Perspective-Taking in Social Interaction
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Abstract

Previous research shows that speakers often fail to regard their addressee’s perspective during conversation. This study investigated whether speakers’ referential communication benefits from an explicitly stimulated attention to addressees’ perspective. This aim was experimentally investigated among student dyads taking part in a referential communication game in which they were randomly assigned the role of the speaker or addressee. Dyads were allocated to one of three experimental settings, each eliciting a different perspective mindset (none, self-focus, other-focus). In the two perspective settings, speakers were explicitly instructed to regard their addressee’s (other-focus) or their own (self-focus) perspective before construing their referential message. Results indicated that eliciting speakers’ self- versus other-awareness did not influence speakers’ audience design. We did find a relationship between speakers’ self-reported perspective-taking tendency and their actual referential behavior. Self-focused speakers reported a higher perspective-taking tendency than other-focused speakers. Findings have been explained using the objective self-awareness theory.

Keywords: Perspective-Taking, Referential Communication, Egocentricity Bias, Experimental Research
Introduction

Engaging in referential communication requires from interlocutors to make their referential act successful, meaning that their conversational partner is able to correctly identify the referent from all other possible alternatives. This is only possible when speakers design their referential communication in such a way that it converges to their addressee’s informational needs (Clark & Carlson, 1982). For speakers to do so, they are expected to make constant assumptions about whether the (to be) discussed information is known by all conversational partners, and whether these partners also know the information is mutually shared. Interlocutors are expected to constantly update this mutually shared information (i.e., common-ground information, Clark & Marshall, 1981) to avoid misunderstanding from occurring (Clark, Schreuder, & Buttrick, 1983). This implies that conversational partners must engage in a correct process of perspective-taking, hereby interpreting the discourse not only from their own point of view, but also through the mind of their interlocutor.

Whereas studies have shown that both speakers (Brennan & Clark, 1996) and addressees (e.g., Hanna, Tanenhaus, & Trueswell, 2003) indeed use common-ground information for communication successes, others have revealed that this is not a common practice. Interlocutors sometimes rely more on information that is not mutually shared, but only accessible or privileged to themselves, leading to egocentric errors during both language production (Apperly et al., 2010) and language comprehension (e.g., Dumontheil, Apperly, & Blakemore, 2010) processes. These egocentric errors during conversation indicate that interlocutors do not always succeed in regarding their partner’s perspective.

Since a large body of studies indicated that regarding the other’s perspective during conversation is a difficult process (e.g., Keysar, Lin, & Bar, 2003; Keysar, 2007), the question
arises how conversational partners can be stimulated to engage in accurate perspective-taking. Recent studies found a positive link between a preceding perspective-taking training (i.e., socio-cognitive training in Santiesteban et al. (2012)) and subsequent perspective-taking performance (e.g., Santiesteban et al., 2012; Todd, Hanko, Galinsky, & Mussweiler, 2010). In both studies, trainees underwent the perspective-taking training before the actual perspective-taking took place, and the methods enhancing perspective-taking (i.e., visual priming in Todd et al. (2010) and inhibition-imitation training in Santiesteban et al. (2012)) did not have anything in common with the subsequent task in which perspective-taking was required. The question thus remains whether an accurate perspective-taking process can also be evoked during the social interaction that requires perspective-taking. From a pragmatic point of view, it is interesting to investigate whether previously found egocentric errors (e.g., Epley, Morewedge, & Keysar 2004; Keysar et al., 2003) can be countered by a mental activation of the others’ (different) perspective. What if interlocutors in the abovementioned studies were made explicitly aware of the others’ different perspective, would they still have fallen prone to their egocentric knowledge? This question is also interesting for social practices that try to enhance perspective-taking during social interaction. Being guided by the argument that accurate perspective-taking is at the core of the maintenance of interpersonal relationships (e.g., Batson et al., 2003; Galinsky, Ku, & Wang, 2005), therapeutic and/or conflict resolution practices employ various questioning techniques that are believed to elicit perspective-taking during the interaction (e.g., Prein, 2007).

One questioning-technique that is explicitly used to enhance perspective-taking processes during social interaction is the so-called ‘circular-questioning’ technique (Selvini, Palazzoli, Boscolo, Cecchin, & Prata, 1990; Prein, 2007), also described as ‘circular’ questions or ‘mind-reading’ questions (Evans & Whitecombe, 2015; Tomm, 1984a, 1984b), and ‘other-awareness
reflexive’ questions (Tomm, 1987). Circular questions found their advent in the systemic family therapy (Selvini-Palazzoli et al., 1980) that treats families as a ‘system’ in which all members have certain roles and behavioural patterns. The behavioural patterns are circular in the sense that each (behavioural) change in the system asks for another (behavioural) change in return, resulting in circular patterns that keep the (malfunctioning) system sustained. Circular questions are used to elicit a change in addressees’ thought or behavioural pattern, by asking members of the system to place themselves in another member’s position while they provide an answer to a circular question (e.g., “How do you think member X feels when you behave in a Y way?”). Although the circular questioning approach is elaborately discussed and employed by therapeutic (Brown, 1997; Brown, 2010; Fleuridas, Nelson, & Rosenthal, 1986; Tomm, 1984a, 1984b, 1987), and conflict resolution settings (e.g., Prein, 2007), empirical tests on the assumed relationship between the questioning-technique and the perspective-taking process are yet to be performed.

The empirical aim of this study is to answer whether perspective-taking can be enhanced during the social interaction by employing the underlying mechanism of the circular questioning technique, namely by asking adults to regard their interlocutor’s perspective during the perspective-taking task. This aim is experimentally investigated among student dyads taking part in a referential communication game in which they are randomly assigned the role of the speaker or addressee. Results of this study provide more insight in how perspective-taking processes are involved during the production of referential descriptions, hereby providing further insights into when and how common-ground information is incorporated in the process of language production (e.g., Bezuidenhout, 2013; Horton & Gerrig, 2002). Practical implications can be sought in the field of therapeutic or conflict resolution settings, in which perspective-taking is considered to be an important factor contributing to the problem’s resolution (Galinsky, Maddux, Gilin, & White,
Theoretical Framework

Communication as a Cooperative Process

Conversation presumes cooperation, especially when conversational partners want to convey and establish meaning (Grice, 1975). Following a strict pragmatic view of communication, this entails that both the sender and receiver in the conversation must obey to certain conversational norms in order for the conversation to succeed. That is, speaker’s intended meaning of the message must be correctly deciphered and understood by the receiver of the message. Speech acts must therefore be designed (Clark & Murphy, 1982) optimally, adhering to a certain level of informativeness (Clark, 1992). Speakers are expected to exchange just the right amount of information - neither too little or too much – (Grice, 1975) and base their contributions on the knowledge, beliefs and assumptions that are shared or salient between them and their addressee. This is necessary, because addressees will rely on this shared, salient knowledge while interpreting their speaker’s referential communication (Arnold, Kaiser, Kahn, & Kim, 2013). Thus, for speakers to effectively communicate, they need to correctly adjust (design) their speech to their addressee’s needs. This process asks speakers to accurately engage in the process of perspective-taking, taking into account the knowledge and attentional state of their interlocutor at each step in the conversation (Arnold, 2008).

