.

The long-term goal of this volume is, in fact, to contribute to the development of a theory of humor performance (Attardo, 2020; Tsakona, 2020; Tsakona & Chovanec, 2018; Ruíz Gurillo, 2016) that will complement the existing theory of humor competence (see Raskin, 1985; Attardo & Raskin, 1991; Raskin et al., 2009) while also foregrounding the role of non-verbal resources such as smiling and gaze. My work builds on previous approaches to performance, and humor performance in particular (see Attardo, 2021), to explain how interlocutors negotiate the humorous framing of an utterance. In doing so, I discussed the semiotic resources that are part of speakers' *repertoire* (Gumperz, 1964) and how speakers mobilize them to negotiate the *framing/keying* (Hymes, 1972; Goffman, 1974) of humorous utterances, and I argued for a non-linguocentric approach to communication (Erickson, 2004), and humor performance in particular.

With the goal of developing a non-linguocentric theory of humor performance based on the notions of framing and speakers' repertoire, in this volume I analyzed instances of verbal humor (spontaneous instances of conversational humor and irony as well as retelling of canned jokes) that occurred in face-to-face conversations involving two speakers, considering how conversational partners mobilized these non-verbal resources in a process of collaborative negotiation of the humorous framing. All instances of conversational humor were found to be negotiated through the mobilization of different multimodal resources that include verbal and non-verbal cues. Regardless of the type of discourse, speakers interact with each other by using language and their own bodies in order to *make meaning emerge* in a joint, embodied, collaborative process of negotiation. This broad definition of performance equally applies to humorous and non-humorous discourse. What is specific of humorous discourse, then, is *which* specific semiotic resources are selected and mobilized among all resources that are part of speakers' repertoire (i.e., smiling and gaze aversion in the case of humorous discourse), and *how* these are mobilized.

While supporting a theory of humor performance based on the notions of framing and speakers' repertoire, the findings of this study also challenge what has been called folk theories of humor, according to which humor is marked in a special

way, with bells and whistles, in order to differentiate it from non-humorous talk. In Section 4.4.4. I discussed the lack of evidence to support one of the claims of these folk theories, namely that a sudden and localized increase in smiling (what I called a peak smiling pattern) would mark the delivery of the humor. In fact, these peak smiling patterns were only present twice in the corpus analyzed, characterizing only 4% of all humorous instances analyzed. Additionally, according to folk theories, these peak smiling patterns would be produced by one person, typically the speaker, putting smiling and humor in a linear and monologic relationship. However, findings from this study showed that this relationship is not linear nor monologic, as both people engaged in a conversation, regardless of their conversational role, were shown to rely on smiling framing patterns to frame a given utterance as humorous (see Section 4.6).

What emerges from the findings of this study, then, is that a variety of resources – which could be non-verbal such as those analyzed here, or verbal – are mobilized to negotiate the humorous framing, rather that marking it from one speaker's point of view. It should be noted, though, as previously concluded by Attardo (2021), that none of the resources mobilized by speakers and discussed in this manuscript are specific to humor, as "humor 'recycles' cognitive mechanisms that appear in serious communication" (p. 359). Therefore, I am not claiming that smiling or gaze aversion, for example, can serve to frame a given utterance as humorous just by virtue of their presence. Instead, I have shown that what characterized conversational humor is the way in which these resources are mobilized, which is quantitatively and qualitatively different in humorous versus non-humorous portions of conversation. But then, how exactly does smiling and gaze support the negotiation of a humorous framing, as opposed to non-humorous framing? This question is answered in the following paragraphs.

7.3.1 How smiling supports the negotiation of the humorous framing

In the negotiation of a humorous framing, conversational humor was shown to be typically accompanied by a wide, open mouth smiling (at times, but not consistently, intensified through a Duchenne display) that is usually absent from non-humorous conversation. This smiling display represents an increase in the smiling intensity displayed by a person with respect to their own baseline and is used to support the negotiation of the humorous framing, indicating that the smiling person interprets an utterance as humorous.

The ways in which interlocutors act upon smiling to support the negotiation of humorous framing were shown to be heterogeneous, in that each individual and each dyad exhibited their own characteristic behaviors. However, certain commonalities emerged, as all individual participants and dyads displayed what I termed *dialogic smiling synergy*, following the work on interpersonal synergy of Fusaroli

et al. (2014). Through a process of dialogic smiling synergy, members of a dyad adapt and align their smiling behavior to each other in a dynamic process modulated by the type of pragmatic meaning (e.g., humor vs non-humor) as well as the characteristics of the dyad and the conversational context. This means that not all dyads will smile in the same way, quantitatively and qualitatively, as their smiling behavior will be modulated by the level of mutual understanding that the interaction requires or aims at and the context in which the interaction takes place. In fact, no two dyads were shown to behave in the exact same way, despite showing a tendency towards the display of framing smiling patterns and relative increase of smiling intensity matching behaviors with respect to their baseline.

