Shifting ground: A *definite* deficit in adult article production

Lara Klainerman Hochstein (Larak@ling.ucsd.edu)
Department of Linguistics, 9500 Gilman Drive
San Diego, CA 92093-0108 USA

David Barner (Barner@ucsd.edu)
Department of Psychology, 9500 Gilman Drive
San Diego, CA 92093-0109 USA

Abstract

Interlocutors are typically thought to keep track of information that is shared between speaker and listener (i.e., common ground) and information that is available only to the speaker (i.e., privileged ground). In this study, we investigated whether speakers take their interlocutor's knowledge into account when choosing between definite articles (e.g., *the)* and indefinite articles (e.g., *a)* in the context of object reference. In Experiment 1, we found that a surprisingly high number of subjects inappropriately use the definite article to refer to objects in privileged ground, suggesting that considering interlocutors' mental states during language production is effortful and does not always come naturally. In Experiments 2-6, we explored various factors that influence whether or not speakers accommodate the knowledge states of interlocutors.

Keywords: common ground; perspective-taking; audience design; definiteness; indefiniteness

Introduction

Communication is often described as a cooperative act in which speakers and listeners work together to achieve mutual understanding. Speakers tailor the style and content of their utterances to the specific needs of their listeners – a process known as *audience design* – while listeners provide important feedback such as acknowledgement or requests for clarification (e.g., Clark & Brennan, 1991). Throughout this process, interlocutors are thought to keep track of information that is shared between speakers and listeners, known as *common ground,* and information that is available only to one party, known as *privileged ground* (e.g., Clark, 1996).

A number of recent studies, however, have found that in simple referential communication tasks, adults often fail to take their interlocutor's perspective into account and instead inappropriately mention privileged information (e.g., Horton & Keysar, 1996; Wardlow & Ferreira, 2003). In some of these studies, for instance, one subject (the speaker) can see two objects of the same type that differ only in size (e.g., a small triangle and a large triangle), while the other subject (the listener) can only see one of these two objects (e.g., the small triangle). Since only one triangle is visible to the listener, speakers should refer to the mutually visible object as simply "the triangle". However, subjects frequently refer to this object as "the small triangle", instead, suggesting that

they fail to appreciate the listener's lack of knowledge about the large triangle.

These findings have raised the possibility that perspective-taking in conversation may not be as automatic or effortless as previously assumed. Horton & Keysar (1996) proposed a two-step *monitoring and adjustment* model of audience design, in which speakers initially formulate their utterances without taking their interlocutor's perspective into account and only later monitor and revise their output if they have sufficient time and processing resources. Pickering and Garrod (2004) and Keysar (2007) have even suggested that adults do not routinely take their interlocutors' mental states into account when producing and comprehending speech: "People don't rely on the beliefs and knowledge of their addressees to design what they say...Of course, sometimes they might. However, such consideration of the mental state of the other is not done systematically" (Keysar, 2007; 72). Under this view, adults are by default egocentric, yet they often *appear* to be taking their interlocutor's mental states into account simply because speakers and interlocutors typically share the same knowledge and context.

The evidence regarding adults' conversational perspective-taking abilities remains inconclusive, however. The referential communication tasks which show perspective-taking failures in adults typically place subjects in somewhat unnatural communicative situations in which they are asked to uniquely identify a given object. Since the primary goal of the task is to be as informative as possible, and since subjects are made explicitly aware of this goal, they may resort to unnatural statements that would otherwise not occur in naturalistic speech. Furthermore, there is some evidence that adults do in fact show sensitivity to their interlocutor's mental states when planning utterances. For instance, Brennan and Clark (1996) found that speakers who establish specific terms (e.g., "the high heel") with a particular partner switch back to more basic-level terms (e.g., "the shoe") when paired with a new partner – indicating awareness on the part of the speakers that their new partner lacks knowledge about the more specific term. Similarly, Heller et al. (2009) show that speakers tend to provide only the name of an object when their interlocutor is familiar with this name, yet provide additional descriptions when their interlocutors are not familiar with the object's name, suggesting that they are

able to successfully track which names are part of common ground and which are privileged.

In this paper, we address this debate by examining adults' perspective-taking abilities in a more natural story-telling setting, in which the speakers are not explicitly directed to be informative or to take their audience's knowledge states into consideration. Also, we explored a more subtle grammatical indicator of audience design, which, as we report, subjects are often unaware of when producing language. Specifically, we investigated whether speakers take their interlocutor's knowledge into account when choosing between definite articles (e.g., *the)* and indefinite articles (e.g., *a)* in the context of object reference. Although there are many different definitions of definiteness and indefiniteness (e.g., see Abbott, 2004 for a full discussion of the roles of uniqueness, familiarity, and specificity in defining definiteness), by all accounts definite articles should typically be used to refer to objects in common ground while indefinite articles should be used to refer to objects in privileged ground. Therefore, when choosing between definite and indefinite articles, speakers must take their interlocutor's knowledge into account. For instance, the sentence, "I read the book this morning" is only appropriate if the book in question is in common ground – e.g., the speaker has reason to believe that the listener knows about this book, and it is salient in the discourse (e.g., a book that was just mentioned in the conversation, or a book assigned in a book club to which both people belong). If the speaker has no reason to believe that the listener has such knowledge, it would be more appropriate to use the indefinite article: "I read a book this morning". Thus, whereas previous studies have examined whether adults take interlocutor knowledge into account when making context-specific distinctions that were made very salient in the task (e.g., deciding whether to say "small triangle" or just "triangle"), our study focused on a less salient linguistic distinction, which nevertheless is both ubiquitous and conditioned on common ground information.

