

Perspective-Taking During Conversation

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Introduction

When people come together to communicate, they each bring their own unique set of life experiences, beliefs and background knowledge. Communicating with another person depends on your own representations of that person's knowledge and beliefs, which is known as their "perspective". During conversation, this representation is relevant to language use at different levels: from the choice of what to say (which determines sentence structure), to the selection of specific words, and even to the way in which words are acoustically realized at a fine-grain level. For example, when conversing with your dentist, it is appropriate to *inquire* about proper tooth-brushing technique, but making an assertion (i.e., stating new information) on the same topic would be more appropriate when talking to your five-year-old. Furthermore, a term such as *carious lesion* may be appropriate in a conversation between dentists, but when addressing a patient, a dentist may have more success using the everyday term *cavity* (see Clark & Murphy, 1982; Isaacs & Clark, 1987; Bromme, Jucks, & Wagner, 2005). Finally, the prosodic realization of words may depend, for example, on whether information is considered new to the partner, in which case one may choose to emphasize the production of that word, to accommodate the addressee's unfamiliarity with the term (Galati & Brennan, 2010; cf., Bard et al., 2000).

The process whereby people consider their partner's perspective during conversation is known as *perspective-taking*. In our examples above, we focused on the process of perspective taking in language production, also known as *audience design* (Clark & Murphy, 1982). Perspective information is also relevant to language comprehension, as the addressee often needs to take into consideration the speaker's perspective at each of these levels of representation as well. When your dentist opens a conversation (see Schegloff, 1968), with the question, "*How are you doing today?*", it is an invitation to talk about your dental health. But if a friend were to ask the same question, the response "*Well one of my fillings seems to be loose*" would be rather odd. In each case, the addressee must use their knowledge of the speaker's background and perspective to interpret the question in the appropriate way.

The idea that felicitous language use depends on perspective information has been recognized in the philosophical literature since the late 1960s. Lewis (1969) was a pioneer in conceptualizing communication as

intentional actions performed by rational agents, and in pointing out the relevance of common knowledge to these actions. The role of common knowledge took on central importance in the work of Stalnaker, who coined the now widely-used term **common ground**: common knowledge that is mutually recognized as such (Stalnaker, 1970, 1973, 1974). Stalnaker pointed out that all conversational moves are performed in relation to common ground: assertions need to contain information that is *not* already in common ground, and, similarly, questions are about information that is *not* in common ground. By contrast, definite referring expressions are based on information that *is* in common ground. It has since been widely recognized in both philosophy and formal linguistics that common ground plays a central role in interpretation. The formal properties of common ground have been studied in connection to many linguistic phenomena, including presuppositions (see e.g., Stalnaker 1972; Heim 1983, 1992; von Stechow, 2004; Potts, 2005; Roberts, 2012), implicatures (see e.g., Grice, 1967; Sperber & Wilson, 1995; Levinson, 2000), anaphora (see e.g., Kaplan, 1989; Asher & Lascarides, 2003), and many others.

In psycholinguistics, the focus of most research concerns **language processing**; namely, when and how perspective information influences language use. The fact that adult interlocutors *represent* information about the perspectives of others *in some form* is generally taken for granted (contrasting with the developmental trajectory by which the young child comes to have such representations: Perner & Ruffman, 2005; Baillargeon, Scott, & He, 2010). Thus, the main research questions concern whether perspective-taking behavior relies on the same mechanisms across language comprehension and production, and across the different levels of linguistic representations (e.g., sound, structure, meaning).

The study of perspective-taking in language processing should be considered against the backdrop of two other lines of inquiry within psychology.

One intellectual tradition explores the development of **theory of mind**, or the capacity to attribute to other individuals belief states that are different than one's own. Level 1 theory of mind allows one to understand that another person may perceive different objects than you do, and includes the capacity to attribute the *absence of*

belief (e.g., Sally does not know about the toy); this capacity is thought to emerge early in development, prior to age 4 (Flavell, Everett, Croft, & Flavell, 1981; Carlson, Mandell, & Williams, 2004). Level 2 theory of mind is a more complex capacity that allows one to understand that another person may have *different* knowledge, and includes the ability to attribute *false* beliefs to others. For example, it allows one to understand that the same object may be perceived differently by another person (e.g., Sally thinks that is her toy, but it is not really her toy). With respect to this more complex ability, there is an ongoing debate regarding the developmental trajectory: classic research using the *false belief task* (Wimmer & Perner, 1983; Baron-Cohen, Leslie, & Frith, 1985) concludes that children develop this ability only around age four, whereas more recent work using implicit response measures finds that children as young as 13-15 months already exhibit behavior indicating that they can represent the false beliefs of others (Onishi & Baillargeon, 2005; Surian, Caldi, & Sperber, 2007). In the adult perspective-taking literature in psycholinguistics, the central question is not whether adults *represent* the belief states of others, but instead when and how these representations guide *real-time language processing*. It is interesting to note that the adult processing literature we discuss in this chapter has mostly focused on cases of Level 1 knowledge, with only a handful of studies targeting the more complex Level 2 knowledge (e.g., Hanna, Tanenhaus, & Trueswell, 2003; Mozuraitis, Chambers, & Daneman, 2015; Mozuraitis, Stevenson, & Heller, 2016).

A second tradition that has influenced the study of perspective-taking in language processing is the study of **egocentrism in social psychology and decision making**. A consistent finding in social psychology studies has been that when individuals are asked to estimate what others know, their estimates are biased towards their own knowledge (Ross, Greene, & House, 1977; Fussell & Krauss, 1991; Epley, Keysar, Van Boven, & Gilovich, 2004). Such egocentric influences have been observed both in non-linguistic domains (e.g., estimates of how much housework you complete; Ross & Sicoly, 1979), and in the domain of language, including measurements of what information a speaker tends to repeat in a conversation (Knutsen & Le Bigot, 2012, 2014), and one's memory for the discourse history (Isaacs, 1990; Yoon, Benjamin, & Brown-Schmidt, 2016; cf. Stafford & Daly, 1984; see discussion in Caruso, Epley, & Bazerman, 2006). These effects are likely to be tied to the greater memory availability for one's own actions and beliefs (Ross & Sicoly, 1979; Isaacs, 1990; Fischer, Schult, &

Steffens, 2015). Theories that judgements begin with egocentric estimation processes that are incrementally adjusted (see Tversky & Kahneman, 1974; Epley et al., 2004; Epley & Gilovich, 2006) have informed a view of perspective-taking in language processing that posited an initial egocentrism phase, followed by incremental adjustment away from this egocentric perspective (Horton & Keysar, 1996; Savitsky, Keysar, Epley, Carter, & Swanson, 2011). As we will see, this intellectual inheritance has influenced research on perspective-taking in language use from the early days until today.

In what follows, we describe approaches to the study of perspective-taking in conversation from the **past** and the **present**. We then speculate about the **future** directions this research will take.

The past

An influential experimental paradigm for studying perspective taking has been the **referential communication task** (Krauss & Weinheimer, 1964; Krauss & Glucksberg, 1977). In this task, two individuals collaborate to arrange or re-arrange a set of objects or pictures in a workspace (or, in recent years, on a computer screen). This setup creates a situation where participants need to produce and interpret referring expressions with respect to a restricted set of candidate referents. In the domain of perspective-taking, this setup allows controlled manipulations of the knowledge mismatch between the conversational partners. Such mismatches are created using their visual perspective (e.g., Keysar., Barr, Balin & Brauner, 2000 and many others), by linguistic mention (e.g., Hanna et al., 2003; Brown-Schmidt, 2012) or by the background experiences of participants, both experiences in the lab (e.g., Wu & Keysar, 2007), as well as prior experiences (e.g., Isaacs & Clark, 1987). What is shared between participants is taken to be in common ground, whereas information available to only one partner is considered to be in that partner's *privileged ground*. To measure perspective-taking, the literature has focused on the referential forms produced by speakers, and on the real-time interpretation of referential forms by listeners as reflected by their eye movements (i.e., using the visual world paradigm, Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995).

As worked out in detail by Clark and Marshall (1978), for communication to be successful, it is not sufficient for one to assume that their partner knows a certain piece of information, but they must also assume that their partner assumes that *they* know this piece of information too. A problem with this logic arises because this recursion should logically continue ad infinitum, but, clearly, infinite recursions could not be represented in our mind. Instead, Clark and Marshall (1978) argue that interlocutors rely on *heuristics* to estimate mutual knowledge, or common ground (also see Clark & Marshall, 1981). On this view, interlocutors combine evidence for mutual knowledge with reasonable assumptions to estimate common ground. The evidence can come from different sources (Clark, 1996). These include visual or other sensory cues (we both see a certain object or hear a certain sound; *physical co-presence*), linguistic cues (we talked about something; *linguistic co-presence*), and cultural cues (Americans are usually assumed to know who the US president is; the Canadian Prime Minister... uh... not so much common ground; *community membership*). Clark and Marshall point out that the stronger the *evidence* for mutual knowledge is, the weaker the *assumption* needs to be that the information is indeed shared. They use a diary-like metaphor for one's memory for life's experiences, and introduce a "reference diaries" model to explain partner-specific effects in definite reference, such as *the candle* or *that flower*; such referring expressions require there to be a uniquely identifiable object that fits the description in the context. In this model, the relevant context is the common ground that the partners share.