The literature shows a puzzling picture with regard to speakers’ ability and propensity to engage in an accurate audience design. On the one hand, studies evidenced that speakers succeed at assessing and adapting their communication to their addressees’ knowledge (e.g., Clark & Brennan, 1991; Horton & Spieler, 2007; Nadig & Sedivy, 2002). On the other hand, however, we find studies indicating that speakers do not always engage in an accurate audience design (e.g.,
Barr & Keysar, 2002; Horton & Keysar, 1996; Keysar, Barr, Balin, & Brauner, 2000). According to these studies, language production is not necessarily anchored to addressees’ needs, but more to speakers’ own knowledge and attentional state, resulting in utterances that are based on information immediately accessible to speakers themselves. Following this approach, addressee’s knowledge state is only considered in a later, optional adjustment stage in which speakers can chose whether to adjust their language production to the addressees’ informational status or not. Scholars defending the latter view argue for an egocentricity bias (e.g., Keysar, Barr, & Horton, 1998; Keysar et al., 2000; Keysar, Barr, Balin, & Paek, 1998). According to this bias, peoples’ own mental state is functioning as a representational default from which the other’s knowledge state and/or perspective is derived (Epley, Keysar, Van Boven, & Gilovich, 2004; Nickerson, 1999). Engaging in perspective-taking is then considered to be a cognitive effortful process that can even result in egocentric anchor mistakes when the automatic responses are not corrected. Failing to get beyond this default leads to egocentric errors in interactions, for both speakers (Horton & Keysar, 1996; Roßnagel, 2000; Wardlow Lane & Ferreira, 2008; Wardlow Lane, Groisman, & Ferreira, 2006; Wardlow Lane & Liersch, 2012) and addressees (Epley et al., 2004; Epley, Morewedge, & Keysar 2004; Keysar, 2007; Keysar, Lin, & Barr 2003).

Communication as Egocentric Anchoring

Following the egocentricity bias in adults, Horton and Keysar (1996) proposed a Monitoring and Adjustment model (or more recently the Egocentric Anchoring and Adjustment model in Epley et al., 2004) to explain when common-ground information is incorporated into speakers’ language production process. By conducting an experiment in which speakers were speeded or unspeeded to produce references, Horton and Keysar (1996) showed that speeded speakers planned their utterances more on information that was privileged to them than speakers
who were not speeded. Hence, Horton and his colleague concluded that common-ground information is not involved in the early process of language production, but only taken into account during a sequential monitoring stage when interpretation errors are detected (e.g., Barr & Keysar, 2002, 2007). Monitoring and adjusting for egocentric anchor mistakes is thus considered to be an effortful process, requiring conscious control of the person anchoring and correcting his or her initial perspective (see also Keysar, 2008; Keysar et al., 2000; Keysar, Lin, & Barr, 2003).

The effort with which speakers need to adjust their initial response might explain why, in every-day communication situations, speakers’ referential expressions often include more information than addressees actually need. Speakers are found to regularly overspecify their descriptions (Arts, Maes, Noordman, & Jansen, 2011a, 2011b), thereby violating conversational rules (Grice, 1975). Following the cooperative principle of communication (Grice, 1975), addressees will expect all communicated information to be relevant for the interpretation process. Hence, when redundant information is present, addressees might infer that information to be important. These implications can be false if speakers did not intend to imply an additional meaning, resulting in unintended communicative consequences, such as addressee’s hampered comprehension process (e.g., Engelhardt, Demiral, & Ferreira, 2011; Davies & Katos, 2013), or speakers’ unintended leakage of information that should have stayed confidential (e.g., Authors, 2014; Wardlow Lane et al., 2006; Wardlow Lane & Ferreira, 2008; Wardlow Lane & Liers, 2012).

For instance, during a referential communication task, Wardlow Lane et al. (2006) evidenced that speakers sometimes give away private information even when it bears negative consequences. Wardlow Lane and colleagues asked speakers to identify geometrical objects differing in size to their addressee. Before every identification, speakers hid one object from their addressee’s view. This object always differed in size with the object speakers had to identify (i.e.,
the target object). On half of the trials, speakers were instructed to identify the target object with just enough information in order for the addressee to select it out of the common-ground figures. Both speakers and addressees would obtain separate points for correctly identified targets. On the other half of the trials, speakers received an additional task of hiding the identity of their privileged object. If addressees were to correctly guess the identity of this privileged figure, they would obtain an additional point, surpassing their speaker’s performance. Strikingly, when Wardlow Lane and colleagues explicitly instructed speakers to conceal their privileged information, speakers were even more likely to refer to their privileged knowledge than when no conceal instruction was given. Following the ironic-processes theory (Wegner, 1994), when speakers tried hard to ignore their privileged information, this knowledge became too salient to ignore and, like a Freudian slip of the tongue, slipped past speakers’ effort to exclude the information in their referential communication. Additional research indicated that speakers’ leakage is also encoded non-verbally and detectable on the basis of these non-verbal cues (Authors, 2014). Further, these ironic-processes are found to be even stronger when speakers are extra motivated to conceal their knowledge (Wardlow Lane & Liersch, 2012), or when speakers do not have enough cognitive resources left to correct for communicative mistakes (Wardlow Lane & Ferreira, 2008).

An important implication of these leakage studies is the fact that speakers’ informational leakage communicates to addressees that there is more than meets the eye. For example, addressees in the study by Wardlow Lane and Liersch (2012) were even able to use speakers’ leakage for their own communicative benefit. That is, when speakers overspecified their referential communication, addressees dared to guess the identity of the hidden object on 80% of the trials, despite the prospect of losing points when their guess had been wrong. When speakers did not include redundant information, addressees never dared to guess. More importantly, however, when addressees
guessed the object’s identity, they were right in 78% of the attempts. This thus indicates that speakers’ informational leakage can hamper their personal goal of keeping information privileged, and that addressees are able to use speakers’ informational leakage for their own communicative gain.

