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Abstract

Indirect speech acts communicate more than their literal meaning, and their comprehension relies on the listener's ability to draw the appropriate inferences in a given context. We used eye-tracking to investigate the cognitive processing involved in the comprehension of simple (direct) and complex (unconventional indirect) communicative acts, a more general distinction that applies not only to sincere speech acts, but also to irony and deceit. We recorded the eye movements of 40 participants while they read 60 stories (20 sincere, 20 deceitful, 20 ironic) consisting of a context and a target answer. For each story, we created two different contexts so that the same identical target answer was a simple (direct) and a complex (unconventional indirect) communicative act, respectively. We also assessed the indirectness of simple and complex communicative acts, as well as participants' working memory (WM) and Theory of Mind (ToM). Eye-pattern analysis showed that complex communicative acts were more difficult to understand than simple acts; differences between simple and complex acts held for all the pragmatic phenomena investigated, though processing differences were greater for sincere acts than for irony and deceit. We found a role of indirectness and ToM in the pragmatic processing of simple and complex acts, whereas the role of WM was modest. The present findings underscore the importance of adopting an encompassing theory that can account for different types of indirect speech acts, such as sincere, deceitful and ironic acts; they also suggest the importance of assessing individual differences in inferential and cognitive abilities.

Key words: Indirect speech acts, inference, pragmatics, irony, theory of mind, non-literal language.

Introduction

In everyday conversation, people frequently use non-literal forms of language in which the implied meaning does not necessarily correspond to the literal one. For example, indirect speech acts communicate more than the speaker literally says, as in "You're standing in front of the TV!" to ask the listener to move out of the way. To fully understand an indirect speech act, a listener has to go beyond the literal meaning of a sentence by relying on inferential ability and mutually shared knowledge (Bara, 2010; Clark, 1979; Gibbs, 1986b, 1994; Holtgraves, 2002; Searle, 1975).

Several theories have been proposed to explain how people understand the speaker's intended meaning of indirect speech acts. According to the standard pragmatic model (SPM, Grice, 1975; Searle, 1975, 1979), an indirect speech act is inherently more complex to understand than a direct one. According to this model, the listener has first to interpret the literal meaning of an utterance, then recognize that it is not sufficient to understand the speaker's communicative meaning, and finally replace the literal meaning with a non-literal one. Early studies provided initial support for this model (Clark & Lucy, 1975), whereas later research did not (Gibbs, 1979, 1983, 1986b; Holtgraves, 1994, 1998, 1999).

Another relevant theory is the direct access view (Gibbs, 1994), which claims that the meaning of an indirect or a non-literal expression can be accessed directly and without necessarily interpreting the literal meaning first. Gibbs (1994) pointed out that indirect speech acts are not a homogeneous category: the comprehension of conventional indirect speech acts such as "Do you mind…", "Would you like…?" does not necessarily require the literal meaning to be processed first and they are easier to understand than indirect speech acts with a non-conventional meaning. Gibbs (1983; 1986a) observed that individuals can process indirect requests faster than direct ones and that people are generally biased toward the conventional interpretation of non-literal sentences: when the indirect meaning is the conventional interpretation of an utterance, people take longer to process the literal, i.e., non-conventional meaning than the non-literal, i.e., indirect meaning. Indirect speech acts that are highly conventionalized are thus easier to understand than non-conventional ones and comparable to direct expressions (Gibbs, 1994).

In line with Gibb's proposal, Reeder (1980) reported that children aged 2.6 to 3 years understand that, in specific contexts, speech acts like "I want you to do that" or "Would you mind doing that?" have the same meaning (see also Bernicot & Legros, 1987). In a series of studies, Holtgraves confirmed Gibbs' results and demonstrated that different factors are involved in the comprehension of indirect meanings (Holtgraves, 1994, 1998, 1999). Holtgraves pointed out that the meaning of conventional indirect speech acts can be accessed directly and quickly, as in idiomatic expressions for example, and therefore does not require specific inferential processes. In contrast, non-conventional indirect speech acts cannot be accessed directly but rather require inferences and analysis of contextual information to be understood.

Holtgraves (1994, 1999) has also shown that this result holds for different types of indirect speech acts, such as indirect requests and indirect replies (see also Bara & Bucciarelli, 1998 for similar results).

A further theoretical framework is the graded salience view (Giora, 2000), which states that the salient meaning of an expression is the first to be activated. The salience of a word or a sentence is a function of the accessibility of that expression out of context, and an expression is considered salient if it is stored in the lexicon (Giora, 1997, 2003). For example, if an indirect statement is highly familiar, the indirect meaning is more salient than the literal one and is accessed first, resulting in faster processing of the indirect vs. the literal meaning.

Finally, a more recent theoretical perspective, the parallel-constraint-satisfaction view (Katz & Ferretti, 2001; Pexman, 2008) claims that several factors are simultaneously responsible for the comprehension of indirect and non-literal expressions. In this view, the reader is sensitive to various types of cues, such as contextual cues (e.g., prosodic intonation or a supportive context), phrase cues (e.g., conventionality), and cognitive factors (e.g., working memory ability), which interact in parallel in the interpretation of an utterance (Ivanko et al., 2004).

Overall, previous research on indirect speech acts has not supported the SPM (Holtgraves, 2002) but rather that the inferential processes involved in the comprehension of indirect speech acts are mediated by multiple factors, such as conventionality (Gibbs, 1986b; Holtgraves, 1994), speaker status (Holtgraves, 1994), specific type of indirect speech act (Holtgraves, 1999), and the context in which the communicative exchange takes place (Gibbs, 1983). A more deliberative and intentional inferential process than those hypothesized by the SPM may intervene only when pragmatic expressions are not conventional, and so require a specific analysis of the context to derive the meaning (Holtgraves, 2002). More recently, Tromp, Hagoort, & Meyer (2016) used pupillometry to investigate the comprehension of indirect speech acts and found that compared to direct requests, the comprehension of non-conventional indirect requests relies on additional inferential processing, which is reflected in increased pupil size.

Most previous studies have focused on sincere communicative acts, and indirect requests in particular (Gibbs, 1979, 1983, 1986c, 2001; Holtgraves, 1994), while few have investigated other communicative phenomena, such as the indirect use of irony and deceit (Gibbs, 1986a; Pexman et al., 2010). Pexman et al. (2010) showed longer reading times for indirect irony than for direct irony, supporting the claim that complex inferential processes are engaged in the comprehension of indirect remarks. However, indirect forms of these communicative phenomena remain underinvestigated.

Cognitive Pragmatic Theory (CPT) – Simple and Complex Communicative Acts

More recently, a new distinction between simple and complex speech acts (Bosco & Bucciarelli, 2008; Bucciarelli, Colle, & Bara, 2003) has been proposed within the Cognitive Pragmatic Theory (CPT) framework (Airenti, Bara, & Colombetti, 1993b, 1993a; Bara, 2010). According to this theory, the meaning of an utterance is clear only when

the communicative partner is able to recognize the specific behavioral game, which s/he assumes is shared with the interlocutor. A behavioral game is a stereotyped pattern of social interaction shared by the participants in the dialogue. Consider the example provided by Bara (2010):

A woman is working in her office when a complete stranger comes in and says:

[1] It's windy outside.

Although the literal meaning of the utterance is completely clear to the woman, she might have difficulty with comprehending the speaker's communicative intention. Only when she is able to make the necessary inferences to interpret [1] as advice not to go outside or a request to close the door or a reminder to take her scarf or whatever else will she be able to understand the communicative meaning of the utterance. The pure and simple literal aspect of the utterance, without a behavioral game (a shared context) to refer it to, is devoid of communicative significance. A communicative act can only be properly understood when the partner comprehends the behavioral game to which it belongs. In brief, the literal meaning of an utterance is merely a starting point: it is necessary but not sufficient for understanding the speaker's intended meaning (see also Gibbs, 1994; Récanati, 1995).

Bara & Bucciarelli (1998) defined direct and conventional indirect speech acts as simple communicative acts, since they directly refer to a shared behavioral game between interlocutors. The authors found in a series of studies with children (Bara & Bucciarelli, 1998; Bucciarelli et al., 2003) that the comprehension of direct and indirect conventional speech acts was equally easy, while the comprehension of non-conventional indirect speech acts resulted more difficult. They concluded that their empirical data argue against Searle's (1975) distinction between direct and conventional indirect speech acts. Non-conventional indirect speech acts are instead defined as complex communicative acts, because they do not immediately refer to a behavioral game and because they require a more complex inferential chain to be connected to the behavioral game shared by the interlocutors, they are more difficult to comprehend. Consider the following example from Bosco & Bucciarelli (2008):

[2] *Barbara is in the kitchen with her mother. Barbara says: "Mummy can I have a chocolate?"*
Her mother replies:

(a) Simple: "Of course, have one."

(b) Complex: "I'll join you."

(a) directly refers to the game [ASK-FOR-SOMETHING] and the partner is able to immediately interpret it as permission. In contrast, to comprehend the communicative value of (b), granting permission, Barbara has to infer that her mum's reply implies the acceptance of her request and is thus a positive answer.

"From an operational point of view, the procedure to discriminate between simple and complex communication acts consisted of seeing whether they answered the question: ''Does it immediately refer to the behavior game? Does it immediately satisfy the actor's communicative goal?''. If the answer is 'yes' the communication act is simple, otherwise it is complex" (Bosco & Bucciarelli, 2008, pp. 594).

Bosco & Bucciarelli (2008) showed that the same distinction between simple and complex speech acts can also be applied to deceitful and ironic communicative acts. Consider the following example:

[3] Pietro and Lucia are playing in the courtyard. Mario joins them; he is not a very nice boy but he always wants to play with them. Mario says: "Are you playing?"

Pietro replies:

(a) Simple: "We're not doing anything."

(b) Complex: "We're going home."

Sentence [3a] is an example of simple deceit because it negates the speaker's private belief *(We are playing)*, which would allow the listener to immediately identify the game [PLAY TOGETHER] that the speaker wishes to conceal from the listener. Sentence [3b], instead**,** is an example of complex deceit, since it leads to the inference (we're going home means we aren't playing), which contrasts with the game [PLAY TOGETHER] that the speaker wants to deny.