The idea that the production and comprehension of definite reference involves a memorial representation linked to a specific conversational partner inspired a body of work seeking to document the influence of these representations on language use. Evidence that the particular conversational partner affects the **production** of referring expressions comes from the study of how referential forms change over the course of a conversation, with repeated reference to the same entity triggering shorter referring expressions (Clark & Wilkes-Gibbs, 1986), and, conversely, with referring expressions becoming comparatively detailed when there is a lack of common ground (Wilkes-Gibbs & Clark, 1992). Other evidence comes from how speakers adapt their referential forms when talking to a partner who they assess to be an expert or a novice with respect to a certain topic (Isaacs & Clark, 1987; Wilkes-Gibbs & Clark, 1992; Bromme et al., 2005), how speakers continue to use a certain way of talking about an object, even when it is relatively atypical, because it was introduced earlier in the conversation

(Bortfeld & Brennan, 1997), and how speakers adapt to a new partner with whom they do not share the same common ground (Brennan & Clark, 1996). Knowledge of common ground is also used to *hinder* understanding by certain persons, as when bilinguals switch to a language not shared by eavesdroppers, or when speakers use terms unfamiliar to certain listeners to prevent their understanding (e.g., spelling *P-I-Z-Z-A* in front of a preliterate child; Clark & Schaefer, 1987). On the **comprehension** side, hearers who actively participate in the conversational exchange perform better on a task than overhearers who are not active participants (Schober & Clark, 1989). This finding has been linked to the conversational process of **grounding**, where hearers actively mark the addition of information to the common ground, with either silence or with short phrases like “yes” and “ok” (Clark & Schaefer, 1989; Clark & Brennan, 1991; Clark & Krych, 2004). In sum, this body of work has led to the documentation of a large number of natural language phenomena that attest to the fact that conversational partners represent the perspective of others, and that these knowledge representations, in some form, guide language use.

In the late nineteen-nineties, the emphasis in the literature shifted away from language use at the macro level towards asking how representations of common ground guide real-time use, and in particular, **real-time (online) language comprehension**. This research was influenced by the dominant view in social psychology where reasoning and decision-making were thought to begin from egocentrically-biased estimations. One early paper examined participants’ eye movements during real-time referential processing to contrast a *restricted search hypothesis* in which the initial search for a referent is restricted to entities in common ground, with an *unrestricted search hypothesis*, in which all referents are initially considered as candidates, independent of their ground status (Keysar, Barr, Balin, & Paek, 1998). The authors took the eye-movement patterns they observed to reflect an early unrestricted search process coupled with a later stage of error-checking that would correct for violations of common ground. While the hypothesis that language comprehension is initially egocentric with a delayed effect of correction (Keysar et al., 2000; Barr & Keysar, 2002; Keysar, Lin, & Barr, 2003) was originally inspired by work in social psychology (e.g., Tversky), it is reminiscent of debates concerning the role of contextual information in other areas of language processing that were taking place at around the same time. In the 1980s and 1990s, a dominant view in cognitive psychology was **the modular conceptualization of the**

mind (Fodor, 1983). Under modularity, basic cognitive systems, including language and its subsystems (e.g., lexicon, syntax), are informationally-encapsulated, meaning that processing in each module operates independent of the influence of other (especially higher-level) modules. In domains such as lexical access or syntactic parsing, the initial stage of processing was argued to be independent of top-down contextual expectations, which were only integrated at a later point (e.g., Frazier, 1979; Swinney, 1979; Ferreira & Clifton, 1986). Similarly, common ground can be viewed as high-level knowledge that would be too effortful and resource-intensive to be incorporated into the initial, rapid first-stage process of language comprehension. Indeed, some have argued that theory of mind, while available for deliberative and explicit reasoning, is not routinely incorporated into the processes by which we interpret the behavior of other people (Keysar et al., 2003; Apperly, et al., 2010).

However, subsequent work provided evidence from a variety of domains that counters the idea that language processing is encapsulated from higher-level knowledge representations. Evidence of cross-domain interaction in language processing included the influence of visual and linguistic context on lexical access (Federmeier & Kutas, 1999; Dahan & Tanenhaus, 2004; Van Berkum, van den Brink, Tesink, Kos, & Hagoort, 2008) and on syntactic parsing (Altmann & Steedman, 1988; Tanenhaus, et al. 1995; Chambers, Tanenhaus, & Magnuson, 2004). An alternative theoretical approach – **constraint-based lexicalist theories** – emerged at this time. These theories postulated that multiple probabilistic constraints simultaneously guide the moment-by-moment processing of language (MacDonald, Pearlmutter, & Seidenberg, 1994; Trueswell & Tanenhaus, 1994). The earliest evidence in support of the constraint-based approach to sentence processing came from studies of how lexical and syntactic processing are influenced by multiple simultaneous cues provided by properties of verbs and their arguments, including their meaning and distributional patterns (Trueswell, Tanenhaus & Kello, 1993; Garnsey, Pearlmutter, Myers, & Lotocky, 1997; Wilson & Garnsey, 2009), as well as by the visual context (Tanenhaus, et al., 1995; Eberhard, Spivey-Knowlton, Sedivy, & Tanenhaus, 1995; Spivey, Tanenhaus, Eberhard, & Sedivy, 2002). Other work extended these findings to the literature on perspective-taking, showing that the listener's knowledge about the perspective of the speaker is one of the cues that affects referential

interpretation from the earliest moments of processing (Nadig & Sedivy, 2002; Hanna et al., 2003; Hanna & Tanenhaus, 2004; Brown-Schmidt, Gunlogson, & Tanenhaus, 2008; Heller, Grodner, & Tanenhaus, 2008).

For example, Heller et al. (2008) show that when listeners interpret a temporarily-ambiguous referring expression, they use information about the perspective of the speaker in choosing between potential referents, before overt disambiguating information becomes available in the speech stream. This study examined listeners' interpretation in a context where potential referents were objects on a shelf (see Figure 1). The listener (participant) followed an instruction to move objects that was provided by a (confederate) speaker who was sitting on the other side of the display (see Keysar et al., 2000 for an earlier use of this type of experimental display). Heller et al. build on the finding that listeners expect modified expressions with size adjectives (e.g., *the big bowl*) in contexts where a noun alone would be insufficient (e.g., when a big and a small bowl are present: Sedivy, Tanenhaus, Chambers, & Carlson, 1999). Of interest were contexts like the example in Figure 1 containing two pairs of size-contrasting objects (e.g., two bowls and two cars), where the two bowls and the big car were visible to both partners, and were thus in common ground, but the small car was hidden from the speaker's view. Because the small car is hidden, the speaker should not be aware of it. A listener who appreciates the speaker's perspective should therefore take this into account. Heller et al. reasoned that if referential processing is initially egocentric, then upon hearing an unfolding referring expression like *the big...*, listeners will consider both the big bowl *and* the big car as potential referents, as both have a contrasting object in the display. However, if listeners take into account the fact that the small car is not known to the speaker, they should rule out the big car as a potential referent, even though that object, in and of itself, *is* in common ground and matches the unfolding expression (they should expect the speaker to simply call it *the car*). Indeed, upon hearing *the big* and before any information from the noun was available in the speech stream (a short interval of about 300 ms), listeners developed the expectation that the speaker would refer to the big bowl and not the big car. These findings were since replicated by Ryskin, Benjamin, Tullis, and Brown-Schmidt (2015), and also by Heller, Parisien, and Stevenson (2016). This work provides critical evidence against egocentric-first theories of the role of common ground in language processing (e.g., Keysar, et al., 2003), because it shows that listeners integrate information about the common vs. privileged distinction continuously during processing, and not just at

a stage when a decision needs to be made (i.e., choice of referent), possibly correcting an initially-egocentric interpretation. These findings also provide evidence against a later, more nuanced version of egocentricity – anticipation-without-integration (Barr, 2008), which argues that listeners distinguish common and privileged referents but do not use this information in interpreting language in the earliest moments (for discussion, see Heller et al., 2016).



Figure 1: Example display modeled after Heller et al., (2008), shown from the listener’s perspective (the speaker would be sitting on the other side of the display). The two bowls and the big car are visible from both sides of the display, and thus are in common ground, whereas the small car is in a cubbyhole that is hidden from the speaker’s perspective by an opaque panel, and is thus only known to the listener. The speaker will instruct the listener to “*pick up the big bowl...*”

In the domain of **language production**, early research on the process of audience design was similarly influenced by findings from social psychology about egocentric biases. For example, Horton and Keysar (1996) proposed a *monitoring and adjustment model*, where common ground does not play a role in initial utterance planning, and instead only comes into play at a delayed second stage. This proposal was based on an analysis of referential form in a situation where a size-contrasting object was only visible to the speaker and not the addressee (e.g., the big car in Figure 1, with the small car hidden from the addressee). In situations like this, Horton and Keysar found that speakers, when under time pressure, used an unnecessary adjective in the description (e.g., *the big car*) 43% of the time. Interestingly, Nadig and Sedivy (2002) similarly find that in situations like this, where a size-contrasting object is privileged to the speaker, that 5-6 year old children (and adults) include an unnecessary adjective about half of the time. However, Nadig and Sedivy interpret this finding differently, taking it as evidence that adults and children *do* take perspective in language production. One reason for the different conclusions may be the theoretical backdrop: Horton and Keysar's conclusion is in line with arguments that decision making is egocentrically biased and therefore deviates from rationality (Tversky & Kahneman, 1974; 1981). By contrast, Nadig and Sedivy's conclusion may have been influenced by their developmental perspective, where achieving the adaptive behaviour half the time is a substantive change over a baseline condition where both objects were available to both partners and children produced a modifier 75% of the time (see Brown-Schmidt & Hanna, 2011 for a related discussion regarding the use of baseline conditions in studies of language comprehension). More recent studies have shown that speakers often exhibit adaptation to the perspective of the addressee, along with a simultaneous influence of the speaker's privileged perspective (Wardlow Lane, Groisman, & Ferreira, 2006; Wardlow Lane & Ferreira, 2008; Heller, Gorman, & Tanenhaus, 2012; Gorman, Gegg-Harrison, Marsh & Tanenhaus, 2013; Vanlangendonck, Willems, Menenti, & Hagoort, 2016). For example, when referring to unfamiliar objects whose names were learned by a speaker but are unknown to an addressee, speakers rarely use these names on their own (e.g., uttering *click on the fluliket*: 5% in Heller et al., 2012), but they do sometimes use these names coupled with a description (e.g., *Fluliket, with the arms*: 18% in Heller et al., 2012; see also Isaacs & Clark, 1987; Gorman et al., 2013). The influence of privileged information may be more apparent when the speaker is under time pressure (Horton & Keysar, 1996),