So far, we have discussed research evidencing that, regardless of the negative consequences, speakers often fall prone to their own egocentric knowledge. These speakers are somehow not always able to monitor for perspective mistakes and to adjust these errors to addressees’ informational needs (Horton & Keysar, 1996). The suggestion elicited here is that speakers’ referential communication would benefit from a constant reminder of their interlocutor’s informational need. In other words, it is suggested that audience design is more likely to occur when speakers are made aware of their addressee’s perspective and learn how to appropriately adjust their message to addressee’s knowledge (Horton & Gerrig, 2002). Guiding speakers through a perspective-taking process might inhibit egocentric anchoring processes and might boost monitoring and adjustment processes, allowing speakers to engage in a more accurate audience design.

**Inhibiting Egocentric Anchoring: Focusing on the Other**

Recent research has evidenced that adults can be trained to engage in a more accurate perspective-taking process. This research supports the view that a clear distinction between the self and the other is at the core of true, accurate perspective-taking. Todd et al. (2010) evidenced in five experiments that enhancing people’s awareness of others’ different mental representations can boost persons’ perspective-taking process. This awareness of differences was evoked using a procedural priming task in which subjects had to name the differences between two depicted scenes (following Mussweiler, 2001). Participants with an evoked difference mindset were not only able
to correctly regard their interlocutor’s different perspective, they were also less influenced by their privileged, egocentric knowledge than those focusing on similarities between one’s own and others’ representations. The elicited difference mind-set thus enabled participants to inhibit their own mental representations while inferring someone else’s, allowing them not to be a victim of egocentric anchoring processes. These findings were supported by inhibition-imitation research executed by Santiesteban et al. (2012). Santiesteban and colleagues trained individual addressees to either imitate or to suppress the imitation of another person’s behavior. A day after this training, the researchers confronted their participants with a visual perspective-taking task in which they had to move objects around in grid (see for similar methods Keysar et al., 2000, 2003). Findings revealed that those trained to inhibit imitation processes looked less at their privileged objects and were also less likely to select these objects than those trained to imitate another’s behavior. Hence, a clear distinction (rather than a correspondence) between one’s own intentions and subsequent motoric behaviours improved the perspective-taking process.

Overall, studies by Todd et al. (2010) and Santiesteban et al. (2012) suggest that an enhanced accessibility of the other’s different mental representation enables individuals to accurately engage in a subsequent perspective-taking process. Not only were people able to take into account their interlocutor’s knowledge, they also refrained from imputing their privileged knowledge to others. In these previously mentioned studies, differences in perspectives were elicited using either a priming method (Todd et al., 2010) or an inhibition-imitation training (Santiesteban et al., 2012). Both methods have in common that they elicited the notion of ‘dissimilarity’. People undergoing the manipulations were trained to draw the distinction between themselves and the other person in the interaction. In both cases, the training methods took place before people’s perspective-taking performance, indicating the pervasiveness of the
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manipulation\textsuperscript{ii}. In addition, note that the dissimilarity enhancements were evoked during an unrelated task. That is, the notion of dissimilarity was cognitively activated not by the perspective-taking task itself, but by motoric (Santiestban et al., 2012) and visual priming (Todd et al., 2010) methods. It remains thus to be investigated whether accurate perspective-taking can be elicited during the concerned social interaction by using a mechanism that is related to the perspective-taking process.

\textbf{Current Study}

This study examines whether speakers can be made aware of differences in perspectives during social interaction, and whether this elicited awareness influences speakers’ audience design. Following the assumptions of the anchoring and adjustment model (Horton & Keysar, 1996), and the egocentricity hypothesis (Keysar, Barr, & Horton, 1998), we expect speakers in a natural communicative setting to anchor their referential expressions to their own knowledge, increasing the likelihood they will refer to privileged information. In turn, we expect speakers to adjust their communication to addressees’ knowledge if their monitoring and adjustment processes are influenced by the awareness of addressees’ informational needs. In other words, speakers who are made aware of their addressee’s different perspective are expected to engage in a more accurate audience design than those without an evoked other-awareness. Moreover, it is expected that, compared to a baseline communicative setting, an enhanced self-awareness will decrease speakers’ audience design even more. In short:

\textbf{H1} \hspace{1cm} In contrast to a baseline setting, speakers with an enhanced other-awareness (i.e., other-focus) will produce more references based on their addressee’s knowledge and, therefore, are less likely to leak information that is privileged to them;

\textbf{H2} \hspace{1cm} In contrast to a baseline setting, speakers with an enhanced self-awareness (i.e., self-focus)
will produce more references that are based on their own, privileged knowledge, and will, therefore, be more likely to leak information that is privileged to them.

Wardlow Lane et al. (2006) and Authors (2014) made a very clear distinction between speakers’ internal and external processes that influence their referential communication. Their findings showed that, although speakers were externally forced to engage in an audience design and to refrain from referring to knowledge that was privileged to them, the salience of privileged information operated as a speaker-internal pressure. This pressure made it hard for speakers to exclude confidential information in their reference. In particular, speakers’ privileged information was too salient to ignore, causing speakers to, ironically (Wegner, 1994), refer to information they wanted to keep concealed. Therefore, we expect that the salience of speakers’ privileged knowledge will influence the extent to which speakers engage in an audience design. In particular:

H3 Speakers are expected to refer more to privileged knowledge when this knowledge is salient versus non-salient;

H4 We expect that the hypothesized relations in H1 and H2 will be moderated by the salience of speakers’ privileged information:

a. Since speakers with an enhanced other-awareness are expected to focus more on their addressee’s informational need than speakers partaking in a baseline setting, we expect the informational leakage of speakers with an enhanced other-focus to be less influenced by the salience of their privileged information than speakers referring in a baseline situation;

b. Since speakers with an enhanced self-focus are expected to focus more on their own, privileged information than speakers partaking in a baseline setting, we expect the informational leakage of speakers with an enhanced self-focus to be more influenced by the salience of their privileged information than speakers referring in a baseline situation.
Method

Participants

In total, 93 student-dyads (N = 186) participated in this study. The data of three dyads were excluded from analyses, due to an error in the experimental procedure, or due to a low proficiency in the language of the experiment. The analyses were thus based on 90 dyads in which the participants were randomly assigned either the role of the speaker (55 women, 35 men, $M_{\text{age}} = 22.0$ years; age range 18-34 years) or the role of the addressee (59 women, 31 men, $M_{\text{age}} = 21.3$ years; age range 17-27). All participants were fluent speakers of the language of the experiment and did not experience problems at discerning the colours used in the study. Participants received a small remuneration for their participation.