Moreover, the difficulty of comprehending a communicative act depends upon the length of the inferences needed to link the communicative act to the behavioral game (shared context) played by the interlocutors. In simple speech acts, there is a direct relationship between the statement and the behavioral game: the utterance directly refers to the game. By contrast, in complex speech acts, understanding the connection between the speech act and the game demands greater cognitive effort by the listener to make longer inferential chains, and this renders a complex communicative act harder to comprehend.

The distinction between simple and complex speech acts is more encompassing than that between direct and indirect speech acts as described previously (Searle, 1975), since it applies to any kind of communicative act, including not only sincere but also deceitful and ironic acts (Bosco & Bucciarelli, 2008), and to extralinguistic/non-verbal communicative acts as well (Bucciarelli et al. 2003; Angeleri et al., 2008).

Eye-tracking investigation of cognitive factors influencing the comprehension of indirect speech acts

Most previous research has investigated the processing of indirect speech acts using priming procedures and lexical decision tasks (Gibbs, 1983; Holtgraves, 1999), true-false paraphrase judgments (Gibbs, 1986; Holtgraves, 1994) or overt explanations (Holtgraves, 1998) to compare reading or reaction times for the processing of direct vs. indirect speech acts. These methodologies may be not be sufficiently fine-grained, however, when we want to look at the time course of processing of indirect speech acts. To our best knowledge, no studies to date have evaluated the on-line processing that takes place during the natural reading of indirect speech acts.

More recent studies have used functional magnetic resonance imaging (fMRI) to disentangle the cognitive processes involved in the recognition of indirect speech acts (Bašnáková et al., 2014, 2015; Feng et al., 2017; Jang et al., 2013; van Ackeren et al., 2012, 2016). These studies found that, as compared to direct statements, the comprehension of indirect speech acts is associated with increased activation of an extended fronto-temporal-parietal cerebral network (Feng et al., 2017; Jang et al., 2013) corresponding to the areas associated with mentalizing and inferential and high-level linguistic processing. fMRI studies can be highly informative in visualizing the neural structure supporting the comprehension of indirect utterances, but because of their low temporal resolution they are not ideal for studying the on-line time course of the processing involved in the understanding of indirect expressions.

Overall, previous studies have provided compelling evidence for contextual and sentence-level factors that influence the comprehension of indirect speech acts (e.g., conventionality, speaker status) and the neural activations involved in their understanding. Very little is known, however, about the time course of the context-dependent pragmatic and inferential processing involved in the real-time comprehension of indirect speech acts.

Eye tracking can yield a fine-grained analysis of the time course of speech act comprehension, allowing the researcher to examine precisely which parts of the text require extra processing time. Moreover, it provides a detailed picture of the different stages of pragmatic processing, helping to determine whether the additional time needed to identify an indirect speech act is located in the earlier or the later stages of processing (see Hyönä & Kaakinen, 2019; Olkoniemi & Kaakinen, 2021). Furthermore, eye-tracking offers several advantages for studying pragmatic processing during text-reading tasks (see Kaakinen, 2017). First, eye-patterns can be recorded continuously during text processing, thus enabling on-line monitoring of cognitive and inferential processing in the analysis of a text. Indeed, increasing inferential and cognitive demands are usually reflected in longer reading time spent examining the target sentence and re-examining earlier parts of the text. Furthermore, eye-tracking paradigms can be used to divide a test into segments corresponding to different areas of interest, making it possible to identify the parts of a text that require additional processing during reading (see Rayner, 1998). Finally, since no additional task is required, eye movements can provide an index of pragmatic processing during natural reading. For these reasons, eye-tracking is an ideal tool for studying the cognitive and inferential

processes involved in pragmatic comprehension. While previous studies have used eye-tracking to test theories on irony (Deliens et al., 2018; Filik et al., 2014, 2018; Kaakinen et al., 2014; Olkoniemi et al., 2019; Ţurcan & Filik, 2016) and metaphor comprehension (Blasko & Briihl, 1997; Olkoniemi et al., 2016), none to date has investigated pragmatic processing during the comprehension of direct vs. indirect speech acts.

Moreover, previous research on the comprehension of indirect speech acts has mainly focused on a specific type of indirect speech act (sincere indirect requests), while other kinds of indirect speech acts, such as indirect forms of deceit and irony, have not been extensively investigated. It is not clear whether the differences previous studies found for sincere speech acts can be extended to other pragmatic phenomena, such as irony and deceit.

Finally, people differ widely in their ability to interpret communicative acts, and these differences may be related to cognitive factors such as theory of mind (ToM) ability or working memory (WM) capacity (Giora, 1999). Previous studies have analyzed this relationship in children (Gabbatore et al., 2017; Tirassa & Bosco, 2008) and adults (Olkoniemi et al., 2016; Trott & Bergen, 2019). For example, Olkoniemi, Johander et al. (2019) found that readers with higher WM working memory can process the meaning of a target expression on-line during first-pass reading and don't need to look back and re-read previous parts of the text. A recent study by Trott & Bergen (2019) found that a listener's ability to comprehend a non-conventional indirect request depends on the knowledge that he/she attributes to the speaker, thus pointing to a role of ToM. Originally, Sperber & Wilson (2002) proposed that pragmatics is a subcomponent of ToM ability. Since then, ToM and pragmatics have typically been considered parts of a more general social skill. More recently, however, it has been argued (Bambini et al., 2016; Bosco et al., 2018; Parola et al., 2018) that ToM does not completely overlap with communicative-pragmatic competence, despite its importance in supporting a person's communicative ability. A series of empirical studies on children (Romina Angeleri & Airenti, 2014; Bosco & Gabbatore, 2017a, 2017b) and clinical conditions (Bosco et al., 2019; Gabbatore et al., 2021; Parola et al., 2018, 2020) support this theoretical position.

Overall, few studies to date have investigated the relationship between cognitive factors such as ToM and working memory in the comprehension of different types of indirect/complex speech acts (sincere, ironic, deceitful speech acts), and thus the role that ToM and working memory can have in the on-line processing of different types of speech acts is still unclear.

Overview of the present study: Aims and Hypotheses

In this study we used eye-tracking methodology to test in a group of healthy adults the validity of the distinction between simple and complex communicative acts (sincere, deceitful, ironic) within the CPT framework (Bara, 2010). In line with Bosco & Bucciarelli (2008), we hypothesized that: i) overall, simple communicative acts are easier to understand

than complex ones. This difference would be reflected in the longer reading time to understand complex vs. simple communicative acts. Specifically, we expected longer reading time for late processing measures (Total fixations, Regression-path, Look-back fixations, Look-from fixations), which would indicate that in order to understand the meaning of a sentence the reader needs to re-fixate and re-analyze previous parts of the text and then integrate this information in a coherent situational model of the story. This hypothesis is in line with previous eye-tracking studies that investigated pragmatic processing (for a review, see Olkoniemi et al., 2020). It is also in line with the graded salience hypothesis and the direct access view, which posit a difference between direct speech acts (simple) and non-conventional indirect speech acts (complex), whereas the standard pragmatic model doesn't distinguish between direct and conventional indirect speech acts (simple) and non-conventional indirect speech acts (complex). ii) The difference between simple and complex communicative acts holds for all the pragmatic phenomena studied here: sincere, deceitful, and ironic communicative acts. This would be reflected in the longer reading time in complex vs. simple communicative acts for all the communicative pragmatic phenomena investigated. iii) we aimed to identify the role of cognitive factors (ToM and working memory) and indirectness involved during real-time comprehension of simple and complex communicative acts. This hypothesis is in line with the parallel-constraint-satisfaction framework, which posits that individual differences (working memory, ToM) play a major role in determining the interpretation of a speech act.

We expected these factors to be related to eye-pattern fixation during the comprehension of complex and simple communicative acts. In detail, we expected that readers with low WM would compensate for their difficulty in processing the meaning of a sentence during first-pass reading by taking longer to re-read, look back, and look from to the target sentence and spillover regions. We also expected to see a role of ToM: participants with low scores in ToM would take longer on late measures of sentence processing (look-back fixations to the target sentence and spillover region, and re-reading of the spillover region) needed to construct a situational model (a global interpretation) of the story.

Methods

Participants

Forty healthy individuals (16 women; mean age 22.8 years, ±(SD) 2.1; mean years of education 15.5± 1.7) took part in the study. Four were excluded because of problems encountered with calibration and eye-tracker recording. All participants were Italian native speakers and had normal or corrected to normal vision. Written, informed consent was obtained before the start of the study. The study was approved by the Ethical Committee of the University of Turin (protocol 79485).

Statistical Power

We calculated statistical power for the present study using G*Power 3.1 (Faul et al., 2009). Based on the only meta-analysis currently available on the topic (Olkoniemi & Kaakinen, 2021), we assumed a weak effect of complex vs. simple acts (d = 0.2). The estimated sample size for the experimental design adopted (2×3 design, with 10 repeated measurements for each condition) for reaching a power > 0.95 was 36 participants.

Material

The experimental material consisted of 60 stories made up of a context describing an interaction between the two characters in the story. Each story has two context versions ending with a different final question followed by the same target answer, the same spillover region, and the same end of the story. There were two different versions of each story so that the same identical target answer that followed it was, respectively, a simple or a complex communicative act according to the two different context versions of the same story (see Table 1 for an example of a story, and Appendix A for the stories used in the experiment). Twelve fillers were included to minimize the habituation effect. The filler items had the same structure as the experimental items, ending with a final question followed by a target answer to be interpreted as literal (e.g., "You should train more often!") when the context was also negative (e.g., Alessia is very tired and she stops running). This was to prevent the participants from expecting a deceitful or an ironic target sentence following a negative event in the context.

Pre-test Study

A pre-test study was conducted to check for different characteristics of the experimental material. In the pre-test study (36 participants, mean age 23.92 years ±1.71), 11 men) we checked that: a) the context of the story actually supported a correct interpretation of the target sentence (sincere, deceitful or ironic); b) the level of indirectness of the target answer in responding to the context + final question (more indirect and implicit answers were given higher scores, see Table 1 for an example) differed between the simple (direct speech act) and the complex (non-conventional indirect) communicative acts. We consider indirectness as a measure of the inferential processes underlying the comprehension of a simple vs. a complex communicative act.

The participants read each story (context, final question, target answer, spillover region) and then answered two questions investigating: a) their comprehension of the communicative intention of the characters (i.e., "Please indicate the communicative intentions of the speaker by choosing from among three alternatives, i.e., sincere, deceitful, ironic), in order to exclude any sentences that may be misinterpreted (ironic sentences interpreted as white lies or as literal statements) and b) the level of indirectness of the target answer ("Please mark on a 5-point scale the extent to which the answer in bold is a direct response to the preceding question.").