when speakers are describing a state of affairs to their addressee rather than requesting something from them (Yoon, Koh, & Brown-Schmidt, 2012), and when privileged ground is salient in the task (Wardlow Lane, et al., 2006; Wardlow Lane & Ferreira, 2008). Thus, while speakers show a remarkable ability of tracking common ground and in using this information in their referring expressions, they do not seem to completely adapt to the addressee's knowledge. Interestingly, in most studies, the intrusion of privileged ground on language production has been used as a litmus test for whether speakers fail in audience design. However, this misses the fact that speakers are regularly required to draw on privileged information in order to make felicitous contributions to conversation. Indeed, conversation would be rather dull if we only spoke about things that were already mutually known. It remains an open question, then, whether the "incomplete" nature of audience design reflects inherent limits in speakers' ability to avoid egocentrism, or whether it instead reflects a communicative system that is operating in relative balance.

The present

As noted earlier, the notion that language processing might be initially egocentric arose from certain perspectives in social psychology and assumptions about cognitive effort, where contextual information was expected to have a delayed effect on interpretation. With conclusive evidence now showing that listeners *can* use information about the knowledge state of the speaker from the earliest moments of processing, the research question has shifted from *whether* people can use perspective information to *when and how* they use this type of information.

This shift has driven researchers to begin cataloging the ways in which perspective influences language processing. One important line of research investigates phenomena that are characteristic of **situated conversation**, such as the role of conversational grounding in establishing common ground (Brown-Schmidt, 2012; Brown-Schmidt & Fraundorf, 2015), the influence of shared experiences in object labelling (Wu & Keysar, 2007; Heller et al., 2012; Gorman, et al., 2013), the role of spatial language and spatial cognition (Garrod & Sanford, 1988; Galati & Avraamides, 2013; Ryskin, Wang, & Brown-Schmidt, 2016), the cognitive and communicative forces that shape attention to common vs. privileged ground (Wardlow Lane & Ferreira, 2008; Wardlow Lane & Liersch, 2012; Yoon, Koh, & Brown-Schmidt, 2012; Wardlow, 2013), as well as

mechanisms of multi-party conversation (Yoon & Brown-Schmidt, 2014) and multimodal communication (Galati & Brennan, 2013; Hilliard & Cook, 2016). A second line of work investigates how **characteristics of one's conversational partner** influence language processing, including stereotypical beliefs about the behavior of individuals from different social groups (Van Berkum, et al., 2008), and cases where the partner is believed to have a cognitive or linguistic deficit (Grodner & Sedivy, 2005; Arnold, Hudson Kam & Tanenhaus, 2007). Additional work has focused on representations of the partner's **goals and beliefs**, including false beliefs (Ferguson, Scheepers & Sanford, 2010; Mozuraitis et al., 2015), the actions that the partner can make in the setting (Hanna & Tanenhaus, 2004), and the partner's desire to keep a secret (Wardlow Lane, et al., 2006; Ferguson & Breheny, 2011). Taken together, this body of work has identified a wide range of factors that influence how perspective guides language processing.

A related question concerns the **cognitive differences** that limit or guide how information is brought to bear on language processing. Proposed system-level constraints include capacity-limited memory and cognitive control processes (e.g., Just & Carpenter, 1992; Novick, Trueswell, & Thompson-Schill, 2005). Note that an alternative view holds that individual differences are linked to differences in *language experience* between individuals (MacDonald & Christiansen, 1992; Wells, Christiansen, Race, Acheson, & MacDonald, 2009; Mishra, Singh, Pandey, & Huettig, 2012). In the domain of perspective-taking, there have been several reports of links between individual differences in working memory and executive function processes, and perspective-taking behavior (Brown-Schmidt, 2009a; Lin, Keysar, & Epley, 2010; Wardlow, 2013). According to one view, these findings provide support for the idea that language users need to resolve competition between competing constraints (Brown-Schmidt, 2009a). Others argue instead that such links reveal that the use of perspective is too effortful to routinely influence language processing, particularly in children (Epley, Morewedge, & Keysar, 2004; Lin et al., 2010). There is, however, evidence that young children do represent – and in some cases use – perspective information successfully (Nadig & Sedivy, 2002; Nilsen, Graham, Smith, & Chambers, 2008; Scott, He, Baillargeon, & Cummins, 2012). Furthermore, the developing executive function in young children has been linked to children's ability to use perspective in language processing (Nilsen & Graham, 2009; Nilsen, Varghese, Xu, & Fecica, 2015). In sum, links between executive function and perspective-taking have been demonstrated

in both children and adults. However, it is important to note in this context that more recent studies fail to find substantive links between individual differences in adults' cognitive function and perspective-taking during language comprehension (Brown-Schmidt, 2012; Ryskin et al., 2014; Brown-Schmidt & Fraundorf, 2015; Ryskin, Benjamin, Tuillis, & Brown-Schmidt, 2015), questioning the magnitude or generalizability of the earlier findings. When the reliability of the measures of individual differences in perspective-taking have been reported, they have been low (Ryskin, et al., 2015; Brown-Schmidt & Fraundorf, 2015); this places an upper limit on the size of a correlation one could expect with other measures (e.g. working memory). Thus, to make further progress on this question, it will be necessary to first identify internally reliable measures of individual differences in listeners' perspective-taking ability.

While the era of cataloguing has significantly advanced our understanding of what influences perspective-taking behavior, the demise of the egocentric-first approach has left the field searching for a new framework. Several candidate approaches have emerged.

One influential framework has been **interactive alignment**, which proposes that during conversation speakers and listeners align to each other (Pickering & Garrod, 2004, 2013). Alignment is hypothesized to operate at all levels of representation, ranging from syntactic priming (where communicative partners become more likely to reuse previously-produced or previously-heard structures), to phonetic accommodation (where partners become more similar in terms of the acoustic properties of their speech). Pickering and Garrod (2004) suggest that perspective-taking behavior emerges through this same mechanism of priming, and this leads speakers and listeners to arrive at similar understanding of a linguistic exchange without having to continuously calculate and integrate explicit representations of common ground. What makes this approach attractive is that it buys perspective-taking behavior "for free" from more general mechanisms, such as the activation of linguistic forms in memory.

The alignment approach can be used to account for certain phenomena in conversation. Here we consider **conceptual pacts**, a tacit agreement about the conceptualization of an object that is reflected in the use of

entrained referential phrases (e.g., whether to call an object *the shiny cylinder* or *the silver pipe*). Entrained terms tend to persist in conversation, such that speakers continue using these terms when talking to the same partner, but do so to a lesser extent when interacting with a new partner (Wilkes-Gibbs & Clark, 1992; Brennan & Clark, 1996). This behavior is mirrored in comprehension: listeners interpret a referring expression faster when their partner continues to use a term they developed earlier (Barr & Keysar, 2002; Brown-Schmidt, 2009b), but interpretation is slowed if the speaker refers to a previously-mentioned object in a new way (Metzing & Brennan, 2003; Kronmüller & Barr, 2007; Matthews, Lieven, & Tomasello, 2010). Under alignment, when a speaker produces a certain referring expression, this linguistic form creates activation at all levels of representation for both the speaker herself and for her addressee. This can explain why speakers reuse entrained terms (because the term is already activated), and why such reuse is observed less with a new partner (because the term is tied to the partner with whom the pact was forged). Alignment can also account for certain partner-specific effects in comprehension. For example, the facilitation observed when the same speaker reuses a referring expression, such as “*the shiny cylinder*”, is explained as a result of the activation of the linguistic representation in the addressee’s mind. The penalty observed when the same speaker “breaks” the pact, compared to a new speaker, can be attributed to pre-activation of the previous term (“*shiny cylinder*”) with the same speaker (but not the new speaker). In sum, effects associated with the use of conceptual pacts can be explained by conceptual alignment, offering an explanation of how perspective-taking behavior can be obtained without the complex process of calculating explicit common ground. There are, however, limits to the explanatory power of this alignment approach. Recall that alignment does not just operate at the conceptual level, but at all levels of linguistic representation. Parallel to the conceptual level, interactive alignment predicts that the *syntactic structure* of referring expressions is activated (and reactivated) and thus preserved over the course of the conversation. This prediction is not borne out: not only is such preservation not observed, but, in fact, the structure of a referring expression normally *changes* over time, becoming shorter as the conversation progresses (e.g., from “*the person ice skating that has two arms*” to “*the ice skater*”; Clark & Wilkes-Gibbs, 1986; Isaacs & Clark, 1987). It is unclear whether and how the alignment approach can be developed to capture the *change* in the syntactic form that referring expressions undergo over time (also see Heller & Chambers, 2014 for a discussion of other phenomena that cannot be captured using alignment).