Design

The experimental design and procedure were replicated from Authors (2014), which in turn was inspired by the design and procedure of Wardlow Lane and colleagues (2006). The experiment consisted of a referential communication task in which speakers were asked to describe mutually visible geometrical figures in such a way that the addressee could indicate the intended one out of a set of four. A schematic of the four figures was physically presented on the table in front of both the speaker and addressee. The same schematic was depicted on speakers’ private computer screen. From their private computer screen, speakers were instructed to block one figure and, subsequently, to identify another figure on the table in front of them (figure 1). The occluded figure differed either in size or colour from the three mutually visible figures (Authors, 2014). In our experiment, we replicated Authors’ (2014) privileged situation and added a perspective-taking manipulation. In this privileged setting, one object was always blocked from addressee’s view and, thus, belonged to speaker’s privileged ground.
Materials

Eliciting Self- Versus Other-Focus. Speakers’ awareness of their addressee’s knowledge was manipulated by asking them explicitly to either regard for their own (i.e., self-focus) or for their addressee’s (i.e., other-focus) perspective. Participants were randomly assigned to one of the three communication settings (self-focus, other-focus, baseline), resulting in 30 speakers per setting. The self- versus other-focus was operationalized by asking speakers to answer a perspective question portrayed on the computer screen next to them. In the self-focus setting, speakers were asked to answer the question reinforcing their own, egocentric knowledge: “Which four figures are visible to you?” This in contrast to the other-focus setting, in which speakers were asked to regard the knowledge state of their addressee: “Which three figures are visible to your addressee?” These awareness questions were outlined above the same schematic as the one that was lying on the table. Speakers answered the question by selecting either the four (self-focused setting) or the three (other-focused setting) figures on the computer screen next to them. To eliminate the possibility that speakers in the self-focused setting would simply select all figures as a response to the question, a fifth figure was added to the schematic presented on the computer screen. In this five-card schematic, the fifth figure’s position and shape was balanced across all trials.

To investigate the influence of our perspective manipulation, we allocated one third of the speakers to a baseline setting. In this setting, we did not reinforce speakers’ self- versus other-focus. In this way, we were not only able to investigate the egocentric hypothesis, but also able to examine how speakers’ referring strategy in the self- versus other-focused settings would diverge from a baseline communication situation.
Salience of Privileged Information. The salience of speakers’ privileged knowledge was manipulated within communicative settings. Participants were confronted with 40 experimental trials, consisting of 20 salient and 20 non-salient trials. In the salient trials, speakers’ privileged figure conceptually matched the shape of the to be identified target figure (figure 2a). In the non-salient trials (20), speakers’ privileged figure conceptually mismatched the shape of the target figure (figure 2b). The salient trials were designed to elicit utterances that contrasted the target figure with the privileged one, whereas the non-salient trials assessed how often speakers included adjectives irrespective of the contrast. Successive figures were not similarly shaped and in both the salient and non-salient trials, half of the figures contrasted in size and the other half in colour. The figures’ shape, colour, and position in the four-card schematic were balanced in all trials.

Procedure

A role with the dice decided which participant took the role of the speaker. Participants were told that, when the addressee was able to correctly identify the target figure, both the speaker and the addressee would obtain one point. Following Authors (2014) and Wardlow Lane et al. (2006), participants were told that failing to identify the target figure would result in zero points obtained, and the goal of the game was to obtain the maximum number of points.

The speaker and addressee were asked to sit down on opposite sides of a table. The speaker was seated next to a computer screen on which the experimental trials were presented using E-
Prime version 2. At the beginning of each trial, the addressee was instructed to close his/her eyes while the experimenter placed four cards on the table. By closing their eyes, addressees were not able to see any of the experimenter’s or the speaker’s actions. During the experimental game, speakers had to perform four actions (A, B, C and D; figure 3).

First, when the four cards were placed on the table, the speaker looked at the computer screen depicting the same schematic of the four figures presented on the table. On the screen, one of the figures had an arrow placed above it with the instruction to (A) “hide this figure” from the addressee’s view. The speaker had to block the actual figure on the table by placing an occluder between the figure and the addressee. In this way, the blocked figure was still visible for the speaker to see, but occluded from the addressee’s view. When one figure was blocked, speakers returned their attention to the computer screen. In the other-focused and self-focused setting, this screen subsequently presented a perspective-taking question (i.e., “Which three/four figures are visible to your addressee/to you?”). This question was depicted above the same four figures that were presented on the table. The only difference was that a fifth figure was added so that speakers in both the other- and self-focused setting had to pay close attention while answering the question. Speakers had to (B) answer this question by selected either the three figures that were visible to the addressee (other-focus setting) or the four figures visible to them (self-focus setting) on their private computer screen. When they had answered the perspective-taking question, speakers looked back at their computer screen. This time, the four-card schematic included an arrow pointing at a different card with the instruction to (C) “describe this figure” to the addressee. The speakers were told that their task was to “describe the object with just enough information so that the listener was able to identify the intended figure” (Wardlow Lane et al., 2006). Speakers were
instructed to look back at their addressee and the four-card schematic on the table when referring to the intended object. While hearing the speaker refer to a figure, the addressee opened his/her eyes and pointed to the intended figure on the table in front of them. When the addressee pointed at the referred object, speakers (D) informed their addressee whether the selected object was indeed the intended one. Since speakers in the baseline setting were not confronted with a perspective-taking manipulation, these speakers only performed actions A, C and D.

The experimental game ended after 40 rounds. After the final round, speakers were asked to indicate on a ten-point scale to what extent they took into account the addressee’s perspective during the game (1 = not at all, 10 = very much). Since audio recordings were made of all sessions, participants’ consent to making these recordings and using them for scientific purposes were collected. Afterwards, all participants were debriefed.

Coding

To measure speakers’ reference to privileged information (RPI), we counted the premodifiers (i.e., adjectives) that matched the contrast between the mutually visible and privileged figure. Adjectives that did not contrast the target figure to the privileged one were not taken into account. For instance, an uttered adjective concerning size was only taken into account when the conceptual match (i.e., contrast) also concerned size. Speakers’ RPI and, thus, the use of contrastive adjectives was calculated as a proportion. When a contrasting adjective was uttered a score of 1 was counted, whereas a score of 0 was counted when adjectives were uttered that did not match the contrast.