One key characteristic of a dialogic smiling synergy model is that it accounts for the fact that dyads do not move towards de-contextualized mimicry, as would happen in a model that would not consider the specific features of the context in which the interaction is taking place. However, a certain degree of mimicry could be part of this process nonetheless and linked to smiling as a means to convey information about the underlying emotions being experienced by the person. We saw, thus far, that when smiling co-occurs with conversational humor, it is not generally the expression of an emotional reaction to the humor. This idea is supported primarily by two findings: smiling was shown to frame instances of humor starting before the delivery of the humorous phrase, and mirth-expressive smiling (Duchenne) is not specific to humorous communication. However, this is not to say that mirth plays no role at all in this process. As discussed in Chapter 1, the facial feedback hypothesis could facilitate the process of smiling dialogic synergy. Since smiling communicates the emotions being experienced by the person as well as their social and communicative intentions, therefore, reciprocating the other person' smiling through a process of facial mimicry would allow one person to experience what is being felt by the other (mirth) and, so, facilitate smiling dialogic synergy.

7.3.2 How gaze supports the negotiation of the humorous framing

The role of gaze was approached as a complementary resource that speakers would mobilize to support the negotiation of the humorous framing through smiling, due to smiling functioning as a visual cue[1] for conversational humor. As the smiling expression comprises two different facial areas, the eyes and the mouth (e.g., as in

1. While smiling is primarily a visual phenomenon, several studies also noted that smiling is also an acoustic phenomenon, known as smiling voice. Then, it is reasonable to ask whether it is smiling as a visual cue, smiling as an acoustic cue, or both that serve to support the process of negotiation of the humorous framing. In Chapter 3, smiling voice was proved to be an unreliable cue for the presence of humor, just at chance level, which indicates that smiling supports the negotiation of the humorous framing mostly through its visual features.

a Duchenne smiling in which both AU 6 and AU 12 are mobilized), I analyzed how people look at the interlocutor' smiling expression as a whole without separating between the eyes and the mouth. Despite a positive tendency of looking at the smiling expression more in the presence of humor, the findings were not significant, and so I approached the two facial areas separately in order to understand which one, if any, played a significant role in the negotiation of the humorous framing.

My findings showed that gaze supports the association between smiling and humor by means of an increase in the attention to the mouth of the listener of an ironic comment, and a decreased attention to the interlocutors' eyes in the presence of any humorous utterance. Both findings underscore the key role of the mouth and smiling in the process of negotiating the humorous framing.

The first finding is particularly relevant for the study of conversational humorous irony. Ironic comments were typically marked by a lower smiling intensity compared to jablines and punchlines and framed through a single framing smiling, meaning that only one of the two interlocutors would display a sustained framing smiling. A low-intensity smiling such as the polite, closed-mouth smiling used to mark ironic comments is less visually salient and so more difficult to perceive and reciprocate. The fact that the speakers of ironic comments would spend significantly more time fixating at the listener's mouth could be linked to this more subtle marking of irony through smiling. This behavior could be due to the fact that the speaker is monitoring the listener's mouth to check for understanding, or maybe is trying to draw the listener's attention to the mouth region of the face to make it more salient and, in this way, invite them to pay attention to the speaker' smiling in order to reciprocate it, thus inviting them to join in the negotiation of the humorous frame.

The second finding applies to conversational humor in general and can also be explained in relationship to the dyads' smiling behavior or the cognitive demands of processing conversational humor. A decreased attention to the interlocutors' eyes in the presence of any humorous utterance could, in fact, be a way to avert their gaze from the interlocutor's eyes to be able to look at their mouth, as explained in the case of irony. However, as this behavior characterizes all instances of humor, and only irony is accompanied by increased attention to the mouth, it is possible that this case of gaze aversion reflects the underlying cognitive challenges of processing conversational humor. Gaze aversion would allow the person to avoid monitoring the interlocutor. By doing so, they would reduce their visual input that would otherwise be processed and thus reduce their cognitive load, which in turn would serve to improve their cognitive processing and allow them to focus on processing and resolving the humorous incongruity.

7.4 Limitations and future research directions

As any other, the present study had a number of limitations, which provide opportunities for future research that build on the methods and results discussed in this volume. Following this same line of research, future studies should address some of the limitations of the present one by considering additional multimodal resources and their role in the co-construction of conversational humor, such as different types of hand gestures, a more thorough consideration of body posture, as well as other facial expressions and head movements. Additionally, it would be important to expand the scope and applicability of the research design employed in this study to other communicative humorous contexts including situations in which facial expressions and gaze are not among the resources available to speakers (e.g., phone conversations), contexts in which the interaction is not occurring live (such as in pre-recorded messages), as well as conversations with more than two interlocutors or instances of humor produced by professional humorists for an audience.