We then selected for the eye-tracker experiment the stories with the highest accuracy (>90%) and the greatest difference in indirectness ratings between the simple and the complex version: a total of 120 stories (20 for each

communicative phenomenon: 20 sincere, 20 deceitful, 20 ironic communicative acts), each story having two versions (one simple and one complex). Finally, we prepared two lists, each with only half of the stories plus 12 fillers (a total of 72 stories). The participants to the eye-tracker experiment were randomly assigned to one of the lists, so that each participant read only one of the two versions of the story. The stories were presented in random order.

To determine whether the two final questions associated with an (identical) target answer and eliciting the two different interpretations of the same target answer (simple and complex) were comparable in reading difficulty, we controlled for: story length in words and characters (Table 2). A series of repeated measures ANOVA was performed with two main within-subjects factors (Type of Phenomenon: Sincere, Deceitful, Ironic; Type of Act: Simple, Complex) to rule out the possibility of there being significant differences in length (mean number of words, mean number of characters) across the different target answers associated with each target sentence. There were no differences in the mean number of words (Type of Act: $F_{(1,2)}$ 0.46, p=.83, η_p .00; Type of phenomenon: $F_{(1,2)}$ 0.20, p=.82, η_p .003) or mean number of characters (Type of Act: $F_{(1,2)}$ 0.67, p=.41, η_p .006; Type of phenomenon: $F_{(1,2)}$ 0.873, p=.87, η_p .002). The remaining parts of the story (context, target answer, spillover region, end of the story) were identical in the two versions (simple and complex) (Table 1). We also controlled for the role of direct semantic priming by ensuring that the content words in the final question (e.g., “painting”) that have a strong semantic association with the content words in the target answer (“picture”) were identical in the two versions (simple and complex) of the story. See Table 1 for an example.

Table 1. Example of stories (sincere, deceitful, ironic communicative acts) in the simple and the complex version and corresponding region of interest (ROI).

AREA OF INTEREST (IA)	ORIGINAL ITALIAN	ENGLISH TRANSLATION
TYPE OF ACT	**SINCERE COMMUNICATIVE ACT**	
CONTEXT AND FINAL QUESTION – *SIMPLE SINCERE VERSION*	Marta vuole passare una bella giornata con la sua migliore amica Camilla. Non la vede da molto tempo, e pensa che sarebbe divertente andare insieme in montagna a sciare. Camilla ha sempre molti impegni, e Marta non sa quando organizzare. Marta chiede a Camilla: "Quando andiamo a sciare insieme?".	Marta wants to spend a nice day with her best friend Camilla. She hasn't seen her in a long time, and she thinks it would be fun to go skiing together. Camilla is always very busy, and Marta doesn't know when to organize their day out. Marta asks Camilla: "When shall we go skiing together?"
CONTEXT AND FINAL QUESTION – *COMPLEX SINCERE VERSION*	Marta vuole passare una bella giornata con la sua migliore amica Camilla. Non la vede da molto tempo, e pensa che sarebbe divertente andare insieme in montagna a sciare. Camilla ha sempre molti impegni, e Marta non sa quando organizzare. Marta chiede a Camilla: "Ti piace andare a sciare?".	Marta wants to spend a nice day with her best friend Camilla. She hasn't seen her in a long time, and she thinks it would be fun to go skiing together. Camilla is always very busy, and Marta doesn't know when to organize their day out. Marta asks Camilla: "Do you like to go skiing?".
TARGET ANSWER (Identical in both versions)	"Combiniamo per questa domenica!"	"Let's make it this Sunday!"
SPILLOVER	Camilla risponde.	Camilla answers.
END OF THE STORY	Marta cerca nell'armadio la sua tuta da sci.	Marta looks for her ski suit in the wardrobe.
TYPE OF ACT	**DECEITFUL COMMUNICATIVE ACT**	
CONTEXT AND FINAL QUESTION – *SIMPLE DECEIT VERSION*	Anna ha accettato di guardare il gatto di Giorgia per il fine settimana. Giorgia ha un siamese molto dispettoso che graffia e rompe tutto quello che tocca, ma Anna non lo sa. Quando Anna entra in casa vede il gatto seduto su una sedia. Anna chiede a Giorgia: "Che carattere ha il tuo gatto?".	Anna has agreed to look after Giorgia's cat for the weekend. Giorgia's cat is a very naughty Siamese that breaks and scratches everything it touches, but Anna doesn't know that. When Anna goes to Giorgia's house she sees the cat sitting on a chair. Anna asks Giorgia: "What is your cat like?"
CONTEXT AND FINAL QUESTION – *COMPLEX DECEIT VERSION*	Anna ha accettato di guardare il gatto di Giorgia per il fine settimana. Giorgia ha un siamese molto dispettoso che graffia e rompe tutto quello che tocca, ma Anna non lo sa. Quando Anna entra in casa vede il gatto seduto su una sedia. Anna chiede a Giorgia: "Mi farà disperare?".	Anna has agreed to look after Giorgia's cat for the weekend. Giorgia's cat is a very naughty Siamese that breaks and scratches everything it touches, but Anna doesn't know that. When Anna goes to Giorgia's house she sees the cat sitting on a chair. Anna asks Giorgia: "Will it be any trouble?"
TARGET ANSWER (Identical in both versions)	"E' un animale tranquillissimo!"	"It's very well-behaved."
SPILLOVER	Giorgia risponde.	Giorgia answers.

END OF THE STORY	Anna continua a fissare il gatto.	Anna keeps looking at the cat.
TYPE OF ACT	**IRONIC COMMUNICATIVE ACT**	
CONTEXT AND FINAL QUESTION – *SIMPLE IRONY VERSION*	Valentina prepara un risotto ai frutti di mare per la sua amica Ilaria. Valentina e Ilaria assaggiano il risotto, ed entrambe dicono che è molto cattivo, ma non essendoci altro per cena lo mangiano lo stesso. Dopo aver chiacchierato al lungo, a fine serata le amiche si salutano. Valentina chiede ad Ilaria: "Com'era la cena di stasera?".	Valentina is preparing a seafood risotto for her friend Ilaria. Valentina and Ilaria taste the risotto when it's ready, and both notice that it doesn't taste good, but since there is nothing else for dinner they eat it anyway. After chatting for a long time, at the end of the evening the two friends say goodbye. Valentina asks Ilaria: "How was dinner tonight?"
CONTEXT AND FINAL QUESTION – *COMPLEX IRONY VERSION*	Valentina prepara un risotto ai frutti di mare per la sua amica Ilaria. Valentina e Ilaria assaggiano il risotto, ed entrambe dicono che è molto cattivo, ma non essendoci altro per cena lo mangiano lo stesso. Dopo aver chiacchierato al lungo, a fine serata le amiche si salutano. Valentina chiede ad Ilaria: "Sono una brava cuoca?".	Valentina is preparing a seafood risotto for her friend Ilaria. Valentina and Ilaria taste the risotto when it's ready, and both notice that it doesn't taste good, but since there is nothing else for dinner they eat it anyway. After chatting for a long time, at the end of the evening the two friends say goodbye. Valentina asks Ilaria: "Am I a good cook?
TARGET ANSWER (Identical in both versions)	"Il risotto era davvero eccezionale!"	"The risotto was truly exceptional!"
SPILLOVER	Ilaria risponde.	Ilaria replies.
END OF THE STORY	Valentina raccoglie i piatti e li lava.	Valentina gathers the dishes to wash them.

Table 2. Mean number of words and characters in the context scenarios, final questions, and target answers for each type of communicative act (simple and complex) and pragmatic phenomenon (sincere, deceit, irony).

Pragmatic Phenomena	**Sincere**		**Deceit**		**Irony**	
Type of Act	**Simple**	**Complex**	**Simple**	**Complex**	**Simple**	**Complex**
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Story context – words	43.55 (4.6)	43.55 (4.6)	43.9 (4.17)	43.9 (4.17)	43.25 (6.06)	43.25 (6.06)
Story context - characters	205.8 (20.2)	205.8 (20.2)	214.75 (21.2)	214.75 (21.2)	214.35 (22.1)	214.35 (22.1)
Final question - words	5.0 (1.29)	4.7 (1.13)	4.85 (1.31)	5.2 (1.54)	5.0 (1.26)	4.8 (1.1.)
Final question - characters	23.85 (7.73)	24.35 (5.16)	23.65 (5.39)	25.2 (7.04)	23.72 (5.68)	24.05 (4.87)
Target answers- words	5.9 (1.55)	5.9 (1.55)	6.05 (2.62)	6.05 (2.62)	5.65 (0.99)	5.65 (0.99)
Target answers-characters	27.8 (6.11)	27.8 (6.11)	31.15 (9.0)	31.15 (9.0)	29.45 (6.9)	29.45 (6.9)
Indirectness rating	1.32 (0.18)	3.47 (0.45)	1.72 (0.29)	3.23 (0.33)	2.09 (0.37)	3.24 (0.39)

Theory of Mind and Working Memory assessment

In order to evaluate the role of other cognitive functions (theory of mind and working memory) in the comprehension of the stories, we administered a series of neuropsychological and ToM tasks:

- **Working Memory**: Digit Forward, Digit Backward and Listening Span tests (De Beni, R. et al., 2008). Digit Forward requires participants to repeat an increasing sequence of numbers in the same order as read aloud by the examiner; Digit Span Backward requires participants to repeat an increasing sequence of numbers in the reverse order of that presented by the examiner. The Listening Span test consists of two sets, each with an increasing number of sequences (2, 3, 4, 5, 6) of simple sentences (example of a two-sentence sequence: 1) "L'idraulico è il tecnico che aggiusta le automobili." [False]; 2) "I leoni e gli elefanti si possono vedere al circo." [True]). Each set consists of 20 sentences (total of 40 sentences). The last words of a sentence can be composed of 2, 3, 4 or 5 syllables. After listening to a sentence, participants give a plausibility judgment (stating whether the content is true or false) and retain the last word. At the end of each sequence, participants have to recall the final word of each sentence in the correct order of presentation (in the example above, the words to recall are "automobili" and "circo"). The tasks in the Italian version are validated (De Beni, Borella, Carretti, Marigo, & Nava, 2008).
- **Theory of Mind**: Reading the Mind in the Eyes test (RMET) (Baron-Cohen et al., 2001; Meyer & Shean, 2006). The RMET was chosen because of its robust psychometric properties, as confirmed in the validation study of the Italian version, and because previous studies proved its robustness and validity in assessing advanced ToM skills (Vellante et al., 2013).