Results

Per communicative setting, speakers provided 1200 object references (30 speakers * 40 trials). Out of the total of produced references (n = 3600), ten (n_{baseline} = 2, n_{other-focus} = 5, n_{self-focus} = 0).
= 3) were excluded due to errors in the experimental procedure. Speakers’ references consisted of noun phrases that contained either zero, one, two or three adjectives. To estimate the amount speakers referred to privileged information, we only counted the adjectives that matched the contrast presented in the stimuli \((n = 1486)\). Speakers’ reference to privileged information (RPI) was computed as a percentage out of produced references. Overall, speakers in the baseline setting referred to privileged information in half of the produced references (50%), followed by speakers in the other-focused setting (45%), and self-focused setting (29%). Across the three communicative settings, speakers seem to have referred to privileged information to the same degree for salient (43%) and non-salient (40%) trials. In table 1, the mean proportions of speakers’ RPI is presented as a function of the setting they participated in and the trials they were confronted with.

[INSERT TABLE 1 ABOUT HERE]

The influence of the communicative setting and the interplay with the salience of speakers’ privileged information on the probability of privileged information to be mentioned was analysed using a generalized linear mixed model analysis with a binomial distribution. For the mixed model analysis, we used the GLMER function from the lme4 package (Baayen, 2007; Bates, Maechler, & Bolker, 2011) in R (version 3.3.0; www.r-project.org). We constructed a maximal model that included a full random effect structure (Barr, Levy, Scheepers, & Tily, 2013). This maximal model included the communicative setting (SETTING; self-focused, other-focused, baseline), trial type (TYPE; salient, non-salient), and the contrast (CONTRAST; colour, size) presented in the trials as fixed factors. For the random effects structure, we included random intercepts for both speakers (SUBJECTS) and experimental trials (ITEMS), as well as random slopes for both speakers and trials. Since the dependent variables were binary coded, all factors were centered to avoid collinearity
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(Zuur, Ieno, & Elphick, 2010). The probability distribution was set on binomial with a logit link function and we used parametric bootstrapping over 100 iterations to estimate the confidence intervals and \( p \)-values. We report the results and structure of the models that were the first to converge (Barr et al., 2013). The first converging models included the communicative setting, the type of trials and the contrast presented in the trials as fixed factors, and the setting * type and setting * contrast interactions. To justify the inclusion of random intercepts for both subjects and items, we compared the models to their corresponding intercept-only models. The beta coefficients, standard errors, and 95% confidence intervals of our first converging models are presented in table 2 to 5. An alpha level of .05 was used for all statistical tests.

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</table>

**The Influence of Setting On Speakers’ RPI.** The converging models treated the baseline setting as the reference category, to which speakers’ behavior in the other- and self-focused settings were contrasted. Results revealed there to be no significant differences between the baseline and other-focused setting, and between the baseline and self-focused setting (all \( p > .05 \)). Speakers in the baseline setting were on both salient \( (M = .50, SD = .48) \) and non-salient \( (M = .49, SD = .48) \) trials just as likely to refer to privileged information as the other-focused speakers on both salient \( (M = .46, SD = .41) \) and non-salient \( (M = .44, SD = .42) \) trials, and the self-focused speakers on both salient \( (M = .31, SD = .40) \) and non-salient \( (M = .28, SD = .41) \) trials.

**The Influence of Information Salience On Speakers’ RPI.** The mixed model analyses further examined the influence of the salience of speakers’ privileged information (controlling for
the effect of the contrast presented in the stimuli) in the baseline setting in comparison to its influence in the self- versus other-focused settings. Results revealed that, in the baseline setting, the salience of privileged information during both size and colour contrasting trials did not influence speakers’ RPI. Speakers in the baseline setting referred to privileged information to the same degree for both salient ($M_{colour} = .55, SD = .49; M_{size} = .46, SD = .50$) and non-salient trials ($M_{colour} = .54, SD = .50; M_{size} = .44, SD = .50$) ($p > .05$). In addition, the likelihood of speakers’ RPI did not significantly differ between colour-contrasting ($M_{salient} = .55, SD = .49; M_{non-salient} = .54, SD = .50$) and size-contrasting ($M_{salient} = .46, SD = .50; M_{non-salient} = .44, SD = .50$) salient and non-salient trials ($p > .05$).

When the other- and self-focused setting were contrasted to the baseline setting, the models revealed that speakers in the perspective-taking settings followed the same referential pattern as the speakers partaking in the baseline setting. The influence of the salience of privileged information on the likelihood of privileged information to be mentioned was in the other-focused and self-focused setting not significantly different from the baseline setting (all $p > .05$). Like the speakers partaking in the baseline setting, speakers in the other-focused setting referred to privileged information to the same degree during both salient ($M_{colour} = .58, SD = .46; M_{size} = .34, SD = .44$) and non-salient ($M_{colour} = .55, SD = .47; M_{size} = .33, SD = .45$) trials, and they did not react differently to colour-contrasting ($M_{salient} = .58, SD = .46; M_{non-salient} = .55, SD = .47$) or size-contrasting ($M_{salient} = .34, SD = .44; M_{non-salient} = .33, SD = .46$) trials (all $p > .05$). Moreover, like the speakers in the baseline setting, speakers in the self-focused setting were just as likely to refer to privileged information when they were confronted with salient ($M_{colour} = .35, SD = .42; M_{size} = .24, SD = .41$) or non-salient ($M_{colour} = .31, SD = .43; M_{size} = .24, SD = .41$) trials, and with colour-
Speakers’ Self-Reported Perspective-Taking Behavior. After the final round, speakers were asked to indicate to what extent they took their interlocutor’s perspective into account. An one-way between-subjects ANOVA revealed that the differences in speakers’ self-reported perspective-taking tendency significantly differed between communicative settings, $Welch’s \, F(2,57) = 4.43, p < .05$. Tukey HSD post-hoc comparisons revealed that self-focused speakers ($M = 7.73, \, SD = 2.94$) reported a significant higher perspective-taking tendency than both other-focused speakers ($M = 5.62, \, SD = 3.63$) and speakers partaking in a baseline setting ($M = 5.60, \, SD = 3.51$) (both $p < .05$). Speakers’ self-reported perspective-taking tendency did not significantly differ between the other-focused speakers and the speakers in the baseline setting ($p > .05$). To investigate whether the self-reported perspective-taking tendency corresponded with speakers’ actual behavior during the game, a follow-up logit mixed model analysis was conducted. This model included speakers’ SELF-REPORT as fixed effect, a random intercept for subjects, and a by-subject random slope for the effect of SELF-REPORT. $P$-values were obtained using the Likelihood Ratio Test (LRT) with which we contrasted the model with the fixed effect (full model) against the model without the fixed effect (null model) (following Winter, 2014). The LRT revealed that speakers’ SELF-REPORT was a significant predictor of their actual RPI, $\chi^2 (2) = 9.90, \, p < .001$, indicating that as speakers’ self-reported perspective-taking tendency decreased, they were more likely to leak privileged information during the game, $\beta = -2.75, \, SE = 0.45, \, p < .001$. Hence, speakers’ self-reported tendency matched their previous behavior during the game, suggesting that self-focused speakers were ironically more attentive to their addressees’ needs than other-focused speakers or speakers partaking in a baseline setting.
**Discussion**