A different mechanism is presented in Horton and Gerrig (2005a,b, 2016) who propose that effects of perspective-taking can arise from **ordinary memory processes**. Horton and Gerrig propose that through shared experiences, we form memory traces that link specific partners with the contents of that shared experience. On this view, when a speaker prepares a referring expression, the addressee serves as a memory cue which resonates with information in memory associated with that addressee. This process leads the speaker to use shared information in the referring expression, such as calling an object by its shared name (“*shiny cylinder*”), rather than a non-shared name (“*silver pipe*”). This aspect of the memory approach is attractive because, like alignment, it derives perspective-taking behavior as a result of general mechanisms that are not specific to common ground.

There is evidence that perspective-taking behavior is indeed linked to shared experiences (Horton & Gerrig, 2005b; Heller et al., 2012; Gorman et al., 2013). For example, one set of findings showed that speakers were better at distinguishing shared and privileged labels when shared information was acquired through a shared learning experience with the addressee, compared to when speakers were simply *told* that the addressee shared this information (Gorman et al., 2013). However, not all cases of shared information are based on direct experience. For example, Isaacs and Clark (1987) examined common ground that is based on community membership: they had New Yorkers (“experts”) and non-New Yorkers (“novices”) perform a task of ordering postcards of New York City landmarks. The task was performed six times; each time they arranged the postcards into a different order. Despite the fact that participants were *not* told that they may have different knowledge of NYC, already on the first time through the task, expert speakers tended to use unadorned names when interacting with other experts (e.g. “*Rockefeller Center*”), whereas they tended to include descriptions in their utterances when interacting with a novice partner (e.g., “*Rockefeller Center, with all the flags*”). Strikingly, this sensitivity to the partner’s expertise (or lack thereof) emerged very early in the interaction, even before all the cards had been discussed for the first time (see Table 2 in the original paper). This pattern reveals that speakers inferred – and adapted to – the knowledge state of their partner rapidly, possibly based on the partner’s accent, or based their reaction to the first card description (only six out of thirty-two pairs of participants explicitly discussed

their familiarity with New York City). As noted by Horton and Gerrig (2005a), cases where common ground is *inferred* based on community membership cannot be handled by associative memory mechanisms, and instead require *strategic* use of memory representations. Understanding how, and when, speakers calculate what type of referential form will be successful with a given addressee, remains an open question. Resolving this issue would require a better understanding of how representations of others' knowledge are stored, and how they are accessed during language production (Clark & Marshall, 1978; Brown-Schmidt & Duff, 2016).

We have seen that some linguistic phenomena that are taken to reflect perspective-taking behavior can arise “for free” from general, non-dedicated cognitive processes that do not require explicit computation of common ground. However, it seems unlikely that these non-dedicated processes alone can be developed to explain *all* aspects of perspective-taking that have been observed in the literature to date. Furthermore, the two mechanisms discussed here focus on *shared* information, and are silent with respect to the phenomena that rely on *non-shared* (or private) information, which, as we will consider in the next section, also plays a central – yet neglected – role in perspective-taking.

The future

Perspective taking is complex. Because there is no direct access to another person's perspective, the process requires estimating what others know, likely by using inferences based on multiple probabilistic cues in the situational context. In order to maintain relevance over time, these estimates must be continuously updated when new information becomes available. At the same time, however, it is clear that language comprehension and production are remarkably rapid and efficient. Earlier research attempted to explain how perspective-taking is accomplished in real time by saying that it isn't: that the effects we observe are due to heuristics such as using one's own knowledge in lieu of calculating another person's (Keysar, et al., 1998). More recent attempts take a different direction, by acknowledging that perspective-taking does happen, but arguing that it is a by-product of other, non-dedicated, cognitive processes (Pickering & Garrod, 2004; Horton & Gerrig, 2005a,b, 2016). Such approaches are appealing, as they offer ways of understanding how seemingly complex mental representations nonetheless entail rapid language processing. However, it is unlikely that these processes alone would be able to

account for all aspects of perspective-taking behavior. Moving forward, it will be necessary to develop in more detail the full range of mechanisms that explain perspective-taking behavior.

One essential line of inquiry is the development of implemented **computational models**. First, from the idea that multiple probabilistic constraints guide language comprehension comes the prediction that different sources of information will vary in the degree to which they allow the listener to make a prediction about upcoming structure. A class of computational models that has been emerging in the literature on pragmatics are probabilistic **Bayesian models** (e.g., Frank & Goodman, 2012; Goodman & Stuhlmüller, 2013; Kehler & Rohde, 2013). In these models, listeners develop an interpretation that is based on reasoning about the most likely context that would have caused the speaker to say what she said. These models have several important properties. First, their probabilistic nature captures the fact that interpretation inherently involves uncertainty: a listener infers what the speaker meant, but never has access to that meaning directly. Second, their probabilistic nature further allows taking noisy context into account, calculating specific predictions about language use, which can then be tested against human behavior in context. Finally, these models reflect a clear hypothesis about the relationship between comprehension and production, where the experience with past production patterns are the basis of the comprehender's inferences about current speaker meaning (cf. MacDonald, 2013). The first such model in the domain of perspective-taking is Heller et al., (2016) which models the comprehension of referring expressions under varying situations of knowledge mismatch between the conversational partners. This work demonstrates how a probabilistic approach can account for different results that were previously interpreted as support for qualitatively different mechanisms (specifically, Keysar et al., 2000, and Heller et al., 2008). One limitation of current Bayesian models is that they deal with highly-simplified situations that abstract away from many aspects of conversation. However, developing a framework to quantify perspective knowledge will allow us to make *qualitative and quantitative predictions* about perspective-taking in language use. Doing so might also provide forward momentum for the cataloging approach and offer a way of corralling these findings within a unified theoretical framework, allowing us to test competing computational frameworks. One important issue is whether humans are “rational” (Frank & Goodman, 2012) or whether rationality is in fact bounded when processing language (e.g., Ferreira & Patson, 2007). Furthermore, what

constitutes rational behavior in the domain of conversation deserves further inquiry. For example, Brown-Schmidt (2012) and Brown-Schmidt and Fraundorf (2015) found very little evidence for an influence of conversational grounding on the degree to which mentioned information was treated as common ground in language comprehension. Yet these grounding phenomena, such as nodding and saying “*uh-huh*” when listening to your partner, are evident in conversational interactions, suggesting that listeners may be failing to appreciate a useful source of information—a type of bounded rationality. In the domain of perspective-taking, then, resolving the issues of if, when, and *how* language users are rational, would likely benefit from a modeling approach.

Current computational approaches, however, do not directly speak to the *cognitive* mechanisms that underlie perspective-taking behavior. Thus, another goal for future work will be understanding the cognitive mechanisms that support the **representation of perspective in memory** and how these representations are brought to bear during language processing. Such an endeavour could address, for example, questions about whether one-bit representations of common ground (e.g., representing common ground as either my partner “does” or “does not know”; Galati & Brennan, 2010), or gradient representations (e.g., representing how likely it is that my partner knows something; Brown-Schmidt, 2012; Gorman, 2012; Mozuraitis et al., 2016) provide a better account of the data. Other representational questions include whether common ground representations are uni-dimensional, or are instead represented in a multidimensional matrix which is indexed according to the different sources of evidence about common ground (e.g., physical co-presence, linguistic mention, community membership). Understanding the neurobiological systems that support different types of perspective-taking processes (e.g., Rubin, Brown-Schmidt, Duff, Tranel, & Cohen, 2011; Duff & Brown-Schmidt, 2012; Brown-Schmidt & Duff, 2016; Rueschemeyer, Gardner & Stoner, 2015; Van Ackeren et al., 2012; 2016) may also offer insights into when and how perspective representations will guide language use. Considerations of memory mechanisms, such as contextual reinstatement (Godden & Baddeley, 1975; 1980; Smith, Glenberg, & Bjork, 1978; Mulligan, 2011) may provide guidance (for discussion see Brown-Schmidt & Fraundorf, 2015; Horton & Gerrig, 2005b). For example, a well-known finding in the memory literature, *the generation effect*, refers to the finding that generating information, such as producing a word based on a three-letter cue, produces better memory than simply studying that word silently (Jacoby, 1978; Slamecka & Graf, 1978; also see the *production effect*,

MacLeod, Gopie, Hourihan, Neary, & Ozubko, 2010). Studies of recognition memory for conversational referents show that speakers indeed exhibit better item memory than listeners (McKinley, Brown-Schmidt, & Benjamin, submitted; Yoon, Benjamin, & Brown-Schmidt, 2016; also see Isaacs, 1990; Knutsen & Le Bigot, 2014). These findings suggest that there may be memorial limitations on the degree to which speakers and listeners can become aligned in conversation. Further, it raises the question of whether and when speakers and listeners are aware of one another's memory or lack of memory for the past. Promising lines of inquiry will examine the interface of language and memory in the service of perspective-taking. These findings pose the question of whether an ideal perspective-taking process is based on joint experience (Clark & Marshall, 1978), or alternatively, is sensitive to the fact that speakers' and listeners' memory of the discourse history is unlikely to be symmetrical (e.g., Fischer, Schult, & Steffens, 2015).

Another important direction for future research is **expanding the range of phenomena** investigated. To illustrate, let us first consider a situation where there are two objects from the same basic level object category (e.g., two trees), and the listener knows both their names (e.g., a Sycamore tree and an Osage Orange tree), but is in a position to assume that the speaker only knows one of those names (e.g., the Sycamore). When the speaker says *the tree*, then despite the fact that there are two trees, the listener can infer that she is referring *not* to the Sycamore, but how will the listener arrive at this interpretation? If the listener accesses their memory representation of the entities, both entities are good candidate referents, as both fit the description "tree". To find the correct referent, the listener must not just access their memory representations of the entities and locate memory traces related to the speaker, but also perform a computation of how *this particular speaker* would have referred to each of the two potential referents, comparing this computation to what the speaker actually said. To do this, listeners don't just need to decide which referents would be most likely for the speaker in the situation (cf. Hanna & Tanenhaus, 2004), but instead must compute the different linguistic forms that the speaker would have used for each referent. This is a complex computation that seems to require explicit inference based on access to past episodes that established common ground, and that could not be explained by a priming or associative mechanism.