One important limitation concerns the languages and corresponding cultural backgrounds of speakers engaged in the conversations that were analyzed as part of this study. The current study focused exclusively on the interaction between speakers of American English, born and raised in the United States, and speakers of Spanish, born and raised in Mexico. All interlocutors within a dyad shared the same first language and were raised in the same country, which served as a proxy for their cultural background. Compared to North American English speakers, Mexican Spanish speakers were found to display a higher smiling intensity with humor, a lower smiling intensity without humor, and a decreased attention to the interlocutor' smiling facial areas in the presence of punchlines. Future studies should explore further these differences and focus on how humor is marked in interactions between speakers from a wider range of linguistic and cultural backgrounds, including bilingual speakers and learners of a second language, in order to determine whether there are differences in how humor is negotiated (that is, which semiotic resources are mobilized and how) depending on the cultural background of the speakers, the language in which the conversation is taking place, or the proficiency level of the speakers in a second language. Additionally, as acknowledged in Chapter 2, the choice of using language and country of origin as proxies for cultural background was motivated by practical reasons but was not without problems. We know that grouping people based on these characteristics does not lead to homogeneous, but rather heterogeneous cultural groups that could possibly only share those superficial traits while having had very different life experiences as a result of, for example, media exposure, upbringing (e.g., including religious and political views), and family migration history, among others (Crafa et al., 2019). Because culture is a multidimensional concept, future studies should define cultural groups

based on a constellation of traits and employ tested instruments such as those used in cross-cultural studies (e.g., Crafa et al., 2019; Chiao et al., 2010).

Besides going beyond the limitations of this study, future research should expand on the findings presented in this volume in different areas not necessarily limited to humor studies. One area of interest is the cross-cultural comparison of the non-verbal behavior of speakers engaged in humorous discourse. To date, only one study (Priego-Valverde et al., 2018) compared the smiling behavior of dyads engaged in humorous conversations in French (from France) and American English, with French speakers interacting face-to-face and American speakers interacting in a computer-mediated setting (Gironzetti et al., 2016b). The results of this comparison showed French speakers behaving as the speaker of American English, that is, displaying more non-synchronic smiling in the absence of humor and more synchronic smiling in its presence, regardless of the different conversational settings. These results are also consistent with the findings discussed in Chapter 4 for American English speakers and Mexican Spanish speaker interacting face-to-face. However, while we know that there are no significant differences in humor performance in a face-to-face or computer-mediated setting (Gironzetti, 2017b) and that behavioral synchronization occurs in a variety of settings including when people are interacting over the phone (Richardson et al., 2007, see § 4.2), we do not know to what degree these different settings affect the non-verbal behavior of speakers and thus cannot exclude that setting-related and culture-related variables interacted. Additionally, more studies with speakers from different cultural backgrounds are necessary to determine whether and to what extent the smiling behaviors that co-occur with conversational humor described in this manuscript are a universal characteristic of humorous discourse, and how cultural differences shape interlocutors' smiling behavior in a variety of settings.

Another important area of development for futures studies stems from a methodological decision that affected the design of the study, as I chose to maximize the ecological validity of data by recording semi-naturalistic conversations instead of conducting a more controlled experimental study. This decision specifically affected two aspects of the study: the number of conversations analyzed, which was limited to six dyadic face-to-face conversations due to the time-consuming process of data collection and data analysis of multimodal studies as well as data losses linked to social eye-tracking, and the set-up of the study, which was chosen to be as natural as possible to allow the researcher to investigate how humor is marked in naturally-occurring conversations, but at the same time made it impossible to control for the effect of different intervening variables. Future studies should adopt a different approach and be conducted in a more controlled, experimental environment to increase the number of participants and confirm the generalizability of

these results, as well as to control and analyze the effect of some of the intervening variables. More specifically, and based on the results obtained in this study, it would be important for future studies to focus on the following variables:

- Age of participants involved in each conversation. Age may have an effect on the type of humor being produced, and age differences may cause difficulties in the comprehension of the humorous instances, as well as affect participants' non-verbal behavior.
- The level of familiarity between participants. In this study, this variable was controlled for, as all participants were acquainted with each other but were not complete strangers nor close friends. Different levels of familiarity among participants could be manipulated in the recruitment stage prior to data collection so as to be able to compare the behavior of dyads with different familiarity levels. Degrees of familiarity could have an effect on the quantity and type of humor produced in the conversation, the behavioral alignment between speakers, as well as their eye movements during the interaction.
- The speakers' evaluation of the interaction in terms of its likeability and pleasantness. This variable was not considered in the present study, but it would be an important element in future studies with the goal of determining if and how it affects speakers' behavioral alignment, type and quantity of humor produced, and eye-movements.
- The relationship between failed humor and behavior of participants with respect to both smiling and gaze. A study with a speaker-confederate would allow researchers to include comparable instances of failed humor in different conversations to address how interlocutors react and navigate the process of negotiating instances of failed humor. These instances could also be manipulated to include cases in which the humor is difficult or impossible to recognize, understand, or appreciate.

A second area of interest for future studies would be to expand the analysis to include speakers of a second language as well as heritage speakers, which would bare significance for the study of failed humor (see Chapter 6). From an interactional and multimodal perspective, a comparison between second language and heritage speakers considering, among others, their proficiency and ease when speaking the language, would help shed light on the differences and similarities among these populations and in contrast to how native speakers mobilize non-verbal resources to negotiate conversational humor.