Eliciting speakers’ self- versus other-awareness did not influence speakers’ subsequent audience design during a referential communication task. Speakers’ proportions of informational leakage did not differ between communicative settings. Other-focused and self-focused speakers were just as likely to refer to information privileged to them as the speakers engaging in a baseline communicative situation. Furthermore, the salience of speakers’ privileged information did not influence speakers’ audience design, nor did it moderate the perspective-taking manipulation. Speakers were just as likely to refer to privileged information independently of the salience of their private knowledge, or the communicative setting they conversed in. Contrary to our expectations, we did not replicate the findings of Authors (2014), and Wardlow Lane et al. (2006, 2008, 2012). In our study, the speaker-internal pressure constituting the salience of speakers’ privileged knowledge did not interfere with the speaker-external pressure to engage in an accurate audience design. Though, an interesting finding of this study is the result of speakers’ self-reported perspective-taking tendency and its relation to speakers’ actual referring behavior. We found that, ironically, self-focused speakers reported to have experienced the game more through the eyes of their interlocutor than other-focused speakers or speakers without a specific enhanced perspective (i.e., baseline setting). These tendencies were found to correlate with speakers’ actual RPI during the game. Thus, during the game, not an elicited other-focus but self-focus activated speakers’ awareness of their interlocutor’s informational need, causing them to be less influenced by their privileged knowledge.

Differences in speakers’ self-report and referring behavior between the self-focused and baseline setting can be explained by the presence or absence of activated mental representations. That is, self-focused speakers answered a question that activated their own mental representation...
of the scene, whereas in the baseline setting, no mental representations were activated simply because speakers in the latter setting were not confronted with perspective questions. A more intriguing finding, however, is the occurrence of a stronger perspective-taking tendency by the self-focused speakers than by the other-focused speakers. This tendency can be explained using the objective self-awareness theory of Duval and Wicklund (1972, in Wicklund, 1975). According to this theory, self-aware persons reflect on themselves as if they are an object under scrutinization. Under this scrutinization, the difference between their actual and desired behavior, derived from the standards that apply to the interaction, becomes salient. Our self-focused speakers could have found themselves in such a reflective state, especially since a cue of their addressee’s different perspective was present (Gendolla & Wicklund, 2009). Speakers in all communicative settings were able to see which figures were available for addressee’s selection process (and which one was not), indicating to speakers they should be aware of their addressee’s informational need. Self-focused speakers could have thus been more aware of the required audience design, causing them to attune more to addressees’ needs and, thereby, being less prone to their own, egocentric knowledge than other-focused speakers (see for effects of self-awareness on pro-social behavior Scaffidi Abbate, Isgrò, Wicklund, & Boca (2006), and Stephenson & Wicklund (1983)). This possible explanation needs further examination by exploring how much the self- versus other-focused questions used in this study elicited speakers’ self-awareness of their actual and required behavior. Speakers’ level of self-awareness can, for example, be assessed using the Situational Self-Awareness Scale of Govern and Marsch (2001). In addition to this, there are some implications that should be addressed in a future study.

First of all, the majority of speakers partaking in our study retained a certain referring strategy throughout the game that could have interfered with their audience design. We know
from previous research that speakers prefer to be consistent in their referring behavior (e.g., Brennan & Clark, 1996; Garrod & Anderson, 1987), and that addressees expect speakers to produce references that are consistent with the previously established ones (e.g., Barr & Keysar 2002; Shintel & Keysar, 2007). Speakers’ tendency to be consistent was strengthened by addressees’ positive feedback. Specifically, addressees’ feedback should signal the informativeness of the referential messages to speakers (e.g., Brennan & Clark, 1996; Clark & Krych, 2004), communicating to speakers whether their references should be adjusted to satisfy addressees’ informational needs. In our study, addressees provided constant feedback about their ability to select the target object on the basis of their speaker’s description. This feedback, however, was always positive in the sense that addressees were always able to correctly identify the intended object, regardless of the under- or overinformativeness of speakers’ descriptions. Hence, each time addressees correctly identified the target object, they signalled to their speaker that the referential message had been successful, inspiring speakers to keep hold of their referential tactic. Since a referential error or leaked information did not bear any negative consequences, these errors were never detected and, thus, speakers were never encouraged to adjust their referential communication (Horton & Keysar, 1996). This implies that increasing speakers’ awareness of the negative consequences associated with referential errors (leakage) could reduce the extent to which they would leak such information. However, as previous research has shown (e.g., Authors, 2014, Wardlow Lane et al., 2006, 2008, 2012), incentives to keep privileged information concealed can ironically increase its leakage. Enhancing speakers’ awareness of the negative consequences of their leakage might thus not be the right solution. There are, however, other factors that should be considered with regard to speakers’ consistency.

A factor that could have contributed to speakers’ referring consistency is the obtrusiveness
of the colour manipulation. Compared to the two size manipulations (i.e., small and big objects), speakers were confronted with five different colours (following the design of Authors (2014)). The obtrusive use of colour could have induced speakers to refer to colour contrasts on all of the experimental trials (Authors, 2011). To account for this implication, a future experiment could reduce the number of colours used so that they correspond to the number of size contrasts employed.

In addition, speakers were instructed to occlude and describe objects via a private computer-screen, using a self-paced procedure. Although speakers were explicitly instructed and trained to return their attention from the screen to the physical context shared between them and their addressee before they identified the target figure, the possibility exists that speakers were still regarding their private screen in which addressee’s perspective was not indicated when they formulated their referential description. Further, the self-paced procedure could have contributed to speakers’ consistency. A future study could account for this and all possible attention deviations by allowing the experimental leader to pace the experiment and to instruct speakers in the physical shared context to occlude (e.g., “Please hide the object on position 2”) and to describe (e.g., Please describe the object on position 4”) objects.