Like this example, much of the research on perspective-taking has focused on reference, specifically on definite referring expressions, perhaps because of the ease of studying these forms in the lab using the referential communication task. While referential phenomena have taught us a lot about perspective-taking, the fact that referring expressions normally encode shared information has led the field to give disproportionate attention to the role of shared information in perspective-taking, whereas the role of private information in conversation has been left outside of the range of typically-investigated phenomena. Future work will require expanding our investigations of perspective-taking beyond the narrow focus on reference, investigating in detail other linguistic forms, such as verbs (see Chambers & San Juan, 2008) or questions (more below), other aspects of communication, such as gesture (Hilliard & Cook, 2016) and depictions (Clark, 2016), and higher level decisions such as choosing a partner depending on the goal of the conversation (e.g., calling the dentist if your tooth aches, and the realtor if you want to sell the house), and choosing a language depending on the conversational situation (e.g., speaking Hebrew to your son at home, but English when addressing him in front of his teacher).

Our next example concerns **information questions**, which are characterized by the speaker assuming that the addressee has, in their privileged ground, the answer to the question. Existing research shows that addressees rapidly interpret questions as asking about information in privileged ground (Brown-Schmidt, et al., 2008; Brown-Schmidt, 2009a; Brown-Schmidt & Fraundorf, 2015). Yet many questions about this process remain unanswered, such as how the speaker goes about choosing a relevant addressee for a certain question. Consider a visit to the dentist with your child: you're at the office, the dentist comes to greet you, and you want to know if your son has brushed his teeth that morning. Who do you ask? Your dentist is highly relevant to the topic of tooth-brushing, and in fact most of your conversations with her involve dental hygiene. If questions were designed simply based on past experiences and memory associations, one would be more likely to (erroneously) ask the dentist. But this kind of error virtually never happens, and you would most likely address the question to your son, suggesting that you have mapped out the privileged ground of both potential addressees. This context can be developed even further: Imagine that you've already been talking to the dentist about your son's terrible tooth-brushing habits (rendering the topic in common ground with her), and further, that she has completed your

son's dental exam and can therefore infer based on the state of his teeth that he was unlikely to have brushed in the last 24 hours. Even in this case, where the dentist is not only knowledgeable about tooth-brushing, but there is also an immediate conversational record with her about the topic, when it comes time to find out the answer to your question, you ask your son and not the dentist. Why? Because she has no direct evidence as to whether he brushed his teeth this specific morning. This indicates that you are able to map out their respective privileged grounds and calculate that your son possesses the best evidence for the answer. New frontiers in the research on the use and interpretation of questions would allow us to better understand how privileged information is represented, organized, and accessed in the service of communication. Especially needed are efforts to expand the domain of inquiry to a range of communicative devices that make different demands on privileged information, such as declarative questions, *You didn't brush your teeth?* (Gunlogson, 2003) and contrastive accenting, *It LOOKS like you brushed your teeth*, (Kurumada, Brown, Bibyk, Pontillo, & Tanenhaus, 2014).

Another domain that deserves further attention is the **type of knowledge mismatch** between interlocutors. It is noteworthy that the majority of the studies examining perspective-taking in conversation have involved Level 1 knowledge mismatch, namely, situations where one partner knows a certain piece of information that the other does not (e.g., Keysar et al., 2000; 2003; Nadig & Sedivy, 2002; Hanna, et al., 2003: Exp.1; Barr, 2008; Brown-Schmidt, et al., 2008; Heller, et al., 2008). Yet, this is the type of knowledge that is assumed in the developmental literature to be mastered early in development (Wimmer & Perner, 1983; Baron-Cohen, Leslie, & Frith, 1985). Only a handful of studies have investigated Level 2 knowledge mismatch, with mixed results: some have shown adaptive behavior (Hanna et al., 2003: Exp.2), while others have found that this type of mismatch is much harder to handle (Mozuraitis, et al., 2015; Mozuraitis et al., 2016 finds an intermediate pattern). This disparity raises questions about the relationship between theory of mind and perspective-taking behaviour in conversation. While some researchers seem to equate perspective-taking processes with theory-of-mind (Keysar, et al., 2003; Apperly, et al., 2010), arguments that perspective-taking emerges from ordinary memory processes (Horton & Gerrig, 2005a) or on the basis of simple one-bit cues (Galati & Brennan, 2010) would seem to be at odds with this link. Thus, examining different types of knowledge mismatch would contribute to the

development of theories of the relationship between common ground in language processing and representations of theory of mind.

Conclusion

Everyday language use is guided by our knowledge of what others do and do not know. This knowledge guides who we communicate with, and how. Theoretical and empirical investigations focus on the cognitive processes that support the interfacing of language production and comprehension with representations of privileged and common ground. Our understanding of these processes has been influenced by theoretical traditions in other areas of psychology including cognitive development, social psychology, and decision making. Early debates about whether or not perspective representations are accessed on-line have given way to a flood of empirical findings cataloguing the factors that influence how perspective is used in language processing. Moving forward, the field will attempt to understand whether language users are integrating information from a noisy signal, or making use of heuristics and other non-dedicated cognitive operations to simplify an otherwise complex cognitive operation. Achieving forward progress will likely necessitate development of implemented computational models of perspective-taking in language use, considerations of the cognitive mechanisms that encode perspective representations, and expanding the domain of inquiry beyond referential processes. Present approaches provide a viable explanation for how visually-grounded references like *the empty martini glass* are produced and interpreted by conversational partners with distinct perspectives. The next horizon will be explaining how exquisitely-canonical exchanges like this, unfold with such ease:

Daphna to Sarah: *Another martini?*

Sarah to Daphna: [winks, puts down her mocktail], whispers: *“I’m pregnant!”*

Exchanges like this involve making guesses about what the partner does and does not know, and what they think you do and do not know. While these everyday examples seem trivial, we know very little about how they unfold in the mind. We look forward to several more decades of progress in answering this intriguing question.

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References

- Altmann, G., & Steedman, M. (1988). Interaction with context during human sentence processing. *Cognition*, 30(3), 191-238. doi:10.1016/0010-0277(88)90020-0
- Apperly, I. A., Carroll, D. J., Samson, D., Humphreys, G. W., Qureshi, A., & Moffitt, G. (2010). Why are there limits on theory of mind use? evidence from adults' ability to follow instructions from an ignorant speaker. *The Quarterly Journal of Experimental Psychology*, 63(6), 1201-1217. doi:10.1080/17470210903281582
- Arnold, J. E., Kam, C. L. H., Tanenhaus, M. K. (2007). If you say thee uh you are describing something hard: The on-line attribution of disfluency during reference comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 33(5), 914-930. doi:10.1037/0278-7393.33.5.914
- Asher, N. & Lascarides, A. (2003). *Logics of Conversation*. Cambridge University Press.
- Baillargeon, R., Scott, R. M., & He, Z. (2010). False-belief understanding in infants. *Trends in cognitive sciences*, 14(3), 110-118.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind" ? *Cognition*, 21(1), 37-46. doi:10.1016/0010-0277(85)90022-8
- Bard, E. G., Anderson, A. H., Sotillo, C., Aylett, M., Doherty-Sneddon, G., & Newlands, A. (2000). Controlling the intelligibility of referring expressions in dialogue. *Journal of Memory and Language*, 42, 1-22.
- Barr, D. J. (2008). Pragmatic expectations and linguistic evidence: Listeners anticipate but do not integrate common ground. *Cognition*, 109(1), 18-40. doi:10.1016/j.cognition.2008.07.005
- Barr, D. J., & Keysar, B. (2002). Anchoring comprehension in linguistic precedents. *Journal of Memory and Language*, 46(2), 391-418. doi:10.1006/jmla.2001.2815
- Bortfeld, H., & Brennan, S. E. (1997). Use and acquisition of idiomatic expressions in referring by native and non-native speakers. *Discourse Processes*, 23(2), 119-147. doi:10.1080/01638537709544986
- Brennan, S. E., Clark, H. H. (1996). Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 22(6), 1482-1493. doi:10.1037/0278-7393.22.6.1482