Procedure

Eye movements were recorded using an SR Eyelink 1000 eye tracker (SR Research Ltd., Ontario, Canada) at a sampling frequency of 1000 Hz. Participants read each story on a 24-inch computer screen (resolution 1920x1080 pixels and refresh rate 60 Hz) placed at a distance of approximately 90 cm from their eyes. They were seated in front of the eye tracker; head movements were minimized with a chin and forehead rest.

An automatic pre-processing procedure removed fixations under 40 ms, while fixations under 80 ms were merged with a nearby fixation (if the distance was <1°). Trials with eye-track loss or in which participants skipped entire parts of the text (e.g., target answer or context) were eliminated prior to analysis (total of 3 of 2160 trials).

Participants completed the experimental session individually. When they arrived at the laboratory, they were familiarized with the task and completed three practice trials (not included in the experimental stories) before the start of the actual experiment. Next, they completed a 9-point eye-tracker screen calibration. Before a story was displayed on the screen, a fixation point appeared in the top-left corner; the participants had to look at this point and press the space key

to move to the next step. The story then appeared on the screen and the participants had to press the space key when they had finished reading it. A question appeared in the center of the screen asking them to judge the speaker's communicative intention ("What was the main character's communicative intention?"). Participants had to choose from among three alternative options 1) sincere 2) deceitful 3) ironic and to press the corresponding number key. The script advanced to the next trial after the participants had answered the question or after 8 seconds if no response was given (no response was recorded in 49 of 2160 trials and a wrong answer in 161 of 2160 trials). The session was divided into two blocks, with a brief pause in between.

Eye-looking Measures and Regions of Interest (ROIs)

The stories were segmented into regions of interest (ROIs): story context, target answer, and spillover region (Table 1). The story context described the scenario in which the events of the story would unfold. In each story there was an interaction between two characters, and at the end of the story context one of them asked the other a question. The target answer was the reply the partner gave the speaker. The spillover region consisted of the remainder of the target answers (e.g., Carlotta answers) (see Table 1 for an example). We computed the following measures of reading behavior for each ROI: First-pass fixations, First-pass rereading time, Total fixations, Regression-path, Look-back fixations, Look-from fixations. These measures were selected to determine whether the comprehension of complex vs. simple acts entails a longer reading time in the early measures (*First-pass fixations, First-pass rereading time*), indicating slower processing when the participants encounter the target sentence, or a longer reading time in late measures (*Total fixations, Regression-path, Look-back fixations, Look-from fixations*), indicating a slower reading process in a later time. A longer reading time in the early measures may indicate that the meaning of a sentence is processed and recognized on the fly as soon as the reader encounters the target sentence, while a longer reading time in the late measures may indicate that the reader has to re-fixate and re-analyze previous parts of the text to understand the meaning of the sentence and then integrate this information in a coherent situational model of the story (see Olkoniemi et al, 2020). Unlike traditional word-level measures generally employed in previous studies (see Rayner, 1998), here we included additional sentence-level measures, such as reading from, reading back, re-reading first-pass, which are thought to be better suited for assessing the time course of complex speech acts (Hyönä et al., 2003; Kaakinen, 2017).

First-pass fixations is the sum of the duration of all fixations falling within the ROI until a fixation leaves the ROI either to the left or the right boundary. This is a measure of early text processing. *Total fixations* is the sum of the duration of all fixations falling within the ROI. This is a measure of overall processing. *Regression path fixations* is the sum of the duration of all fixations starting from the moment when the ROI is first entered until a fixation leaves the ROI to the right boundary. The *regression path* includes fixations on the ROI and any regressive fixations on previous parts of a text until a fixation leaves the ROI to the right boundary. This measure includes early text processing plus the time taken to reinspect

previous parts of a text. *First-pass re-reading time* is the sum of the duration of all fixations falling within the ROI and spent re-fixing previous parts of that ROI until a fixation leaves the ROI to either the left or the right boundary. This is a measure of the total time spent reinspecting the ROI during early processing (first pass). *Look-back fixations* is the sum of the duration of all fixations returning to the ROI from subsequent parts of a text. This is a measure of the time spent reinspecting the ROI after the reader has moved on to the next ROI. *Look-from fixations* is the sum of the duration of the look-back fixations that were initiated from that ROI. While some late measures partially overlap (e.g., look-from and regression path, look-back and total fixation), they have some relevant differences, nevertheless (e.g., look-from include only fixations to previous parts of a text, while regression path includes also first-pass fixations). For this reason, we preferred to include all these measures to allow for comparison of our story with previous studies that used other selections (see Olkoniemi & Kaakinen, 2021). The datasets of the present study are publicly available via the Open Science Framework: https://osf.io/bsj2w/.

Statistical Analysis

Model Selection Procedure

Eye data were analyzed in R using a linear mixed-effects model (LMM), with Type of Act (two levels: simple, complex) and Type of Phenomenon (three levels: sincere, deceit, irony) as fixed effects, and participants and items as crossed random effects. The main effect Type of Act answers the question of whether there is an overall difference in processing simple and complex communicative acts, irrespective of the specific communicative phenomenon (here, sincere, deceitful or ironic communicative act). The main effect Type of Phenomenon answers the question of whether there is a difference in processing time between the pragmatic phenomena (sincere, deceitful, ironic communicative act). For our study design we created two different versions of the context of the same story, so that the same identical following target answer was, respectively, a simple and a complex communicative act in the two versions (see Methods). The stories were also checked across different communicative phenomena to ensure that there were no significant differences in length between sincere, deceitful and ironic stories (Table 2). However, since the scenarios are identical only in the simple and complex versions of each story, but not across different communicative phenomena, there could be other potential differences between the sincere, the deceitful, and the ironic scenarios, for example in the complexity of the story, in the sequence of the events and so on. This is why a direct comparison between sincere, deceitful, and ironic communicative acts is not possible. The aim of the study was to investigate differences between simple and complex communicative acts across different communicative phenomena and not to differentiate between communicative phenomena *per se*, which previous studies have done (Bosco, Berardinelli, & Parola, 2019; Bosco, Gabbatore, Angeleri, Zettin, & Parola, 2018; Bosco, Parola, Valentini, & Morese, 2017).

More relevant to our hypotheses is the interaction Type of Act x Type of Phenomenon. The interaction term answers the question about whether the difference in processing time between simple and complex communicative acts is influenced by the specific communicative phenomenon, i.e., whether the difference in processing between simple and complex communicative acts varies with different communicative phenomena (sincere, deceitful, ironic communicative acts). Further on, we will report the results for the main factor Type of Phenomenon, but for the present we will focus our discussion on the results for the main factor Type of Act and on the interaction Type of Act x Type of Phenomenon, which are the only relevant effects in light of our study aims and hypotheses.

We established the appropriate random and fixed effects structure in order to reach the best model fit for our data. We started by fitting the maximal random effect structure, as suggested in Barr et al., (2013). The maximal random effect structure model included (1 + Type of Phenomenon x Type of Act | subject) + (1 + Type of Phenomenon x Type of Act | item). The maximal random effect structure allows to control for Type I Error 1, thus reducing the risk of false positives; however, it can also lead to fitting a model that is too complex for the observed data and substantially reduces statistical power or causing convergence failure (Matuschek et al., 2017; Vandekerckhove & Matzke, 2015). In a second step, we thus used a model simplification procedure as recommended in Matuschek et al. (2017) . We compared the model with the maximal random effect structure with progressively simpler random-effects structures and by removing one random component at a time, starting from higher order variance components (interaction terms) before lower-order term components (main effects). At each step, we used the likelihood ratio test to determine whether the removal of each component led to a marked drop in goodness of fit. This procedure was continued until a significant decrease in fit was observed, maintaining the model with the more complex random effect structure or until convergence was achieved. After the proper random effect structure had been established, in the third step we determined the fixed-effect structure. Again, we started by fitting the model with the most complex fixed-effect structure (1 + Type of Phenomenon + Type of Act + Type of Phenomenon x Type of Act) and then applied likelihood ratio tests to determine whether removing each component, starting from interaction terms before main effects, led to a marked drop in goodness of fit. Since the distribution of reading measures was skewed, we applied logarithmic transformation. The trials in which the participants gave incorrect answers were not entered in the final analysis. See Table 3 for the final model for each eye-reading measure and ROI, with the likelihood ratio tests and significant t- and p-values associated with each of the models. Table 3 presents the mean and the standard error for each of the six reading measures for each ROI, type of communicative act (simple and complex), and type of pragmatic phenomenon (sincere, deceit, irony).

Finally, we applied correlation-adjusted Bonferroni correction to control for multiple comparisons and Type-I error rate (see Sankoh et al., 1997) within each family of ROIs (Context, Target answer, Spillover region). While Bonferroni correction assumes independence between statistical tests (e.g., Joo et al., 2016), our eye-tracking measures

have a substantial degree of correlation within each ROI. Application of Bonferroni correction would have resulted too conservative. The correlation between eye tracking measures within each ROI and the resultant correlation-adjusted Bonferroni corrected p-value thresholds are: - Context ($r = 0.56$, $p < .035$) – Target sentence ($r = 0.53$, $p < .030$) – Spillover region ($r = 0.38$, $p < .024$).

Analysis of Cognitive Factors (theory of mind and working memory) and Indirectness involved in the Comprehension of Simple and Complex Communicative Acts

To analyze the role of cognitive factors, (working memory and ToM) and indirectness in the comprehension of simple and complex communicative acts, we modelled each eye-reading measure separately using mixed-linear models with indirectness of each target sentence, working memory (Backward and Forward Span, Listening Span), and theory of mind (Mind in the Eyes task) abilities as continuous predictors; we assessed separately the effect for each communicative phenomenon (sincere, deceit, irony) and type of act (simple and complex), with participants and items as crossed random effects. We established the appropriate random effects using the same procedure detailed before.