7.4.1 Towards a multimodal theory of humor performance

The analysis of humor performance in dyadic face-to-face conversations confirmed that humor framing is a negotiated activity that takes places through the mobilization of non-verbal resources. Despite the fact that the literature has shown that speakers do rely on metalinguistic comments such as *this is / is not funny* to negotiate the humorous framing verbally, this did not happen in the corpus analyzed here. In fact, the analysis of the data showed that interlocutors do not generally negotiate the humorous frame verbally, but by means of non-verbal cues. Throughout this volume, I showed the ways in which smiling and gaze are mobilized to frame an utterance as humorous, with the data regarding failed humor adding further evidence to support the idea that non-verbal behaviors are essential to understanding how people frame what is said in real life. I showed that besides smiling and gaze, additional non-verbal cues such as head tilts, lip biting, and face aversion are also mobilized to negotiate humor in face-to-face conversation.

A linguocentric approach that only looks at verbal resources is thus not adequate to understand how humor is performed in face-to-face conversation, as it would not allow us to account for any of the non-verbal cues discussed in this manuscript. One of the main takeaways of this manuscript, in fact, has to do with the importance of moving away from a linguocentric approach (Erickson, 2004) to communication and discourse and emphasize, instead, the central role that different semiotic resources play in the negotiation of different kinds of framing, including but not limited to humorous framing.

Earlier in this chapter, I described performance broadly, as a process in which speakers interact with each other by using language and their own bodies in order to *make meaning emerge* in a joint, embodied, collaborative process of negotiation. But what type of meaning is emerging through this process in the specific case of conversational humor? To answer this question, I propose that smiling, as an *emotional expression* (Scarantino, 2017), operates on the *organic meaning plane* (Green, 2019) and can convey at the same time natural meaning as well as non-natural meaning. That is, smiling can communicate natural meaning, showing mirth and making this emotion perceptible by the other interlocutors who can then act upon it, and non-natural meaning, making manifest the humorous intention that the person displaying the overt smiling behavior attaches to the utterance. Each type of meaning serves a specific function in the negotiation of the humorous framing.

Through smiling, in the case of conversational humor, mirth and the humorous intention of the smiling person become part of the common ground between interlocutors and can be acted upon in the conversation. Theoretically, then, both could serve to support the negotiation of a humorous framing as both are perceptible to

interlocutors. However, since mirth-expressing smiling (i.e., Duchenne smiling) is not specific to humorous conversation, then what is relevant and acted upon by interlocutors is the non-natural meaning conveyed through smiling that makes manifest the humorous intention that the smiling person. The role of mirth, instead, can be explained by means of the facial feedback hypothesis as a resource that could facilitate smiling dialogic synergy: reciprocating the other person' smiling through a process of facial mimicry would allow one person to experience what is being felt by the other (mirth) and, in doing so, facilitate smiling dialogic synergy among interlocutors.

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APPENDIX A

Research protocol

A1. Eye-tracking specifications, calibration, and data

The eye-trackers that were used for this study are two remote Tobii X2–60. Before the recording, the researcher calibrated each eye-tracker with the participant who was going to be using it. The procedure to be carried out before calibration of a portable eye-tracker with a screen input or scene camera involved a set of measurements, which include calculating: (a) the angle of the eye tracker to the ground, (b) the distance between the eye tracker and the input (screen or scene camera/calibration grid), (c) the distance between the eye tracker and the top and bottom of the input (screen or scene camera/calibration grid), and (d) the angle of the input (screen or scene camera/calibration grid). The configuration tool used to input these measurements in the eye-tracking software is shown in Figure A1.

The use of a scene camera, as opposed to a screen input commonly used in non-social eye-tracking studies, required the researcher to build and use a physical calibration grid that could stand in the area where each participant would be during the experiment. The calibration grid had the same shape as the calibration pattern used in the eye-tracking software, and included five calibration dots, as per the software requirements, with one dot placed at the exact center of the grid. The process of calibration required the participant to be looking at the dots on the calibration grid, in a given order and at a specific moment, while the eye tracker recorded the participants' eye characteristics and performance.