- Bromme, R., Jucks, R., & Wagner, T. (2005). How to refer to 'diabetes'? language in online health advice. *Applied Cognitive Psychology, 19*(5), 569-586. doi:10.1002/acp.1099
- Brown-Schmidt, S. (2009a). The role of executive function in perspective taking during online language comprehension. *Psychonomic Bulletin & Review, 16*(5), 893-900. doi:10.3758/PBR.16.5.893
- Brown-Schmidt, S. (2009b). Partner-specific interpretation of maintained referential precedents during interactive dialog. *Journal of Memory and Language, 61*(2), 171-190. doi:10.1016/j.jml.2009.04.003
- Brown-Schmidt, S. (2012). Beyond common and privileged: Gradient representations of common ground in real-time language use. *Language and Cognitive Processes, 27*(1), 62-89. doi:10.1080/01690965.2010.543363
- Brown-Schmidt, S. & Duff, M. C. (2016). Memory and Common Ground Processes in Language Use. *TopiCS in Cognitive Science, 8*, 722-736. DOI: 10.1111/tops.12224
- Brown-Schmidt, S. & Fraundorf, S. H., (2015). Interpretation of informational questions modulated by joint knowledge and intonational contours. *Journal of Memory and Language, 84*, 49-74. doi/10.1016/j.jml.2015.05.002
- Brown-Schmidt, S., Gunlogson, C., & Tanenhaus, M. K. (2008). Addressees distinguish shared from private information when interpreting questions during interactive conversation. *Cognition, 107*(3), 1122-1134. doi:10.1016/j.cognition.2007.11.005
- Brown-Schmidt, S., & Hanna, J. E. (2011). Talking in another person's shoes: Incremental perspective-taking in language processing. *Dialogue & Discourse, 2*(1), 11-33. doi: 10.5087/dad.2011.102
- Carlson, S. M., Mandell, D. J., Williams, L. (2004). Executive function and theory of mind: Stability and prediction from ages 2 to 3. *Developmental Psychology, 40*(6), 1105-1122. doi:10.1037/0012-1649.40.6.1105
- Caruso, E. M., Epley, N., Bazerman, M. H. (2006). The costs and benefits of undoing egocentric responsibility assessments in groups. *Journal of Personality and Social Psychology, 91*(5), 857-871. doi:10.1037/0022-3514.91.5.857
- Chambers, C. G., & San Juan, V. (2008). Perception and presupposition in real-time language comprehension: Insights from anticipatory processing. *Cognition, 108*(1), 26-50.
- Chambers, C. G., Tanenhaus, M. K., & Magnuson, J. S. (2004). Actions and affordances in syntactic ambiguity resolution. *Journal of Experimental Psychology: Learning, Memory and Cognition, 30*, 687-696.
- Clark, H. H. (1996). *Using language*. Cambridge: Cambridge University Press.
- Clark, H. H. (2016). Depicting as a method of communication. *Psychological Review, 123*(3), 324-347.
- Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. *Perspectives on socially shared cognition, 13*(1991), 127-149.
- Clark, H. H., & Krych, M. A. (2004). Speaking while monitoring addressees for understanding. *Journal of Memory and Language, 50*(1), 62-81. doi:10.1016/j.jml.2003.08.004

- Clark, H.H., Marshall, C.R., (1978). Reference diaries. In: Waltz, D.L. (Ed.), *TINLAP-2: Theoretical Issues in Natural Language Processing-2*. Association for Computing Machinery, New York, pp. 57--63.
- Clark, H.H., Marshall, C.M., (1981). Definite reference and mutual knowledge. In: Joshi, A.K., Webber, B.L., Sag, I.A. (Eds.), *Elements of Discourse Understanding*. Cambridge University Press, Cambridge, pp. 10-63.
- Clark, H. H., & Murphy, G. L. (1982). Audience design in meaning and reference. *Advances in psychology*, 9, 287-299.
- Clark, H. H., & Schaefer, E. F. (1987). Concealing one's meaning from overhearers. *Journal of Memory and Language*, 26(2), 209-225. doi:10.1016/0749-596X(87)90124-0
- Clark, H. H., & Schaefer, E. F. (1989). Contributing to discourse. *Cognitive Science*, 13(2), 259-294. doi:10.1207/s15516709cog1302_7
- Clark, H. H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. *Cognition*, 22(1), 1-39. doi:10.1016/0010-0277(86)90010-7
- Dahan, D., & Tanenhaus, M. K. (2004). Continuous mapping from sound to meaning in spoken-language comprehension: Immediate effects of verb-based thematic constraints. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 30(2), 498-513. doi:10.1037/0278-7393.30.2.498
- Duff, M. C., & Brown-Schmidt, S. (2012). The hippocampus and the flexible use and processing of language. *Frontiers in Human Neuroscience*, 6, 69. doi:10.3389/fnhum.2012.00069
- Eberhard, K., Spivey-Knowlton, M., Sedivy, J., & Tanenhaus, M. (1995). Eye movements as a window into real-time spoken language comprehension in natural contexts. *Journal of Psycholinguistic Research*, 24(6), 409-436. doi:10.1007/BF02143160
- Epley, N., & Gilovich, T. (2006). The anchoring-and-adjustment heuristic. *Psychological Science*, 17(4), 311-318. doi:10.1111/j.1467-9280.2006.01704.x
- Epley, N., Keysar, B., Van Boven, L., Gilovich, T. (2004). Perspective taking as egocentric anchoring and adjustment. *Journal of Personality and Social Psychology*, 87(3), 327-339. doi:10.1037/0022-3514.87.3.327
- Epley, N., Morewedge, C. K., & Keysar, B. (2004). Perspective taking in children and adults: Equivalent egocentrism but differential correction. *Journal of Experimental Social Psychology*, 40(6), 760-768. doi:10.1016/j.jesp.2004.02.002
- Federmeier, K. D., & Kutas, M. (1999). A rose by any other name: Long-term memory structure and sentence processing. *Journal of Memory and Language*, 41(4), 469-495. doi:10.1006/jmla.1999.2660
- Ferguson, H. J., & Breheny, R. (2011). Eye movements reveal the time-course of anticipating behaviour based on complex, conflicting desires. *Cognition*, 119(2), 179-196. doi:10.1016/j.cognition.2011.01.005
- Ferguson, H. J., Scheepers, C., & Sanford, A. J. (2010). Expectations in counterfactual and theory of mind reasoning. *Language and Cognitive Processes*, 25(3), 297-346. doi:10.1080/01690960903041174
- Ferreira, F., & Clifton Jr, C. (1986). The independence of syntactic processing. *Journal of Memory and Language*, 25(3), 348-368. doi:10.1016/0749-596X(86)90006-9

- Ferreira, F., & Patson, N. D. (2007). The 'Good enough' approach to language comprehension. *Language and Linguistics Compass*, 1(1-2), 71-83. doi:10.1111/j.1749-818X.2007.00007.x
- Von Stechow, K. (2004). Would you believe it? The king of France is back! Presuppositions and truth-value intuitions. In M. Reimer & A. Bezuidenhout (eds.), *Descriptions and beyond*, Oxford University Press, pp. 315–341.
- Fischer, N. M., Schult, J. C., & Steffens, M. C. (2015). Source and destination memory in face-to-face interaction: A multinomial modeling approach. *Journal of Experimental Psychology: Applied*, 21(2), 195-204. doi:http://dx.doi.org/10.1037/xap0000046
- Flavell, J. H., Everett, B. A., Croft, K., & Flavell, E. R. (1981). Young children's knowledge about visual perception: Further evidence for the level 1–Level 2 distinction. *Developmental Psychology*, 17(1), 99-103. doi:http://dx.doi.org/10.1037/0012-1649.17.1.99
- Fodor, J. A. (1983). *The modularity of mind: An essay on faculty psychology*. MIT press.
- Frank, M. C., & Goodman, N. D. (2012). Predicting pragmatic reasoning in language games. *Science*, 336, 998-998.
- Frazier, L. (1979). On comprehending sentences: Syntactic parsing strategies. Bloomington: Indiana University Linguistics Club.
- Fussell, S. R., & Krauss, R. M. (1991). Accuracy and bias in estimates of others' knowledge. *European Journal of Social Psychology*, 21(5), 445-454. doi:10.1002/ejsp.2420210507
- Galati, A., & Avraamides, M. (2013). Flexible spatial perspective-taking: conversational partners weigh multiple cues in collaborative tasks. *Frontiers in Human Neuroscience*, 7, 1-16. doi: 10.3389/fnhum.2013.00618
- Galati, A., & Brennan, S. E. (2010). Attenuating information in spoken communication: For the speaker, or for the addressee?. *Journal of Memory and Language*, 62(1), 35-51.
- Galati, A., & Brennan, S. E. (2013). Speakers adapt gestures to addressees' knowledge: Implications for models of co-speech gesture. *Language, Cognition and Neuroscience*, 29(4), 435-451. doi:10.1080/01690965.2013.796397
- Garnsey, S. M., Pearlmutter, N. J., Myers, E., & Lotocky, M. A. (1997). The contributions of verb bias and plausibility to the comprehension of temporarily ambiguous sentences. *Journal of Memory and Language*, 37(1), 58-93. doi:10.1006/jmla.1997.2512
- Garrod, S.C., & Sanford, A.J. (1988). Discourse models as interfaces between language and the spatial world. *Journal of Semantics*, 6(1), 147-160. doi:10.1093/jos/6.1.147
- Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of psychology*, 66(3), 325-331.
- Godden, D., & Baddeley, A. (1980). When does context influence recognition memory?. *British journal of Psychology*, 71(1), 99-104.
- Goodman, N. D., & Stuhlmüller, A. (2013). Knowledge and implicature: Modeling language understanding as social cognition. *Topics in Cognitive Science*, 5(1), 173-184. doi:10.1111/tops.12007