Results

Behavioral Results

The overall mean (±sd) accuracy in responding to the questions evaluating the comprehension of a speaker's communicative intention on the eye tracker tasks was 93.2% ± 8.7 for sincere (simple act 95.8% ± 7.3, complex act 90.5% ±9.2), 91.2% ± 13.3 for deceitful (simple deceit 89.4% ± 14.6, complex deceit 93.1% ± 11.9), and 86.5% ± 15.0 for ironic (simple irony 86.5% ± 15.0, complex irony 87.2% ± 15.2) communicative acts. One way ANOVA showed a significant main effect of Type of Phenomenon (F 5.31, $p=.006$) but no statistically significant effect for Type of Act (F .002, $p=.962$) or for the interaction Type of Act ×Type of Phenomenon (F 2.476, $p=.087$). Post-hoc comparison revealed that irony (simple and complex) was more difficult to recognize than sincere (simple and complex) communicative acts ($p=.005$). No differences were found between deceitful and sincere communicative acts.

Eye-Reading Results

Context

We observed an effect of Type of Phenomenon in *reading back time*: participants read the context of deceitful ($b = -1.35$, $se = 0.29$, $t = -4.59$, $p < .001$) and ironic ($b = -0.81$, $se = 0.30$, $t = -2.74$, $p < .01$) stories faster than the context of sincere stories, and in *total reading time*: participants read the context of deceitful stories ($b = -0.10$, $se = 0.04$, $t = -2.68$, $p < .01$) faster than the context of sincere communicative acts. We found no effect of Type of Act and no effect of Type of Act × Type of Phenomenon in *first-pass reading, total reading, reading back measures*: overall, reading the context of stories including simple communicative acts took just as long as reading the context of stories including complex communicative acts (Table 4 and Fig. 1).

Target Answer

We found an effect of Type of Act on *total reading time* (β = 0.05, se = 0.02, t = 2.29, p < .05) and *total first pass re-reading time* (b = 0.25, se = 0.11, t = 2.32, p < .05): participants took longer to read and re-read the target sentence of overall complex communicative acts than the target sentence of overall simple communicative acts, regardless of the communicative phenomenon (sincere, ironic or deceitful speech act). We found an effect of interaction Type of Act × Type of Phenomenon on *total reading time*: the difference in reading time between simple and complex communicative acts was smaller for deceit (b = -0.17, se = 0.06, t = 2.76, p < .01) than for sincere communicative acts (Table 4 and Fig. 2).

Spillover Region

We found no effect of Type of Act and Type of Phenomenon on any of the reading measures to the spillover region (Table 4 and Fig 3). We found an effect of interaction Type of Act × Type of Phenomenon on *reading from time:* the difference in reading time between the simple and the complex communicative acts was smaller for deceit (b = -0.62, se = 0.20, t = 3.05, p < .01) than for sincere communicative acts (Table 4 and Fig. 2).

Analysis of Cognitive Factors (theory of mind and working memory) and Indirectness involved in the Comprehension of Simple and Complex Communicative Acts

Context

We found a negative effect of Theory of Mind on *reading back time* in all the tasks: sincere simple acts (β =-0.38, se = 0.15, t = -2.47, p < .05), sincere complex acts (β = -0.38, se = 0.16 , t = -2.43, p < .05), deceitful simple acts (β = -0.45, se = 0.16, t = -2.82, p < .01), deceitful complex acts (β = -0.5, se = 0.16, t = -3.20, p < .01), ironic simple acts (β =-0.72, se = 0.16, t = -4.40, p < .001), ironic complex acts (β = -0.4, se = 0.16, t = -2.48, p < .05); in brief, participants with higher REMT scores spent less time reading back the context of the stories.

Target Answer

We found a positive effect of indirectness on *total first-pass rereading time* - sincere complex acts (β = 0.80, se = 0.31, t = 2.55, p < .05) and deceitful simple acts (β = 0.60, se = 0.25, t = 2.31, p < .05) and on *total reading time* - sincere simple acts (β = 0.21, se = 0.06, t = 3.63, p < .001) – in *regression path* – deceitful simple acts (β = 0.17, se = 0.07, t = 2.47, p < .05) and deceitful complex acts (β = 0.19, se = 0.08, t = 2.31, p < .05) – *on reading back time* – sincere complex acts (β = 0.75, se = 0.32, t = 2.34, p < .05); in brief, participants spent more time reading and re-reading the target answers rated as more indirect in the rating study.

We found a negative effect of Theory of Mind on *reading back time* - sincere simple acts (β = -0.38, se = 0.13, t = -3.06, p < .01), sincere complex acts (β =0.43, se =0.13, t =-3.38, p < .001), deceitful simple acts (β = -0.31, se = 0.13,

t = -2.39, p < .05), deceitful complex acts (β = -0.43, se = 0.13, t = -3.37, p < .001), ironic simple acts (β = -0.48, se = 0.14, t = -3.56, p < .001), ironic complex acts (β = -0.36, se = 0.13, t = -2.76, p < .01); briefly, participants with higher REMT scores spent less time reading back the target answer of the stories.

We found a negative effect of working memory, with higher scores corresponding to faster reading times, on *reading back time* - sincere complex acts (β = -0.10, se = 0.03, t = -2.54, p < .05); briefly, participants with higher scores on working memory tasks spent less time reading back the target answer of the stories.

Spillover Regions

We found a positive effect of indirectness for deceitful simple acts on *first pass reading time* (β = 0.43, se = 0.16, t = 2.78, p < .01), on *total reading time* (β = 0.46, se = 0.14, t = 3.31, p < .001), and on *regression path* (β = 0.38, se = 0.16, t = 2.35, p < .05); briefly, participants spent more time reading back the spillover regions of the stories in which the target sentence was rated as more indirect in the rating study.

We found a negative effect of ToM, i.e. higher REMT scores corresponded to faster reading times, on *total first-pass rereading time* - sincere complex acts (β = -0.37, se = 0.12, t = -3.20, p < .01) – and *reading back fixation* – sincere complex acts (β = -0.44, se = 0.11, t = -3.92, p < .001), and ironic simple acts (β = -0.27, se = 0.12, t = -2.31, p < .05); briefly, participants with higher REMT scores spent less time reading and first time re-reading the spillover region of the stories. We found no effect of working memory on *total reading time*, *reading back time*, *first-pass reading*, *regression path*, and *total first time re-reading time* of the target answer.

Table 3. Mean reading time and standard error (SE) for each eye-reading measure and ROI for each communicative phenomenon (sincere, deceit, irony) in the simple and the complex story version.

Communicative Phenomena	**Sincere**				**Deceit**				**Irony**			
Type of Act	**Simple**		**Complex**		**Simple**		**Complex**		**Simple**		**Complex**	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Story context												
First-pass	9095	194	9284	221	9098	222	8904	192	9499	232	9379	223
Total reading time	10983	263	11571	314	10199	283	9973	229	11118	308	11057	290
Reading back-time	1888	156	2287	199	1100	153	1069	108	1619	188	1677	165
Target answer												
First-pass	812	24	843	25	725	22	740	21	838	30	873	29
Total reading time	1221	40	1485	59	1139	58	1108	43	1266	52	1374	54
Total first pass re-reading time	126	14	132	16	87	12	114	12	133	15	162	17
Regression path	986	37	1118	51	860	30	939	41	1109	53	1143	54
Reading back-time	334	26	529	47	343	49	302	33	334	37	385	39
Target from-time	99	21	163	30	64	14	133	28	177	40	154	35
Spillover region												
First-pass	304	10	309	13	298	11	306	10	303	11	306	12
Total reading time	469	20	488	22	442	23	458	21	422	19	457	21
Total first pass re-reading time	12	3	19	6	19	4	17	4	17	4	23	4
Regression path	411	33	504	42	391	20	402	28	366	20	459	45
Reading back-time	149	15	144	16	116	19	118	14	99	14	132	15
Reading from-time	90	28	161	36	66	14	62	19	43	15	67	12

Table 4. Selected models for the eye reading measures from the regions of interest (ROIs).

ROI Eye Measure	Model	Fixed effects	b	SE	t	p-value
CONTEXT						
First_pass	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	(Intercept)	9.05	0.05	165.10	< .0001
		Type of Act= Complex	0.00	0.01	0.15	0.88
Total	outcome ~ 1 + TYPE OF ACT+ TYPE OF PHENOMENA+ (1 | ID) + (1 | ITEM)	(Intercept)	9.22	0.06	159.92	< .0001
		Type of Act= Complex	0.02	0.02	1.28	0.2
		Type of Phenomena= Deceit	-0.10	-0.04	-2.68	**<.01**
		Type of Phenomena= Irony	-0.01	-0.04	-0.34	0.73
Back	outcome ~ 1 + TYPE OF ACT+ TYPE OF PHENOMENA+ (1 | ID) + (1|ITEM)	(Intercept)	4.97	0.31	16.16	<0.001
		Type of Act= Complex	0.20	0.15	1.33	0.183
		Type of Phenomena= Deceit	-1.35	0.29	-4.59	**<0.001**
		Type of Phenomena= Irony	-0.81	0.30	-2.74	**0.006**
TARGET_ANSWER						
First pass	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM) + (1 + TYPE OF ACT| ID) + (1 + TYPE OF ACT| ITEM)	(Intercept)	6.47	0.06	100.7	< .0001
		Type of Act= Complex	0.03	0.03	1.24	0.22
Total	outcome ~ 1 + TYPE OF ACT+ TYPE OF PHENOMENA+ TYPE OF PHENOMENA* TYPE OF ACT+ (1 | ID) + (1 | ITEM)	Intercept)	6.91	0.06	105.03	< .0001
		Type of Act= Complex	0.05	0.02	2.29	**0.022***
		Type of Phenomena= Deceit	-0.23	0.11	-2.16	0.03421
		Type of Phenomena= Irony	-0.06	0.11	-0.62	0.53
		Type of Act= Complex: Type of Phenomena= Deceit	-0.17	0.06	-2.76	**0.006 ****
		Type of Act= Complex: Type of Phenomena= Irony	-0.13	0.06	-2.1	0.033
Back	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	Intercept)	2.83	0.22	12.80	<0.001
		Type of Act= Complex	0.22	0.13	1.63	0.104
Regression Path	outcome ~ 1 + TYPE OF ACT+ TYPE OF PHENOMENA+ (1 | ID) + (1 | ITEM)	Intercept)	6.68	0.09	70.32	< .0001
		Type of Act= Complex	0.06	0.03	2.04	0.041
		Type of Phenomena= Deceit	-0.13	0.11	-1.16	0.24
		Type of Phenomena= Irony	0.04	0.11	0.40	0.68
Rereading first pass		(Intercept)	1.62	0.28	5.72	<0.001