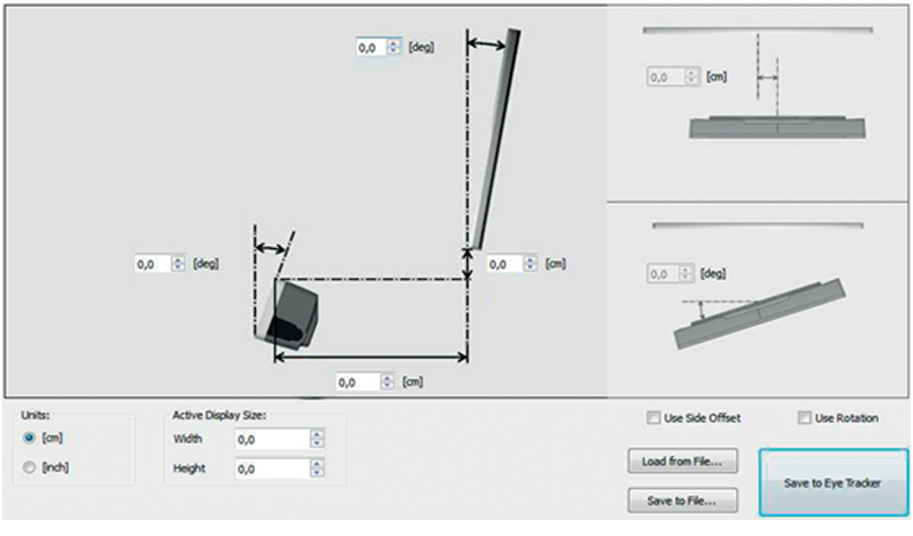


Figure A1. The tobii X configuration tool for calibration with a scene camera and a physical grid

Tobii Studio, the software necessary to operate Tobii X60 eye-tracker, allowed planning and performing calibration, and then displayed the results of calibration as a set of green lines in correspondence with each calibration dot. If the lines resulting from calibration were short and not scattered, calibration was successful; if these lines were missing, long, or very scattered, calibration was unsuccessful, and a recalibration was performed until the researcher was able to obtain a successful calibration for each participant.

Unsuccessful calibrations are not uncommon with portable eye-tracker and may be due to several factors, including wrong measurements taken before calibration, participants head's movements beyond the tolerance threshold, and participant's sight. An inaccurate calibration, if not recognized in time and repeated successfully, could be responsible for serious accuracy errors or precision errors, which would invalidate the data analysis and interpretation. On the one hand, as a result of a large accuracy error, the pattern of fixations would be displayed lower or higher (in the case of a vertical error), or on the right or the left (in the case of a horizontal error) than the accurate one; such an error could cause false positives or false negatives in the interpretation of eye-tracking results. On the other hand, a large precision error would cause the software to wrongly interpret one longer fixation as many shorter fixations, while maintaining the accurate fixation pattern; this error would affect the analysis of fixations' number and duration.

The initial analysis of eye-tracking data for each participant was done using the Tobii Studio software. First, the two areas of interest were created and adjusted manually for the whole length of the video. Second, the humorous and non-humorous events were created as logs in the eye-tracking file. Third, segments of equal length were automatically generated for each event, humorous and non-humorous. The segments thus obtained were associated with either a humor or a non-humor group in Tobii Studio in order to allow group by group comparison of fixations data. The segments were then used to extract raw eye-tracking data as well as descriptive statistics regarding the number, length, and percentage of fixations per area of interest and per participant.

Raw data for the following measures were extracted for each segment using Tobii Studio, including local, eye-tracker, and recording timestamps, key press events, and validity measures for left and right eyes. Files with a high percentage of low validity values (these measures were collected for the right and left eye at the same sampling rate of the rest of the data) were excluded from the analysis, and the number of segments was then adjusted in order to have the same number of humorous and non-humorous segments. The values for the two AOI, together with their duration, type, and index, were used in the statistical analysis of data. Tobii Studio statistical package was used to extract descriptive statistics regarding the following measures: (a) total number of fixations per participant on the two areas of interest per group of segments (humorous and non-humorous), (b) percentage of time each participant fixated on the areas of interest per group of segments (humorous and non-humorous), (c) total fixations' duration per participant on the two areas of interest, and (d) total number of fixations on each area of interest for both participants combined. These values were used to compare participants' behavior with respect to the presence or absence of humor in the conversation.

A.2 Areas of interest

An *Area of Interest* (also called ROIs, regions of interest) is a portion of the visual field about which the researcher wants to know more (Holmqvist et al., 2011, p. 241). AOIs can be static if the stimulus participants are looking at during the experiment is static (such as pictures), or dynamic, if participants are looking at real life scenes or moving images, since AOIs need to be always located on the target stimulus. AOI can be defined manually (*expert-defined AOIs*; Holmqvist et al., 2011, p. 279) or automatically based on the stimulus properties (*stimulus-generated AOIs*; Holmqvist et al., 2011, p. 279). For this study, dynamic and expert-defined AOIs were used.

The creation of dynamic AOIs is a very time-consuming process and it was completed manually for each segment of conversation to be analyzed. AOIs are portions of the visual field of the participant that were video recorded, and over which eye-tracking data were superimposed, or geometrical apportionments of the screen where data are visualized, as illustrated in Figure A.2.