- Gorman, K. S. (2012). Investigating interlocutors' use of common ground during the comprehension and production of referring expressions. Unpublished doctoral dissertation, University of Rochester.
- Gorman, K. S., Gegg-Harrison, W., Marsh, C. R., & Tanenhaus, M. K. (2013). What's learned together stays together: Speakers' choice of referring expression reflects shared experience. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 39(3), 843-853. doi: 10.1037/a0029467
- Grice, H.P., 1967. Logic and Conversation. William James Lectures. Reprinted in: Grice, H.P., 1989, pp. 1–143.
- Grodner, D., & Sedivy, J. C. (2005). The effect of speakerspecific information on pragmatic inferences. The processing and acquisition of reference.
- Gunlogson, C. (2003). *True to form: Rising and falling declaratives as questions in English*. New York, New York: Routledge.
- Hanna, J. E., & Tanenhaus, M. K. (2004). Pragmatic effects on reference resolution in a collaborative task: Evidence from eye movements. *Cognitive Science*, 28(1), 105-115. doi:10.1016/j.cogsci.2003.10.002
- Hanna, J. E., Tanenhaus, M. K., & Trueswell, J. C. (2003). The effects of common ground and perspective on domains of referential interpretation. *Journal of Memory and Language*, 49(1), 43-61. doi:10.1016/S0749-596X(03)00022-6
- Heim, I. (1983). On the projection problem for presuppositions. *Second West Coast Conference on Formal Linguistics (WCCFL 2)*, 114–125.
- Heim, I. (1992). Presupposition Projection and the Semantics of Attitude Verbs. *Journal of Semantics* 9, 183-221.
- Heller, D., & Chambers, C. G. (2014). Would a *blue kite* by any other name be just as blue? Effects of descriptive choices on subsequent referential behavior. *Journal of Memory and Language*, 70, 53-67.
- Heller, D., Gorman, K. S., Tanenhaus, M. (2012). To name or to describe: Shared knowledge affects referential form. *Topics in Cognitive Science*, 4(2), 290-305. doi: 10.1111/j.1756-8765.2012.01182.x
- Heller, D., Grodner, D., & Tanenhaus, M. K. (2008). The role of perspective in identifying domains of reference. *Cognition*, 108(3), 831-836. doi:10.1016/j.cognition.2008.04.008
- Heller, D., Parisien, C., & Stevenson, S. (2016). Perspective-taking behavior as the probabilistic weighing of multiple domains. *Cognition*, 149, 104. doi:10.1016/j.cognition.2015.12.008
- Hilliard, C., & Cook, S. W. (2016). Bridging gaps in common ground: Speakers design their gestures for their listeners. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 42(1), 91-103.
- Horton, W. S., & Gerrig, R. J. (2005a). Conversational common ground and memory processes in language production. *Discourse Processes*, 40(1), 1-35. doi:10.1207/s15326950dp4001_1
- Horton, W. S., & Gerrig, R. J. (2005b). The impact of memory demands on audience design during language production. *Cognition*, 96(2), 127-142. doi:10.1016/j.cognition.2004.07.001
- Horton, W. S., & Gerrig, R. J. (2016). Revisiting the memory-based processing approach to common ground. *Topics in Cognitive Science*, 8, 780-795. 10.1111/tops.12216

- Horton, W. S., & Keysar, B. (1996). When do speakers take into account common ground? *Cognition*, *59*(1), 91-117. doi:10.1016/0010-0277(96)81418-1
- Isaacs, E. A. (1990). *Mutual memory for conversation* (Doctoral dissertation, Stanford University).
- Isaacs, E. A., & Clark, H. H. (1987). References in conversation between experts and novices. *Journal of experimental psychology: general*, *116*(1), 26.
- Jacoby, L. L. (1978). On interpreting the effects of repetition: Solving a problem versus remembering a solution. *Journal of verbal learning and verbal behavior*, *17*(6), 649-667.
- Just, M. A., Carpenter, P. A. (1992). A capacity theory of comprehension: Individual differences in working memory. *Psychological Review*, *99*(1), 122-149. doi:10.1037/0033-295X.99.1.122
- Kaplan, D. (1989). Demonstratives. (In J. Almog, J. Perry, & H. Wettstein (Eds.), *Themes from Kaplan*, Oxford: Oxford University Press, pp. 481–563.
- Kehler, A. & Rohde, H. (2013). Aspects of a theory of pronoun interpretation. *Theoretical Linguistics*, *39*(3-4), pp. 295-309. Retrieved 10 Aug. 2016, from doi:10.1515/tl-2013-0019
- Keysar, B., Barr, D. J., Balin, J. A., & Paek, T. S. (1998). Definite reference and mutual knowledge: Process models of common ground in comprehension. *Journal of Memory and Language*, *39*(1), 1-20. doi:10.1006/jmla.1998.2563
- Keysar, B., Barr, D. J., Balin, J. A., & Brauner, J. S. (2000). Taking perspective in conversation: The role of mutual knowledge in comprehension. *Psychological Science*, *11*(1), 32-38. doi:10.1111/1467-9280.00211
- Keysar, B., Lin, S., & Barr, D. J. (2003). Limits on theory of mind use in adults. *Cognition*, *89*(1), 25-41. doi:10.1016/S0010-0277(03)00064-7
- Knutsen, D., & Le Bigot, L. (2012). Managing dialogue: How information availability affects collaborative reference production. *Journal of Memory and Language*, *67*(3), 326-341. doi:10.1016/j.jml.2012.06.001
- Knutsen, D., & Le Bigot, L. (2014). Capturing egocentric biases in reference reuse during collaborative dialogue. *Psychonomic Bulletin & Review*, *21*(6), 1590-1599. doi:10.3758/s13423-014-0620-7
- Krauss, R. M., & Glucksberg, S. (1977). Social and nonsocial speech. *Scientific American*. 236: 100-105.
- Krauss, R. M., & Weinheimer, S. (1964). Changes in reference phrases as a function of frequency of usage in social interaction: A preliminary study. *Psychonomic Science*, *1*, 113-114.
- Kronmuller, E., & Barr, D. J. (2007). Perspective-free pragmatics: Broken precedents and the recovery-from-preemption hypothesis. *Journal of Memory and Language*, *56*(3), 436-455. doi:10.1016/j.jml.2006.05.002
- Kurumada, C., Brown, M., Bibyk, S., Pontillo, D. F., & Tanenhaus, M. K. (2014). Is it or isn't it: Listeners make rapid use of prosody to infer speaker meanings. *Cognition*, *133*(2), 335-342. doi:10.1016/j.cognition.2014.05.017
- Lin, S., Keysar, B., & Epley, N. (2010). Reflexively mindblind: Using theory of mind to interpret behavior requires effortful attention. *Journal of Experimental Social Psychology*, *46*(3), 551-556. doi:10.1016/j.jesp.2009.12.019

- Levinson, S. C. (2000). *Presumptive meanings: The theory of generalized conversational implicature*. Cambridge: MIT press.
- Lewis, D. (1969). *Convention: A Philosophical Study*. Cambridge, MA: Harvard University Press.
- MacDonald, M. C. (2013). How language production shapes language form and comprehension. *Frontiers in psychology, 4*, 226.
- MacDonald, M. C., Christiansen, M. H. (2002). Reassessing working memory: Comment on just and carpenter (1992) and Waters and Caplan (1996). *Psychological Review, 109*(1), 35-54. doi:10.1037/0033-295X.109.1.35
- MacDonald, M. C., Pearlmutter, N. J., Seidenberg, M. S. (1994). Lexical nature of syntactic ambiguity resolution. *Psychological Review, 101*(4), 676-703. doi:10.1037/0033-295X.101.4.676
- MacLeod, C. M., Gopie, N., Hourihan, K. L., Neary, K. R., Ozubko, J. D., (2010). The production effect: Delineation of a phenomenon. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 36*(3), 671-685. doi:10.1037/a0018785
- Matthews, D., Lieven, E., Tomasello, M. (2010). What's in a manner of speaking? children's sensitivity to partner-specific referential precedents. *Developmental Psychology, 46*(4), 749-760. doi:10.1037/a0019657
- McKinley, G. L., Brown-Schmidt, S., & Benjamin, A. S. (in progress). Common ground in conversation: Evidence from item and context memory. Manuscript submitted for publication.
- Metzing, C., & Brennan, S. E. (2003). When conceptual pacts are broken: Partner-specific effects on the comprehension of referring expressions. *Journal of Memory and Language, 49*(2), 201-213. doi:10.1016/S0749-596X(03)00028-7
- Mishra, R. K., Singh, N., Pandey, A., & Huettig, F. (2012). Spoken language-mediated anticipatory eye movements are modulated by reading ability: Evidence from Indian low and high literates. *Journal of Eye Movement Research, 5*(1): 3, pp. 1-10. doi:10.16910/jemr.5.1.3.
- Mozuraitis, M., Chambers, C. G., & Daneman, M. (2015). Privileged versus shared knowledge about object identity in real-time referential processing. *Cognition, 142*, 148-165. doi:10.1016/j.cognition.2015.05.001
- Mozuraitis, M., Stevenson, S., and Heller, D. (2016) Combining Multiple Perspectives in Language Production: A Probabilistic Model. *Proceedings of the 38th Annual Conference of the Cognitive Science Society (CogSci 2016)*, Philadelphia, PA, August 2016.
- Mulligan, N. W. (2011). Generation disrupts memory for intrinsic context but not extrinsic context. *The Quarterly Journal of Experimental Psychology, 64*(8), 1543-1562. doi:10.1080/17470218.2011.562980
- Nadig, A. S., & Sedivy, J. C. (2002). Evidence of perspective-taking constraints in children's on-line reference resolution. *Psychological Science, 13*(4), 329-336. doi:10.1111/j.0956-7976.2002.00460.x
- Nilsen, E. S., & Graham, S. A. (2009). The relations between children's communicative perspective-taking and executive functioning. *Cognitive Psychology, 58*(2), 220-249. doi:10.1016/j.cogpsych.2008.07.002