	outcome ~ 1 + TYPE OF ACT+ TYPE OF PHENOMENA+ (1 | ID) + (1 | ITEM)	**Type of Act= Complex**	0.25	0.11	2.33	**0.020***
		Type of Phenomena= Deceit	-0.18	0.31	-0.59	0.5554
		Type of Phenomena= Irony	0.13	0.31	0.43	0.667
From	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	(Intercept)	0.87	0.12	7.51	<0.001
		Type of Act= Complex	0.15	0.10	1.50	0.133
SPILLOVER						
First pass	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	(Intercept)	5.07	0.10	46.48	< .0001
		Type of Act= Complex	0.01	0.07	0.08	0.92
Total	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	Intercept)	5.53	0.09	55.68	< .0001
		Type of Act= Complex	0.05	0.07	0.77	0.44
Back	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	(Intercept)	1.65	0.18	9.32	<0.001
		Type of Act= Complex	0.14	0.11	1.22	0.226
From	outcome ~ 1 + TYPE OF ACT+ TYPE OF PHENOMENA+ TYPE OF PHENOMENA* TYPE OF ACT+ (1 | ID) + (1 | ITEM)	Intercept)	0.64	0.07	9.08	<0.001
		Type of Act= Complex	0.10	0.08	1.23	0.217
		Type of Phenomena= Deceit	-0.03	0.15	-0.22	0.825
		Type of Phenomena= Irony	-0.17	0.15	-1.12	0.265
		Type of Act= Complex:Type of Phenomena= Deceit	-0.62	0.20	-3.05	**0.002**
		Type of Act= Complex:Type of Phenomena= Irony	-0.35	0.21	-1.68	0.093
Regression Path	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	Intercept)	5.21	0.11	46.54	<0.001
		Type of Act= Complex	0.04	0.08	0.43	0.665
Rereading first pass	outcome ~ 1 + TYPE OF ACT+ (1 | ID) + (1 | ITEM)	Intercept)	0.35	0.08	4.41	<0.001
		Type of Act= Complex	0.04	0.06	0.72	0.469

Discussion

The study of indirect speech acts has a long history in the field of pragmatics, where various theories have tried to explain the nature of the processes involved in their recognition (Gibbs, 1994; Grice, 1975; Holtgraves, 2002; Searle, 1975). While the topic has been the subject of a large amount of research (e.g., Gibbs, 1983, 1986a; Holtgraves, 1994; 1998; Coulson & Lovett, 2010; Tromp et al., 2016; Trott & Bergen, 2019), to our best knowledge there have been no studies examining the time course of pragmatic processing involved in the on-line comprehension of indirect speech acts during text-reading. In the present study we used eye-tracking to investigate the cognitive processing involved during the comprehension of simple and complex communicative acts, a more general distinction that applies not only to sincere communicative acts but also to other communicative phenomena such as irony and deceit (Bosco & Bucciarelli, 2008).

The first finding of this study is that complex communicative acts were more difficult to understand than simple ones, confirming our first hypothesis. Indeed, we observed that the participants took longer to read complex communicative acts in different eye-reading measures (total reading time and total first pass re-reading time to the target sentence). In light of the CPT framework (Bara, 2010) and Bosco & Bucciarelli (2008), we interpreted the additional effort by participants when encountering complex communicative acts (non-conventional indirect speech acts) as compared to simple communicative acts (direct speech acts) as due to the longer inferential chain needed to link the communicative act to the specific behavioral game, i.e. a stereotyped pattern of social interaction shared between the interlocutors. Because simple communicative acts refer directly to the behavioral game shared between partners, they can be understood in a relatively straightforward way. In contrast, complex communicative acts (non-conventional acts) require a longer inferential chain in order to understand the connection between the speech act and the behavioral game, making them more difficult to comprehend than simple acts.

Consistent with other theoretical accounts (Holtgraves 1999; Gibbs,1981), we found that the indirect meaning took longer to be processed for non-conventional indirect speech acts (complex communicative acts) than for direct ones (simple communicative acts). Holtgraves (1999) observed that non-conventional indirect replies rely on a dedicated inferential process in order to interpret the target utterance within a specific discourse context. Differently, he noted that the recognition of indirect conventional replies does not require a dedicated inferential process and could be accomplished relatively quickly in a direct fashion, in line with the direct access view and previous results by Gibbs (1986a; 1983).

Other recent studies found that non-conventional indirect requests involve higher cognitive demands than literal statements. Tromp et al. (2016) reported that the processing of non-conventional indirect requests posed higher cognitive demands than literal statements and that it was associated with an increase in mean and peak pupil diameter. This result supports the view that the processing of non-conventional indirect speech acts is not an automatic process but rather that it requires specific inferential mechanisms. Also, Coulson & Lovett (2010), using electroencephalography (EEG),

observed an increase in the P600 component associated with the comprehension of indirect speech acts, which they attributed to transient processing costs associated with the comprehension of indirect requests, as compared to literal statements. Recent neuroimaging studies provided a similar picture (Bašnáková et al., 2014; Feng et al., 2017; Jang et al., 2013; Shibata et al., 2011; van Ackeren et al., 2016). Feng et al. (2017) found that the comprehension of indirect replies activated a large fronto-temporal (inferior frontal gyrus, medial temporal gyrus, and right temporo-parietal junction) cerebral network, as compared to direct replies, supporting high-level pragmatic processing needed to understand indirect meaning. In their study, Shibata, Abe, Itoh, Shimada, & Umeda (2011) also indicated that understanding indirect replies, as compared to literal sentences, involved increased brain activation in diverse cerebral areas pivotal in the generation of context-dependent linguistic inferences: right and left fronto-temporal networks and the medial frontal cortex.

Our findings are consistent with the graded salience theory, which predicts differences in the processing of conventional vs. unconventional speech acts (Giora, 1999; 2003). However, the difference between simple and complex communicative relies not only on the degree of conventionality but also on the fact that complex acts require a longer inferential chain in order to understand the connection between the speech act and the behavioural game. Thus, while conventionality is a property of a word or a sentence out of context, the complex vs. simple distinction depends specifically on the behavioural game, i.e. context shared between the interlocutors.

Going further than previous studies, with the present study we were able to investigate the detailed time-course of pragmatic processing involved in the comprehension of indirect meaning. We measured eye-patterns at the sentence level in order to depict participants' on-line processing of the text, for example by revealing hesitations on the target sentence, or fixations going back to reinspect previous parts of the text. Analysis of the eye-patterns showed that participants tried to derive the meaning of the complex communicative acts by hesitating more on the target sentence (total reading time) and re-reading the target sentence during first–pass (first pass re-reading time). Differently from our predictions, we found a difference between simple and complex acts in an early processing measure (first-pass rereading time), indicating that the participants were able to detect the incongruence between the complex acts and the preceding context at an early stage of processing, i.e. during first reading of the phrase. The longer processing time spent re-inspecting the target answer during first pass-reading was insufficient to resolve the meaning of the utterance, however. Indeed, in line with our predictions, we found that the participants took longer on many late processing measures (total reading, reading back, reading from), indicating that they spent more time in reanalysis of the target sentence in order to build a coherent discourse representation. These eye-looking patterns probably reflect the greater cognitive effort (in term of inferential processing) to retrieve the knowledge shared between the interlocutors (i.e. the behavioral game) to which the target utterance refers. This strongly suggests that the meaning of non-conventional indirect (complex) speech acts is

not derived via dedicated shortcuts but rather requires in-depth analysis of the preceding context to derive correct inferences.

This last claim is further supported by analysis of indirectness and two other cognitive factors (ToM and working memory) involved during the task. Different from previous studies, we also investigated the role of cognitive function (ToM and working memory) and of indirectness in the processing of simple and complex communicative acts. We found that indirectness of the target answer, as assessed in the pre-test study, was the best predictor in explaining participants' eye-patterns during the task. We used the participants' indirectness ratings from the pilot study as an additional measure of the length of the inferential chain needed to connect the target answer (simple or complex speech act) to the behavioral game shared between the interlocutors. We found that the participants took longer to read and re-read the target sentences that were rated as more indirect during the pilot study, that is, sentences with higher inferential complexity. The participants spent even more time re-inspecting previous parts of the text and going back to re-read the target sentence from a subsequent part of the text in the trials with higher inferential complexity. This provides further evidence supporting the claim that the additional cognitive effort needed to process complex communicative acts is due to increasing inferential demands. Indeed, we found a role for inferential complexity especially in the eye reading measures for which we observed a significant difference in fixation times between simple and complex communicative acts (total reading time and total first pass re-reading time).

We also report a role for ToM in the pragmatic processing of simple and complex acts: the participants with higher RMET scores spent less time reading back the context, reading the target sentence and the spillover region, and re-reading the spillover region. This result is consistent with previous evidence that suggests that, to recognize the speaker's communicative intention during the comprehension of an indirect speech act, the listener must take his/her mental states, i.e., belief, knowledge and emotions, into account (e.g, Gibbs, 1987). A recent study by Trott & Bergen (2019) found that a listener's ability to comprehend a non-conventional indirect request depends on the knowledge that he/she attributes to the speaker, thus pointing to a role of ToM in inferring the speaker's communicative intention during the comprehension of indirect speech acts. Our data suggest, however, that the role of ToM is related mainly to a later stage of sentence processing (look-back fixations to the target sentence and spillover region, and re-reading of the spillover region) and that it is not limited to complex acts but extends also to the comprehension of simple ones. This suggests that ToM is not the cognitive factor that distinguishes between simple and complex speech acts but rather that it is related more to the construction of a situational model (global interpretation) of a story. Taken together, these findings are in line with Bosco, Tirassa, & Gabbatore (2018), who argued that, while they partially overlap, ToM and inferential ability are different cognitive processes that contribute to the comprehension of the pragmatic meaning of a communicative act.