Finally, the intrusiveness of the perspective manipulation could be induced in a future study by asking speakers to point out the figures they are or their addressee’s is seeing in the shared context, instead of presenting the perspective-taking manipulation on a private computer screen in which addressees’ perspective is not marked. A follow-up study is designed to address this and all abovementioned issues. This study is currently being conducted. If this paper is accepted for the conference, we will share the result.
References


PERSPECTIVE-TAKING IN SOCIAL INTERACTION: ENHANCING SELF- AND OTHER-AWARENESS


PERSPECTIVE-TAKING IN SOCIAL INTERACTION: ENHANCING SELF- AND OTHER-AWARENESS


Horton, W. S., & Keysar, B. (1996). When do speakers take into account common ground?


PERSPECTIVE-TAKING IN SOCIAL INTERACTION: ENHANCING SELF- AND OTHER-AWARENESS


Appendix

Figure 1. The experimental setting replicated from Authors (2014) in which the speaker (on the bottom) and addressee (on the top) played a referential game. Speakers were instructed (via a private computer-screen) to hide one figure from their addressee’s view and to describe one common-ground figure.
Figure 2a. An example of a salient trial in which the privileged figure (the large circle) conceptual matched with the target figure in common-ground (the small circle).

Figure 2b. An example of a non-salient trial in which the privileged figure (the large triangle) conceptual mismatched with the target figure in common-ground (the small circle).
Figure 3. This example depicts the experimental procedure of the game. In the self- and other-focused settings, speakers performed actions A through D. Since perspective-taking was not manipulated in the baseline setting, speakers partaking in this setting did not perform action B, but went straight from action A to C.
Table 1.

*Mean Proportions of Speakers’ Reference to Privileged Information as a Function of the Communication Setting, the Type of the Trials, and the Contrast Presented in the Trials (Standard Deviation Between Parantheses)*

<table>
<thead>
<tr>
<th></th>
<th>Salient Trials (ST)</th>
<th></th>
<th>Non-Salient Trials (NST)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Colour</td>
<td>Size</td>
<td>Overall ST</td>
<td>Colour</td>
</tr>
<tr>
<td>Other-focus</td>
<td>.58 (.46)</td>
<td>.34 (.44)</td>
<td>.46 (.41)</td>
<td>.55 (.47)</td>
</tr>
<tr>
<td>Baseline</td>
<td>.55 (.49)</td>
<td>.46 (.50)</td>
<td>.50 (.48)</td>
<td>.54 (.50)</td>
</tr>
<tr>
<td>Self-focus</td>
<td>.35 (.42)</td>
<td>.24 (.41)</td>
<td>.31 (.40)</td>
<td>.31 (.43)</td>
</tr>
</tbody>
</table>
Table 2.

_Estimated Coefficients and Standard Errors for the Mixed Model (M1) Fitted to Speakers’ RPI Scores, Using the Baseline Setting, Non-Salient Trials and Size Contrasts as Reference Categories_

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE b</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-13.93</td>
<td>1.74</td>
<td>-15.38, -8.56</td>
</tr>
<tr>
<td>SETTING Other-focus (Non-Salient, Size)</td>
<td>0.80</td>
<td>2.07</td>
<td>-3.02, 5.11</td>
</tr>
<tr>
<td>SETTING Self-focus (Non-Salient, Size)</td>
<td>1.28</td>
<td>1.66</td>
<td>-1.98, 4.52</td>
</tr>
<tr>
<td>TYPE (Salient, Size in Baseline)</td>
<td>1.53</td>
<td>0.81</td>
<td>-0.33, 2.86</td>
</tr>
<tr>
<td>CONTRAST (Non-Salient, Colour in Baseline)</td>
<td>-1.91</td>
<td>1.93</td>
<td>-6.59, 0.97</td>
</tr>
<tr>
<td>SETTING Other-focus * TYPE (Salient in Size)</td>
<td>-0.88</td>
<td>0.90</td>
<td>-2.61, 0.93</td>
</tr>
<tr>
<td>SETTING Self-focus * TYPE (Salient in Size)</td>
<td>-0.30</td>
<td>0.90</td>
<td>-2.03, 1.51</td>
</tr>
<tr>
<td>SETTING Other-focus * CONTRAST (Colour in Non-Salient)</td>
<td>0.64</td>
<td>3.45</td>
<td>-5.32, 8.20</td>
</tr>
<tr>
<td>SETTING Egocentric * CONTRAST (Colour in Non-Salient)</td>
<td>-4.24</td>
<td>5.11</td>
<td>-14.67, 5.37</td>
</tr>
</tbody>
</table>

_Note._ A comparison with the intercept-only model proved that the inclusion of the by-participant random slope for CONTRAST and the by-item random slopes for TYPE in M1 was justified by the data, $\chi^2 (4) = 173.8, p < .001.
Table 3.

*Estimated Coefficients and Standard Errors for the Mixed Model (M2) Fitted to Speakers’ RPI Scores, Using the Baseline Setting, Non-Salient Trials and Colour Contrasts as Reference Categories*

<table>
<thead>
<tr>
<th></th>
<th>B</th>
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<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-15.08</td>
<td>1.75</td>
<td>-17.80, -10.94</td>
</tr>
<tr>
<td>SETTING Other-focus (Non-Salient, Colour)</td>
<td>1.24</td>
<td>1.90</td>
<td>-1.67, 5.76</td>
</tr>
<tr>
<td>SETTING Self-focus (Non-Salient, Colour)</td>
<td>-3.31</td>
<td>4.41</td>
<td>-12.06, 5.21</td>
</tr>
<tr>
<td>TYPE (Salient, Colour in Baseline)</td>
<td>0.46</td>
<td>2.04</td>
<td>-3.05, 4.93</td>
</tr>
<tr>
<td>CONTRAST (Non-Salient, Size in Baseline)</td>
<td>1.67</td>
<td>2.36</td>
<td>-2.23, 7.01</td>
</tr>
<tr>
<td>SETTING Other-focus * TYPE (Salient in Colour)</td>
<td>-0.79</td>
<td>1.13</td>
<td>-3.10, 1.32</td>
</tr>
<tr>
<td>SETTING Self-focus * TYPE (Salient in Colour)</td>
<td>-0.24</td>
<td>1.16</td>
<td>-2.58, 1.97</td>
</tr>
<tr>
<td>SETTING Other-focus * CONTRAST (Size in Non-Salient)</td>
<td>-0.17</td>
<td>3.12</td>
<td>-6.55, 5.66</td>
</tr>
<tr>
<td>SETTING Self-focus * CONTRAST (Size in Non-Salient)</td>
<td>4.79</td>
<td>4.81</td>
<td>-4.41, 14.43</td>
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</tbody>
</table>

*Note.* A comparison with the intercept-only model proved that the inclusion of the by-participant random slopes for TYPE and CONTRAST, and the by-item random slope for TYPE in M2 was justified by the data, $\chi^2 (7) = 174.7, p < .001$. 
Table 4.