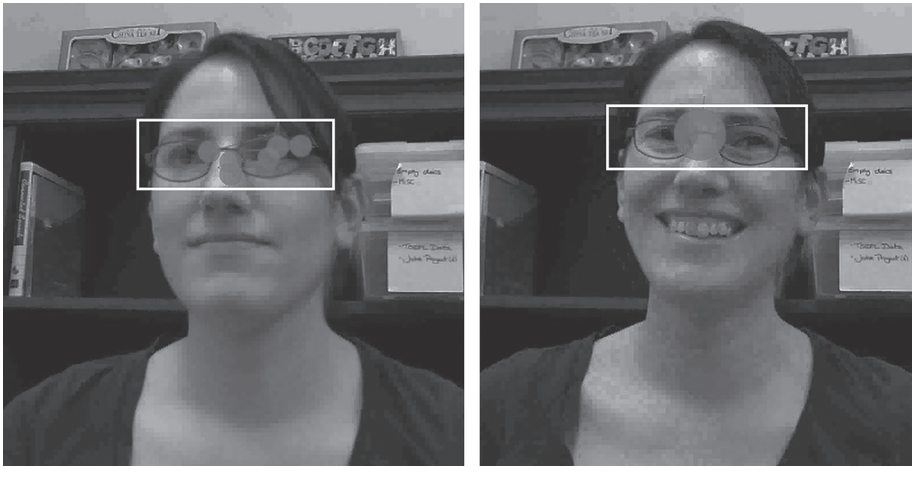
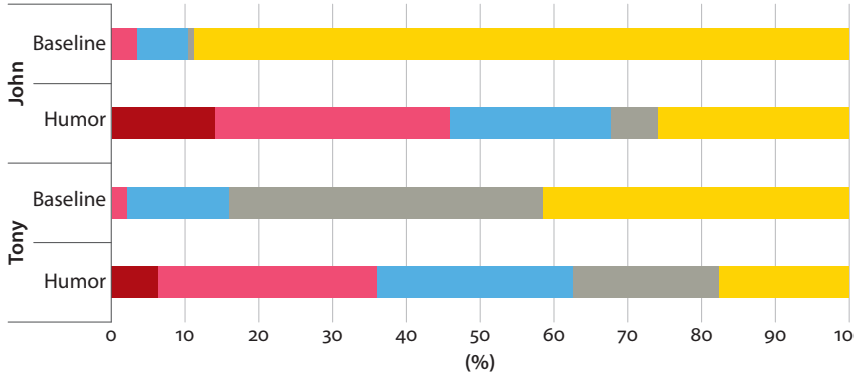


Figure A2. Fixations and saccades over a sample dynamic area of interest (Eyes) (from Gironzetti, 2020)

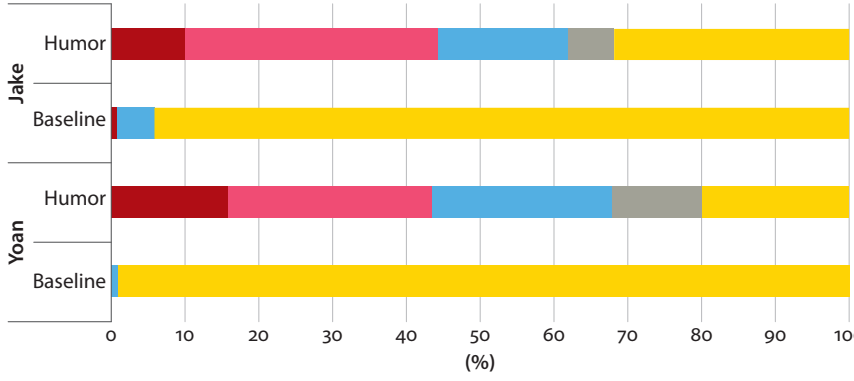
APPENDIX B

Individual smiling intensity by Dyad



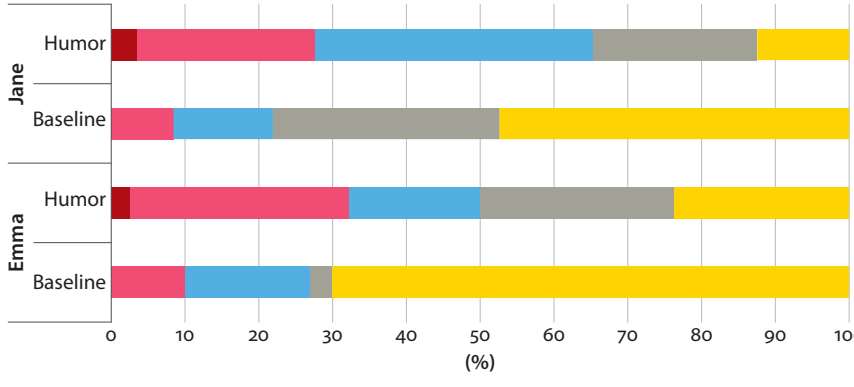
	Tony		John	
	Humor	Baseline	Humor	Baseline
SIS 4	3145	0	7276	0
SIS 3	14773	782	16150	1207
SIS 2	13209	4947	11169	2567
SIS 1	9843	15334	3383	289
SIS 0	8738	14960	13209	31960

Figure B1. Baseline and humor individual smiling intensity: conversation 1, John and Tony