Surprisingly, the role of working memory was modest (only reading back times to the target sentence for sincere complex acts). This contrasts with previous results (Gibbs & Colston, 2012; Kaakinen et al., 2014; Olkoniemi et al., 2016) but is consistent with recent eye-tracking studies (Olkoniemi, Johander, et al., 2019) that showed that readers with low working memory are more likely to look back to ironic expressions from other parts of a text. Also, Olkoniemi, Strömberg, et al. (2019) suggested that the role of working memory emerges clearly only when the reading task requires a high working memory load, whereas when the expressions are preceded by a relatively short context (3-4 sentences), the effect of working memory tends to reduce or disappear. A plausible interpretation of this result is that we did not observe a significant effect of working memory on eye patterns because the task did not demand much working memory.

Another major finding of the present study is that the differences in eye-patterns between simple and complex acts held for all three communicative acts investigated (sincere, deceitful, ironic). This confirms our second hypothesis that simple deceitful and ironic communicative acts are easier to comprehend than complex ones. The distinction between simple and complex communicative acts applies to any kind of communicative act (Bosco & Bucciarelli, 2008), including extralinguistic/non-verbal communicative acts (Bucciarelli et al. 2003). This definition is more encompassing than the previous distinction between direct and indirect speech acts proposed by the SPM (Searle, 1975). This distinction has proven particularly useful for studying how pragmatic performance can vary as a function of increasing inferential complexity in clinical populations, such as those with traumatic brain injury (Bosco et al., 2017), schizophrenia (Bosco et al., 2019; Parola et al., 2018), right (Parola et al., 2016) and left (Gabbatore et al., 2014) hemisphere damage, and also for assessing the comprehension of different communicative phenomena and expressive modalities in these populations (Parola et al., 2020; Bosco, Gabbatore, et al., 2018; Bosco, Parola, et al., 2018; Parola, Brasso, et al., 2021; Parola, Gabbatore, et al., 2021). The present study provides additional support for this distinction and its utility, for example in the clinical assessment of communicative-pragmatic deficits (see Angeleri et al., 2008).

The results also revealed a significant interaction between Type of Act × Type of Phenomenon in *total reading time* of the target sentence: the difference in overall reading time of the target sentence between simple and complex acts was greater for sincere communicative acts than for irony and deceit. This difference was confirmed in the analysis of the cognitive and inferential processing involved during the task, which showed that the relationship between indirectness and eye patterns (longer fixation on more indirect sentences) was stronger for sincere acts than for deceit and irony. This may be due to the characteristics of the material, since the tasks we designed to investigate irony and deceit, though complex, were quite prototypical, while in reality there is no limit to the complexity of a deceitful or an ironic statement. In line with such results, the rating study conducted before the experiment showed that the difference in the indirectness rating between the simple and the complex versions was greater for the sincere than for the deceit and the irony communicative acts. This may also have been due to the specificity of each of the communicative phenomena. For

example, in both deceit and irony, what the speaker says does not correspond to his/her private knowledge, and the listener has to recognize such a conflict in order to understand the meaning of these expressions. This is why irony and deceit are generally more difficult to understand than sincere communicative acts (Bosco et al., 2019; Bosco, Gabbatore, et al., 2018; Parola et al., 2016). The additional cognitive load required for understanding these expressions may lessen the observed differences in processing complex vs. simple deceitful and ironic speech acts. This underscores the importance of comparing different types of communicative acts when evaluating the processing involved in the comprehension of indirect speech acts, given that indirect forms of irony and deceit are frequent in everyday communication.

The results of the present investigation are also in line with the parallel-constraint-satisfaction framework (Katz & Ferretti, 2001; Pexman, 2008). This theoretical account sustains that multiple cues are processed rapidly and in parallel in order to construct a coherent interpretation of an utterance, and it explicitly states the importance of considering the role of individual differences in speech act processing. In line with this prediction, we found that several factors, including contextual cues (e.g., complex vs. simple acts, indirectness, type of communicative phenomena), phrase cues (e.g., conventionality), and cognitive factors (e.g., working memory and ToM), interact in parallel in determining the interpretation of the target utterance.

One limitation of the present study is that it investigated only a specific class of indirect/complex communicative acts, i.e., indirect replies. An important direction for future research will be to determine whether the processing costs we observed for simple vs. complex communicative acts also applies to other (compared to indirect replies) types of speech acts. In addition, future studies with a larger sample size may be better able to investigate the role that a larger set of cognitive functions can play in the pragmatic processing of simple and complex speech acts. Given the large heterogeneity in participants' cognitive performance, studies with higher statistical power may better identify the role of different cognitive functions in the pragmatic processing of indirect speech acts.

Finally, our findings showcase the advantages of using eye-tracking to investigate pragmatic processing during text-reading comprehension tasks. Eye-tracking provides continuous recording of eye-patterns during text processing, thus allowing the on-line monitoring of the cognitive and inferential processing underlying text analysis. This makes it possible to detect even subtle differences in the cognitive demands posed by the task, as reflected in longer reading times and regression fixations. In our results, this was highlighted by the discrepancy between participants' accuracy score and eye-tracking data. Indeed, we found no overall difference in accuracy rates between simple and complex versions of the same target utterance, whereas the eye-tracking patterns showed that that complex communicative acts required longer reading times and placed higher cognitive demands. While previous studies showed promising results using eye tracking and text-reading paradigms in their investigation of irony and metaphor comprehension (Deliens et al., 2017; Filik et al.,

2017; Olkoniemi et al., 2016), ours is the first study to use eye-tracking to investigate the difference between simple/direct and complex/unconventional indirect communicative acts.

Conclusions

We present evidence suggesting that comprehending complex (unconventional indirect communicative acts) requires more complex pragmatic processing than understanding simple (direct) acts. Consistent with the Cognitive Pragmatic theory, we found that these differences are best explained by the higher inferential processes required for interpreting complex communicative acts compared to simple ones. To the best of our knowledge, no other theories in the current literature propose an encompassing distinction between simple (direct) and complex (unconventional indirect) acts based on inferential processes, which include various pragmatic phenomena (sincerity, irony, deceit). We also found a role of ToM in the pragmatic processing of simple and complex acts related mainly to the later stage of sentence processing. Crucially, the differences in eye-patterns between simple and complex acts held for all communicative acts studied (sincere, deceitful, ironic), although the effect was larger for sincere communicative acts than for irony and deceit. Our results also indicate that other factors, such as speaker's communicative intention in proffering a speech act (e.g., sincere, deceitful or ironic), sentence cues (e.g., conventionality), and cognitive factors (e.g., working memory and ToM), contribute to interpretation of speech acts, and should be taken into account in explaining their comprehension.

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Conflict of interest

The authors have no real or potential conflicts of interest that could have had influenced the research.

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Figure 1. Fixation times from the context for the different eye-looking measures. The horizontal line corresponds to the mean of the different conditions (sincere, complex) for the different communicative acts (sincere, deceitful, ironic), and the rectangle represents the Bayesian highest density interval

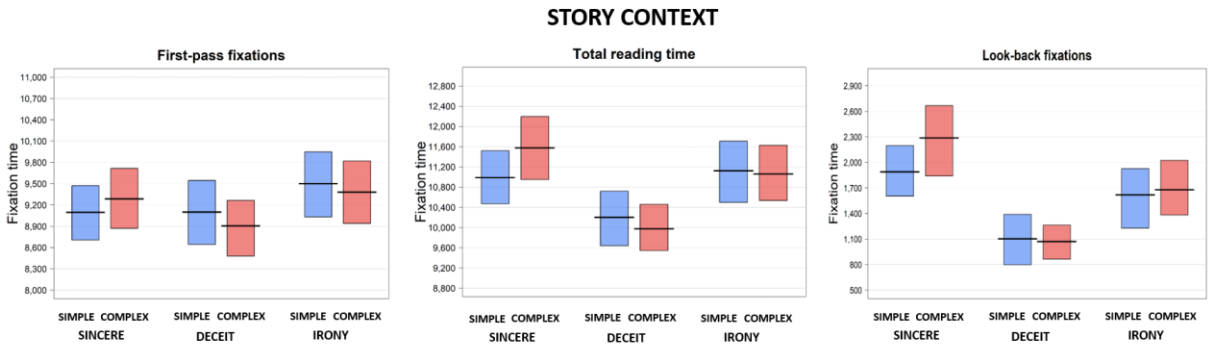


Figure 2. Fixation times from the target answer for the different eye-looking measures. The horizontal line corresponds to the mean of the different conditions (sincere, complex) for the different communicative acts (sincere, deceitful, ironic), and the rectangle representing the Bayesian highest density interval