*Estimated Coefficients and Standard Errors for the Mixed Model (M3) Fitted to Speakers’ RPI Scores, Using the Baseline Setting, Salient Trials and Size Contrasts as Reference Categories*

<table>
<thead>
<tr>
<th>Category</th>
<th>B</th>
<th>SE b</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-12.40</td>
<td>1.78</td>
<td>-14.24, -7.27</td>
</tr>
<tr>
<td>SETTING Other-focus (Salient, Size)</td>
<td>-0.07</td>
<td>1.61</td>
<td>-2.92, 3.38</td>
</tr>
<tr>
<td>SETTING Self-focus (Salient, Size)</td>
<td>0.98</td>
<td>1.56</td>
<td>-1.86, 4.25</td>
</tr>
<tr>
<td>TYPE (Non-Salient, Size in Baseline)</td>
<td>-1.53</td>
<td>1.00</td>
<td>-3.29, 0.65</td>
</tr>
<tr>
<td>CONTRAST (Salient, Colour in Baseline)</td>
<td>-1.91</td>
<td>2.23</td>
<td>-6.81, 1.95</td>
</tr>
<tr>
<td>SETTING Other-focus * TYPE (Non-Salient in Size)</td>
<td>0.88</td>
<td>1.05</td>
<td>-1.33, 2.79</td>
</tr>
<tr>
<td>SETTING Self-focus * TYPE (Non-Salient in Size)</td>
<td>0.30</td>
<td>0.96</td>
<td>-1.70, 2.08</td>
</tr>
<tr>
<td>SETTING Other-focus * CONTRAST (Colour in Salient)</td>
<td>0.64</td>
<td>2.71</td>
<td>-4.33, 6.27</td>
</tr>
<tr>
<td>SETTING Self-focus * CONTRAST (Colour in Salient)</td>
<td>-4.24</td>
<td>4.43</td>
<td>-13.71, 3.64</td>
</tr>
</tbody>
</table>

*Note. A comparison with the intercept-only model proved that the inclusion of the by-participant random slope for CONTRAST, and the by-item random slope for TYPE in M3 was justified by the data, $\chi^2(4) = 173.81, p < .001.$*
Table 5.

*Estimated Coefficients and Standard Errors for the Mixed Model (M4) Fitted to Speakers’ RPI Scores, Using the Baseline Setting, Salient Trials and Colour Contrasts as Reference Categories*

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE b</th>
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<tbody>
<tr>
<td>Intercept</td>
<td>-14.31</td>
<td>1.49</td>
<td>-16.20, -10.34</td>
</tr>
<tr>
<td>SETTING Other-focus (Salient, Colour)</td>
<td>0.57</td>
<td>2.36</td>
<td>-3.38, 5.88</td>
</tr>
<tr>
<td>SETTING Self-focus (Salient, Colour)</td>
<td>-3.26</td>
<td>4.41</td>
<td>-12.64, 4.67</td>
</tr>
<tr>
<td>TYPE (Non-Salient, Colour in Baseline)</td>
<td>-1.53</td>
<td>0.90</td>
<td>-3.31, 0.23</td>
</tr>
<tr>
<td>CONTRAST (Salient, Size in Baseline)</td>
<td>1.91</td>
<td>2.32</td>
<td>-2.01, 7.08</td>
</tr>
<tr>
<td>SETTING Other-focus * TYPE (Non-Salient in Colour)</td>
<td>0.88</td>
<td>0.87</td>
<td>-0.78, 2.64</td>
</tr>
<tr>
<td>SETTING Self-focus * TYPE (Non-Salient in Colour)</td>
<td>0.30</td>
<td>1.03</td>
<td>-1.73, 2.32</td>
</tr>
<tr>
<td>SETTING Other-focus * CONTRAST (Size in Salient)</td>
<td>-0.64</td>
<td>3.12</td>
<td>-7.02, 5.21</td>
</tr>
<tr>
<td>SETTING Self-focus * CONTRAST (Size in Salient)</td>
<td>4.24</td>
<td>4.62</td>
<td>-4.19, 13.94</td>
</tr>
</tbody>
</table>

*Note.* A comparison with the intercept-only model proved that the inclusion of the by-participant random slope for CONTRAST, and the by-item random slope for TYPE in M4 was justified by the data, $\chi^2 (4) = 173.8, p < .001$. 
Overspecification can be helpful when speakers plan to overspecifying their descriptions. For example, you can tell your nephew not to pick the green berries when no other berries are present, implying to your nephew that green fruits are usually not ready for plucking.

In Santiesteban et al.’s studies (2012), participants followed the imitation-inhibition training even one day before they participated in the perspective-taking tasks.

By-subject random slopes for SETTING and by-item random slopes for CONTRAST were not included in the maximal model, as this were respectively between-subjects and between-items factors.

In order to examine all contrasts appertaining to our hypotheses, four models were constructed. Information about these models’ reference categories and random-effects structures are presented in the Appendix (table 2 to 5). We reported the results from the first model that contained the comparison.

Comparisons between settings were always based on which level of the type of trials (salient, non-salient) and the contrast variable (colour, size) was presented to be the reference category. For instance, when the reference category was set on baseline, salient trials and size contrasts, the proportion of this cell was compared to the proportions of salient trials contrasting in size in the other two settings.

Comparison with the intercept-only model revealed that the inclusion of the by-subject random slope for speakers’ self-report was justified by the data, $\chi^2 (2) = 9.90, p < .001$.

It was out of the scope of this paper to explain this in further detail. Results revealed that 66% ($N = 59$) of the speakers followed either a minimum or maximum referring strategy throughout the game. More specifically, 33 speakers ($N_{\text{other-focused}} = 7$, $N_{\text{baseline}} = 13$, $N_{\text{self-focused}} = 13$) either excluded all information about objects’ colour or size from all references, and 26 speakers ($N_{\text{other-focused}} = 8$, $N_{\text{baseline}} = 12$, $N_{\text{self-focused}} = 6$) included all information to their references.