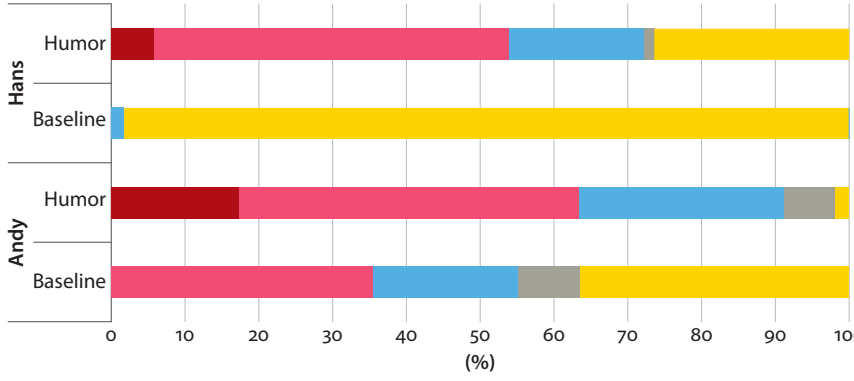
	Yoan		Jake	
	Baseline	Humor	Baseline	Humor
SIS 4	0	6222	0	3961
SIS 3	0	11152	238	13498
SIS 2	357	9231	1326	7259
SIS 1	0	5287	34	2584
SIS 0	39508	7956	38267	12546

Figure B2. Baseline and humor individual smiling intensity: conversation 2, Yoan and Jake



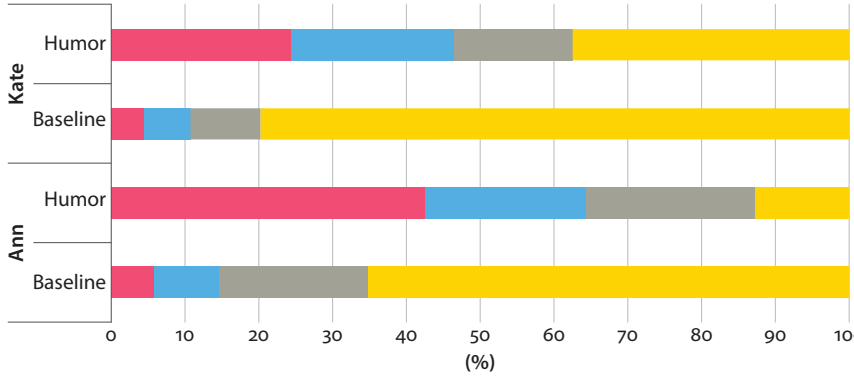
	Emma		Jane	
	Baseline	Humor	Baseline	Humor
SIS 4	0	777	0	1074
SIS 3	2952	8903	2543	7192
SIS 2	4980	4953	4032	11344
SIS 1	932	8189	9248	6607
SIS 0	20616	6595	13657	3200

Figure B3. Baseline and humor individual smiling intensity: conversation 3, Emma and Jane



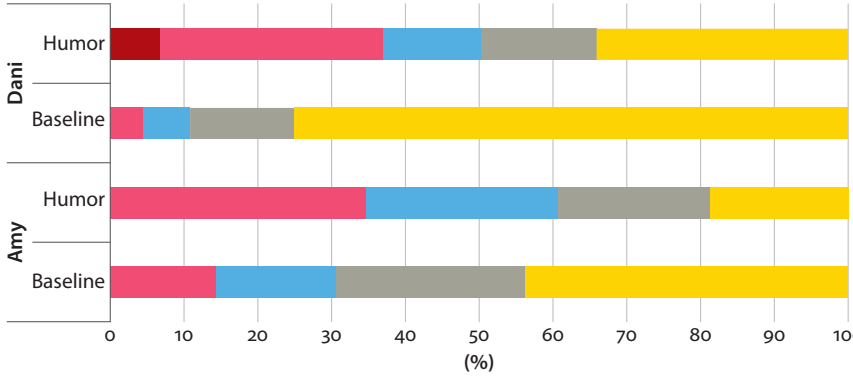
	Andy		Hans	
	Baseline	Humor	Baseline	Humor
SIS 4	0	4335	0	1445
SIS 3	9027	11560	459	12104
SIS 2	4964	6596	0	4556
SIS 1	2108	1785	51	357
SIS 0	8874	442	24463	6256

Figure B4. Baseline and humor individual smiling intensity: conversation 4, Andy and Hand



	Ann		Kate	
	Baseline	Humor	Baseline	Humor
SIS 4	0	0	0	0
SIS 3	1479	10642	1122	5831
SIS 2	2193	5474	1513	5338
SIS 1	5083	5763	2397	3859
SIS 0	16014	2805	19737	8636

Figure B5. Baseline and humor individual smiling intensity: conversation 5, Ann and Kate



	Amy		Dani	
	Baseline	Humor	Baseline	Humor
SIS 4	0	17	0	3485
SIS 3	8568	18887	2669	15691
SIS 2	9588	14093	3825	6528
SIS 1	15266	10625	8279	8466
SIS 0	25160	10149	43809	16932

Figure B6. Baseline and humor individual smiling intensity: conversation 6, Amy and Dani

APPENDIX C

Demographic questionnaire

Q1. What is your age?
☐ 18–24 years old
☐ 25–34 years old
☐ 35–44 years old
☐ 45–54 years old
☐ 55–64 years old
☐ 65+ years old

Q2. What is your sex?
☐ Male
☐ Female

Q3. Please specify your ethnicity.