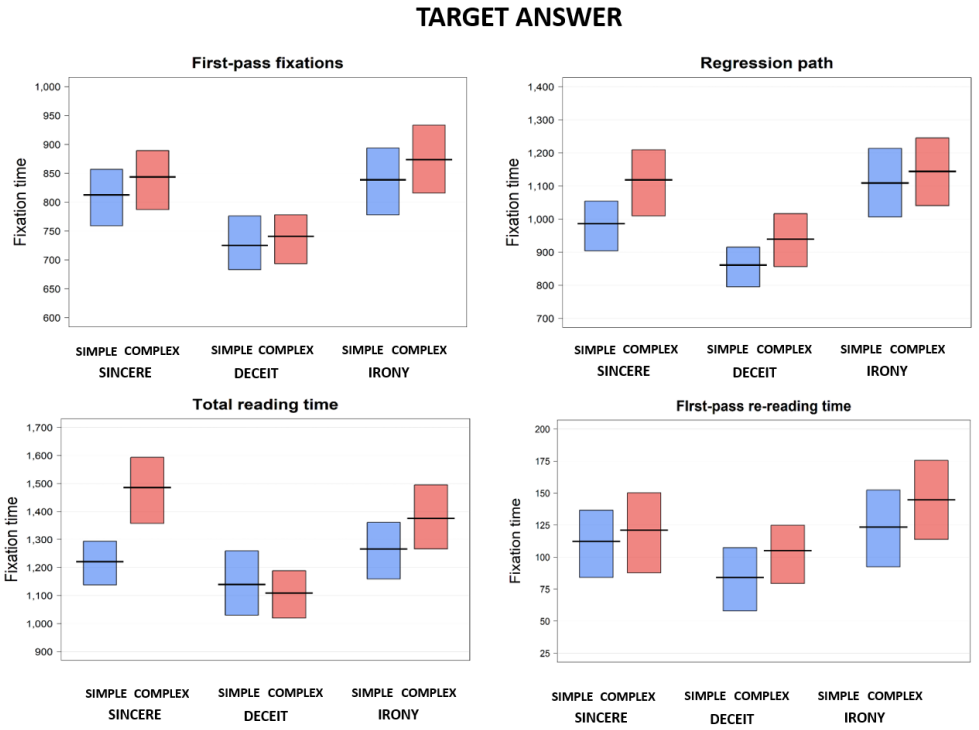
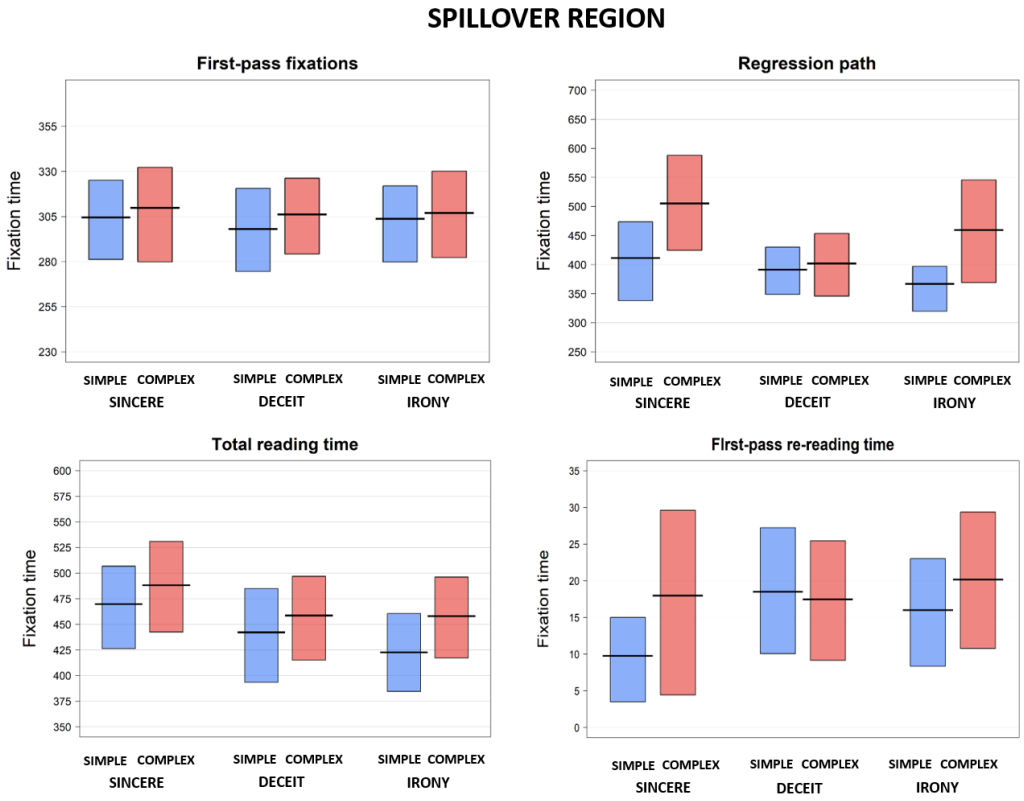


Figure 3. Fixation times from the spillover region for the different eye-looking measures. The horizontal line corresponds to the mean of the different conditions (sincere, complex) for the different communicative acts (sincere, deceitful, ironic), and the rectangle represents the Bayesian highest density interval



Appendix A

1) **Sincere**

Original Italian

Context story: Marta vuole passare una bella giornata con la sua migliore amica Camilla. Non la vede da molto tempo, e pensa che sarebbe divertente andare insieme in montagna a sciare. Camilla ha sempre molti impegni, e Marta non sa quando organizzare.

Simple version: Marta chiede a Camilla: "Quando andiamo a sciare insieme?".

Complex version: Marta chiede a Camilla: "Ti piace andare a sciare?".

Target answer: "Combiniamo per questa domenica!".

Spillover region: Camilla risponde.

End of the story: Marta cerca nell'armadio la sua tuta da sci.

English Translation

Context story: Marta wants to spend a nice day with her best friend Camilla. She hasn't seen her in a long time, and she thinks it would be fun to go skiing together. Camilla is always very busy, and Marta doesn't know when to organize their day out.

Simple version: Marta asks Camilla: "When shall we go skiing together?"

Complex version: Marta asks Camilla: "Do you like to go skiing?"

Target answer: "Let's make it this Sunday!"

Spillover region: Camilla answers.

End of the story: Marta looks for her ski suit in the wardrobe.

2) **Sincere**

Original Italian

Context story: Alice e Federica sono da ore in aula studio a ripassare per una verifica di matematica molto difficile. Ad Alice, che non ha fatto colazione, inizia a brontolare lo stomaco per la fame. Nello zaino non riesce a trovare nulla di commestibile e non riesce più a resistere.

Simple version: Alice chiede a Federica: "É quasi mezzogiorno, dove andiamo a mangiare?".

Complex version: Alice chiede a Federica: "É quasi mezzogiorno, sei affamata?".

Target answer: "Pranziamo insieme al bar dietro l'angolo!"

Spillover region: Federica risponde.

End of the story: Le ragazze escono dalla biblioteca.

English Translation

Context story: Alice and Federica have been in a study room for hours preparing for a difficult exam. Alice hasn't had breakfast and she is beginning to feel hungry. She can't find anything to eat in her bag, and she can't wait any longer.

Simple version: Alice asks Federica: "Is it nearly noon, where shall we go for lunch?"

Complex version: Alice asks Federica: "Is it nearly noon, are you hungry?"

Target answer: "Let's have lunch together at the bar round the corner!"

Spillover region: Federica answers.

End of the story: The girls leave the library.

3) **Deceit**

Original Italian

Context story: Giancarlo è un giovane appassionato di arti marziali. Ha appena partecipato ad una competizione, ma la sua fidanzata Viviana, che non vuole che gareggi, non ne è stata informata. Giancarlo torna a casa con uno zigomo gonfio.
Simple version: Viviana gli chiede: "Cosa ti è successo all'occhio?".
Complex version: Viviana gli chiede: "Hai ricominciato con le arti marziali?".
Target answer: "Ero distratto e ho sbattuto contro un palo!"
Spillover region: Giancarlo risponde:
End of the story: Viviana prende del ghiaccio da mettere sull'occhio.

English Translation

Context story: Giancarlo is a young man who is keen on martial arts. He has just taken part in a competition, but hasn't told his girlfriend Viviana, who doesn't want him to compete. Giancarlo has come home with a swollen cheek.
Simple version: Viviana asks him: "What happened to your eye?"
Complex version: Viviana asks him: "Have you taken up martial arts again?"
Target answer: "I wasn't thinking what I was doing, and walked into a post!"
Spillover region: Giancarlo answers:
End of the story: Viviana gets some ice to put on his eye.

4) **Deceit**

Original Italian

Context story: Anna ha accettato di guardare il gatto di Giorgia per il fine settimana. Giorgia ha un siamese molto dispettoso che graffia e rompe tutto quello che tocca, ma Anna non lo sa. Quando Anna entra in casa vede il gatto seduto su una sedia.
Simple version: Anna chiede a Giorgia: "Che carattere ha il tuo gatto?".
Complex version: Anna chiede a Giorgia: "Mi farà disperare?".
Target answer: "E' un animale tranquillissimo!".
Spillover region: Giorgia risponde.
End of the story: Anna continua a fissare il gatto.

English Translation

Context story: Anna has agreed to look after Giorgia's cat for the weekend. Giorgia's cat is a very naughty Siamese that breaks and scratches everything it touches, but Anna doesn't know that. When Anna goes into Giorgia's home she looks at the cat sitting on a chair.
Simple version: Anna asks Giorgia: "What is your cat like?"
Complex version: Anna asks Giorgia: "Will it be any trouble?"

Target answer: “It’s very calm”

Spillover region: Giorgia answers.

End of the story: Anna carries on looking at the cat.

5) **Irony**

Original Italian

Context story: Valentina prepara un risotto ai frutti di mare per la sua amica Ilaria. Valentina e Ilaria assaggiano il risotto, ed entrambe dicono che è molto cattivo, ma non essendoci altro per cena lo mangiano lo stesso. Dopo aver chiacchierato al lungo, a fine serata le amiche si salutano.

Simple version: Valentina chiede ad Ilaria: “Com’era la cena di stasera?”.

Complex version: Valentina chiede ad Ilaria: “Sono una brava cuoca?”.

Target answer: “Il risotto era davvero eccezionale!”

Spillover region: Ilaria risponde.

End of the story: Valentina raccoglie i piatti e li lava.

English Translation

Context story: Valentina is preparing a seafood risotto for her friend Ilaria. Valentina and Ilaria taste the risotto when it’s ready, and both notice that it doesn’t taste good, but since there is nothing else for dinner they eat it anyway. After chatting for a long time, at the end of the evening the two friends say goodbye.

Simple version: Valentina asks Ilaria: “How was dinner tonight?”

Complex version: Valentina asks Ilaria: “Am I a good cook?

Target answer: “The risotto was truly exceptional!”

Spillover region: Ilaria replies.

End of the story: Valentina gathers the dishes to wash them.

6) **Irony**

Original Italian

Context story: Alessandro è diventato vegano da qualche mese, ma ha molti amici che mangiano carne. Una sera vanno insieme in un ristorante argentino, la cui cucina è famosa soprattutto per le bistecche e che non fornisce grande scelta di piatti vegani. Alessandro sta sfogliando il menù da un po’di tempo, ma non riesce a scegliere.

Simple version: L’amica Ginevra chiede ad Alessandro: “Cosa ordini di buono?”

Complex version: L’amica Ginevra chiede ad Alessandro: “Ti piace questo posto?”

Target answer: “Proverò sicuramente una bella bistecca!”.

Spillover region: Alessandro risponde.

End of the story: Gli amici aspettano il cameriere e finiscono di ordinare.

English Translation

Context story: Alessandro became a vegan some months ago, but he has a lot of friends who eat meat. One evening they go out together to an Argentinian restaurant that is especially renowned for its steaks but does not offer a great choice of vegan dishes. Alessandro has been reading the menu for a while, but is unable to choose.

Simple version: His friend Ginevra asks Alessandro: "What you are you going to order?"

Complex version: His friend Ginevra asks Alessandro: "Do you like this place?"

Target answer: "I'm definitely going to try a lovely steak!"

Spillover region: Alessandro answers.

End of the story: The friends wait for the waiter and then finish ordering.