- Nilsen, E. S., Graham, S. A., Smith, S., & Chambers, C. G. (2008). Preschoolers' sensitivity to referential ambiguity: Evidence for a dissociation between implicit understanding and explicit behavior. *Developmental Science, 11*(4), 556-562. doi:10.1111/j.1467-7687.2008.00701.x
- Nilsen, E. S., Varghese, A., Xu, Z., & Fecica, A. (2015). Children with stronger executive functioning and fewer ADHD traits produce more effective referential statements. *Cognitive Development, 36*, 68-82.
- Novick, J., Trueswell, J., & Thompson-Schill, S. (2005). Cognitive control and parsing: Reexamining the role of Broca's area in sentence comprehension. *Cognitive, Affective, & Behavioral Neuroscience, 5*(3), 263-281. doi:10.3758/CABN.5.3.263
- Onishi, K. H., & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science, 308*(5719), 255-258
- Perner, J., & Ruffman, T. (2005). Infants' insight into the mind: How deep?. *Science, 308*(5719), 214-216.
- Pickering, M. J., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences, 27*(2), 169-190. doi:10.1017/S0140525X04000056
- Pickering, M. J., & Garrod, S. (2013). An integrated theory of language production and comprehension. *Behavioral and Brain Sciences, 36*(4), 329-347. doi:10.1017/S0140525X12001495
- Potts, C. (2005). *The Logic of Conventional Implicatures*. Oxford University Press.
- Roberts, C. (2012). Information Structure: Towards an integrated formal theory of pragmatics. *Semantics and Pragmatics, 5*, 1-69.
- Ross, L., Greene, D., & House, P. (1977). The "false consensus effect": An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology, 13*(3), 279-301. doi:10.1016/0022-1031(77)90049-X
- Ross, M., & Sicoly, F. (1979). Egocentric biases in availability and attribution. *Journal of Personality and Social Psychology, 37*(3), 322-336. doi:http://dx.doi.org/10.1037/0022-3514.37.3.322
- Rubin, R., Brown-Schmidt, S., Duff, M., Tranel, D., & Cohen, N. (2011). How do I remember that I know you know that I know? *Psychological Science, 22*(12), 1574-1582. doi:10.1177/0956797611418245
- Rueschemeyer, S.-A., Gardner, T., & Stoner, C. (2015). The Social-N400 effect: how the presence of other affects language comprehension. *Psychonomic Bulletin and Review, 22*, 128-134.
- Ryskin, R. A., Benjamin, A. S., Tullis, J., & Brown-Schmidt, S. (2015). Perspective-taking in comprehension, production, and memory: An individual differences approach. *Journal of Experimental Psychology: General, 144*(5), 898-915. doi:http://dx.doi.org/10.1037/xge0000093
- Ryskin, R. A., Wang, R. F., & Brown-Schmidt, S. (2016). Listeners use speaker identity to access representations of spatial perspective during online language comprehension. *Cognition, 147*, 75-84. doi:10.1016/j.cognition.2015.11.011
- Savitsky, K., Keysar, B., Epley, N., Carter, T., & Swanson, A. (2011). The closeness-communication bias: Increased egocentrism among friends versus strangers. *Journal of Experimental Social Psychology, 47*(1), 269-273. doi:10.1016/j.jesp.2010.09.005
- Schegloff, E. A. (1968). Sequencing in conversational openings. *American anthropologist, 70*(6), 1075-1095.

- Schober, M. F., & Clark, H. H. (1989). Understanding by addressees and overhearers. *Cognitive Psychology*, *21*(2), 211-232. doi:10.1016/0010-0285(89)90008-X
- Scott, R. M., He, Z., Baillargeon, R., & Cummins, D. (2012). False-belief understanding in 2.5-year-olds: Evidence from two novel verbal spontaneous-response tasks. *Developmental Science*, *15*(2), 181-193. doi:10.1111/j.1467-7687.2011.01103.x
- Sedivy, J. C., K. Tanenhaus, M., Chambers, C. G., & Carlson, G. N. (1999). Achieving incremental semantic interpretation through contextual representation. *Cognition*, *71*(2), 109-147. doi:10.1016/S0010-0277(99)00025-6
- Slamecka, N. J., & Graf, P. (1978). The generation effect: Delineation of a phenomenon. *Journal of experimental Psychology: Human learning and Memory*, *4*(6), 592.
- Smith, S. M., Glenberg, A., & Bjork, R. A. (1978). Environmental context and human memory. *Memory & Cognition*, *6*(4), 342-353.
- Sperber, D. & Wilson, D. (1995). *Relevance: Communication and Cognition*, Second Edition, Oxford/Cambridge: Blackwell Publishers, pp. 2–9.
- Spivey, M. J., Tanenhaus, M. K., Eberhard, K. M., & Sedivy, J. C. (2002). Eye movements and spoken language comprehension: Effects of visual context on syntactic ambiguity resolution. *Cognitive Psychology*, *45*(4), 447-481. doi:10.1016/S0010-0285(02)00503-0
- Stafford, L., & Daly, J.A. (1984). Conversational memory. *Human Communication Research*, *10*(3), 379-402. doi:10.1111/j.1468-2958.1984.tb00024.x
- Stalnaker, R. C. (1970). Pragmatics. *Synthese: An International Journal for Epistemology, Methodology and Philosophy of Science*, *22*, 272.
- Stalnaker, R. (1973). Presuppositions. *Journal of Philosophical Logic*, *2*, 447.
- Stalnaker, R. C. (1974). Pragmatic presuppositions. in M. Munitz and P. Under (eds.), *Semantics and Philosophy*, New York University Press, New York, pp. 197–213. Reprinted in Davis (1991) and in Stalnaker (1999). Page references to the latter.
- Surian, L., Caldi, S., & Sperber, D. (2007). Attribution of beliefs by 13-month-old infants. *Psychological Science*, *18*(7), 580-586. doi:10.1111/j.1467-9280.2007.01943.x
- Swinney, D. A. (1979). Lexical access during sentence comprehension: (Re)consideration of context effects. *Journal of Verbal Learning and Verbal Behavior*, *18*, 645.
- Tanenhaus, M. K., Spivey-Knowlton, M. J., Eberhard, K. M., & Sedivy, J. E. (1995). Integration of visual and linguistic information in spoken language comprehension. *Science*, *268*, 632–634.
- Trueswell, J. C. & Tanenhaus, M. K. (1994). Toward a lexicalist framework for constraint-based syntactic ambiguity resolution. In Clifton, C., Frazier, L. and Rayner, K. (Eds.) *Perspectives in Sentence Processing*. Lawrence Erlbaum Assoc.: Hillsdale, NJ, pp. 155-179.
- Trueswell, J. C., Tanenhaus, M. K., Kello, C. (1993). Verb-specific constraints in sentence processing: Separating effects of lexical preference from garden-paths. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *19*(3), 528-553. doi:10.1037/0278-7393.19.3.528

- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124-1131.
- Tversky, A., & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice. *Science*, *211*(4481), 453-458.
- Van Ackeren, M., Casasanto, D., Hagoort, P., Bekkering, H., & Rueschemeyer, S.-A. (2012). Pragmatics in Action: Indirect Requests Engage Theory of Mind Areas and the Cortical Motor Network. *Journal of Cognitive Neuroscience*, *24*(11), 2237-2247.
- Van Ackeren, Smaragdi A, Rueschemeyer S-A (2016) Neuroanl interactions between mentalizing and action systems during indirect request processing. *Social Cognitive and Affective Neuroscience* *11* (9): 1402-1410.
- Van Berkum, J. J., Van den Brink, D., Tesink, C. M., Kos, M., & Hagoort, P. (2008). The neural integration of speaker and message. *Journal of cognitive neuroscience*, *20*(4), 580-591. doi: 10.1162/jocn.2008.20054
- Vanlangendonck, F., Willems, R. M., Menenti, L. & Hagoort P. (2016). An early influence of common ground during speech planning. *Language, Cognition and Neuroscience*, *31*(6), 741-750.
- Wardlow, L. (2013). Individual differences in speakers' perspective taking: The roles of executive control and working memory. *Psychonomic Bulletin & Review*, *20*(4), 766-772. doi:10.3758/s13423-013-0396-1
- Wardlow Lane, L., Ferreira, V. S. (2008). Speaker-external versus speaker-internal forces on utterance form: Do cognitive demands override threats to referential success? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *34*(6), 1466-1481. doi:10.1037/a0013353
- Wardlow Lane, L., Groisman, M., & Ferreira, V. (2006). Don't talk about pink elephants! *Psychological Science*, *17*(4), 273-277. doi:10.1111/j.1467-9280.2006.01697.x
- Wardlow Lane, L., & Liersch, M. J. (2012). Can you keep a secret? increasing speakers' motivation to keep information confidential yields poorer outcomes. *Language and Cognitive Processes*, *27*(3), 462-473. doi:10.1080/01690965.2011.556348
- Wells, J. B., Christiansen, M. H., Race, D. S., Acheson, D. J., & MacDonald, M. C. (2009). Experience and sentence processing: Statistical learning and relative clause comprehension. *Cognitive Psychology*, *58*(2), 250-271. doi:10.1016/j.cogpsych.2008.08.002
- Wilkes-Gibbs, D., & Clark, H. H. (1992). Coordinating beliefs in conversation. *Journal of Memory and Language*, *31*(2), 183-194. doi:10.1016/0749-596X(92)90010-U
- Wilson, M. P., & Garnsey, S. M. (2009). Making simple sentences hard: Verb bias effects in simple direct object sentences. *Journal of Memory and Language*, *60*(3), 368-392. doi:10.1016/j.jml.2008.09.005
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, *13*(1), 103-128. doi:10.1016/0010-0277(83)90004-5
- Wu, S., & Keysar, B. (2007). The effect of information overlap on communication effectiveness. *Cognitive Science*, *31*(1), 169-181.
- Yoon, S. O., Benjamin, A. S., & Brown-Schmidt, S. (2016). The historical context in conversation: Lexical differentiation and memory for the discourse history. *Cognition*, *154*, 102-117.

Yoon, S., Koh, S., & Brown-Schmidt, S. (2012). Influence of perspective and goals on reference production in conversation. *Psychonomic Bulletin & Review*, 19(4), 699-707. doi:10.3758/s13423-012-0262-6