☐ White
☐ Hispanic or Latino
☐ Black or African American
☐ Native American or American Indian
☐ Asian / Pacific Islander
☐ Other

Q4. What is the highest degree or level of school you have completed? ***If currently enrolled, highest degree received.***
☐ No schooling completed
☐ School up to 8th grade
☐ Some high school, no diploma
☐ High school graduate, diploma or the equivalent (for example: GED)
☐ Some college credit, no degree
☐ Trade/technical/vocational training
☐ Associate degree
☐ Bachelor's degree
☐ Master's degree
☐ Doctorate degree

Q5. Which language is your mother tongue?
☐ English
☐ Spanish
☐ Other (please, specify)
_____

Q6. Do you speak any other language?

☐ No
☐ Yes (please, specify)
_____
_____

Q7. How well do you know the other participant in the experiment?
☐ We are family
☐ We are friends
☐ We are acquaintances
☐ We don't know each other

APPENDIX D

Jokes in English and Spanish

Joke 1 (English)
An engineer was crossing a road one day when a frog called out to him and said, "If you kiss me, I'll turn into a beautiful princess." He bent over, picked up the frog and put it in his pocket. The frog spoke up again and said, "If you kiss me and turn me back into a beautiful princess, I will stay with you for one week." The engineer took the frog out of his pocket, smiled at it and returned it to the pocket. The frog then cried out, "If you kiss me and turn me back into a princess, I'll stay with you and do ANYTHING you want." Again the engineer took the frog out, smiled at it and put it back into his pocket. Finally, the frog asked, "What is the matter? I've told you I'm a beautiful princess, that I'll stay with you for a week and do anything you want. Why won't you kiss me?" The engineer said, "Look I'm an engineer. I don't have time for a girlfriend, but a talking frog, now that's cool."

Joke 2 (English)
A car was involved in an accident in a street. As expected, a large crowd gathered. A newspaper reporter, anxious to get his story, could not get near the car. Being a clever sort, he started shouting loudly, "Let me through! Let me through! I am the son of the victim." The crowd made way for him. Lying in front of the car was a donkey.

Joke 1 (Spanish)
Un día un ingeniero estaba paseando por la calle cuando de repente escuchó un sapo que le llamaba, diciéndole: "Si me besas, me transformaré en una princesa muy linda." Él se paró, recogió el sapo y se lo metió en el bolsillo. El sapo habló otra vez: "Si me besas, me transformaré en una princesa muy guapa y me quedaré contigo una semana entera." El ingeniero sacó el sapo del bolsillo, sonrió, y lo volvió a guardar. El sapo empezó a gritar: "Si me besas, me transformaré en una princesa muy, muy bonita, me quedaré contigo y haré TODO lo que me pidas." Una vez más, el ingeniero sacó el sapo del bolsillo, sonrió, y lo volvió a guardar. Al final, el sapo preguntó: "¿Qué pasa contigo? Te dije que si me besas me transformaré en una princesa muy linda, me quedaré contigo una semana y haré todo lo que me pidas. ¿Por qué no me besas?" Y el ingeniero dijo: "Mira, soy un ingeniero, no tengo tiempo para una novia, pero un sapo que habla… ¡está padrísimo!"

Joke 2 (Spanish)
Un día un coche tuvo un accidente muy grave por una calle del centro. Como era de esperar, mucha gente se acercó a ver qué había ocurrido. Un joven reportero de las noticias, ansioso por tener una buena historia, estaba intentando acercarse al lugar del accidente sin tener mucho éxito. Siendo un chico muy inteligente, empezó a gritar: "¡Déjenme pasar, déjenme pasar! ¡Soy el hijo de la víctima!" La gente le abrió paso. Y en el suelo en frente del coche había un burro.

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This volume is the first monograph exploring the functions of visual cues in humor, advocating for the development of a non-linguocentric theory of humor performance. It analyzes a corpus of dyadic, face-to-face interactions in Spanish and English to study the relationship between humor, smiling, and gaze, and shows how, by focusing on these elements, it is possible to shed light on the "unsaid" of conversations.

In the book, the humorous framing of an utterance is shown to be negotiated and co-constructed dialogically and multimodally, through changes and patterns of smiling synchronicity, smiling intensity, and eye movements. The study also analyzes the multimodal features of failed humor and proposes a new categorization from a dialogic perspective.

Because of its interdisciplinary approach, which includes facial expression analysis and eye tracking, this book is relevant to humor researchers as well as scholars in social and behavioral sciences interested in multimodality and embodied cognition.

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