Interestingly, previous research on definite and indefinite article use has focused primarily on children, and has used article production as a test of childhood egocentrism. These studies have shown that children between 2-4 years of age inappropriately use the definite article to introduce a new discourse entity – a phenomenon that has been dubbed "the-overuse" (e.g., Karmiloff-Smith, 1979; Maratsos, 1976). For instance, in Karmiloff-Smith (1979), children were presented with a scene in which a doll knocked over one of three identical objects and then were asked, "What did the doll do?" The 3- and 4-year-olds in this study used the definite article 39-63% of the time to refer to the item that had been knocked over – e.g. "The doll knocked over the X" – even though it was one item of many and had not been formally introduced into the discourse yet. Similarly, Schaeffer and Matthewson (2005) presented 2- and 3-year-olds with a picture of an event (e.g., a picture of Mickey Mouse drawing a picture of a house) and asked them to describe what happened (e.g. "What did Mickey Mouse just

do?"). They found that children overused the definite article 25% of the time to introduce this new entity (e.g. "He drew the house"), whereas adults almost never did.

It has been proposed that this overuse of the definite article in children's production stems from egocentrism, or a lack of ability to consider the interlocutor's perspective (Maratsos, 1976; Schaeffer & Matthewson, 2005). However, the studies assessing children's competence with definite and indefinite articles do not directly manipulate audience design. Similarly, no studies have directly manipulated audience design to test adults' use of the definite and indefinite articles. Our study therefore explores whether children's apparent egocentrism with article use constitutes a developmental delay or whether it extends to adults as well.

To test whether adults take their interlocutors' knowledge into account when choosing between the definite and indefinite article to refer to an object, we asked subjects to describe a scene to either an interlocutor with shared knowledge about the scene or to an interlocutor with no shared knowledge (Exp. 1). We hypothesized that if subjects take their interlocutor's mental states into consideration when producing referential expressions, they should use the definite article to refer to objects in common ground and switch to the indefinite article when referring to objects in privileged ground. Contrary to our expectations, we found that approximately half of our subjects used the definite article to refer to an object in privileged ground when speaking to an unknowledgeable interlocutor, suggesting a failure on the part of many subjects to spontaneously consider this interlocutor's lack of knowledge. Five follow-up studies (Exp. 2-6) replicated and extended these findings to a variety of contexts, and identify factors which cause speakers to refresh their discourse models to accommodate the knowledge states of new interlocutors.

Experiment 1

In this experiment, we investigated whether adults are more likely to use the definite article to refer to an object if their interlocutor has shared knowledge about this object (i.e., the object is in common ground), and more likely to use the indefinite article if their interlocutor has no knowledge about this object (i.e., the object is in the speaker's privileged ground).

Participants

We recruited 45 adults (32 females) from the UCSD campus, ranging in age from 18 to 40, with a mean age of 20.7. All subjects were native speakers of English.

Materials & Procedure

There were 2 experimenters in this task: E1 and E2. Subjects were seated at a table directly across from E1, with an array of stuffed animals lined up in front of them. This array consisted of 4 sets of 3 identical animals: 3 identical bears, 3 identical cows, 3 identical lions and 3 identical

monkeys. At the beginning of the session, E1 introduced the stuffed animals on the table by saying, "Look at all these animals!" and then asked subjects to "pick one to go on an adventure". Once subjects had selected one of the stuffed animals from the array, E1 removed all the other animals from the table and presented subjects with 3 sets of 2 identical toy food items: 2 fish, 2 bananas, and 2 strawberries. E1 then asked subjects to, "Pick one of these."

After subjects had selected a food item, E1 removed all other items from the table such that only the chosen animal and the chosen food item were still visible to the subject. E1 then announced that the adventure was about to begin, and acted out the following simple story: the chosen animal is walking along when he spots the chosen food item and instantly devours it. After this story was acted out, all items were removed from the table. In the *Common ground* condition, E1 then asked subjects, "What happened on the adventure?" In the *No common ground* condition, E1 told subjects, "Ok now my friend is going to come in. She didn't get to see what happened on the adventure, so she's going to ask you to tell her." E1 then left the room as E2 entered. E2 asked subjects, "What happened on the adventure?"

Responses were coded for use of definite or indefinite articles in the first mention of the animal protagonist.
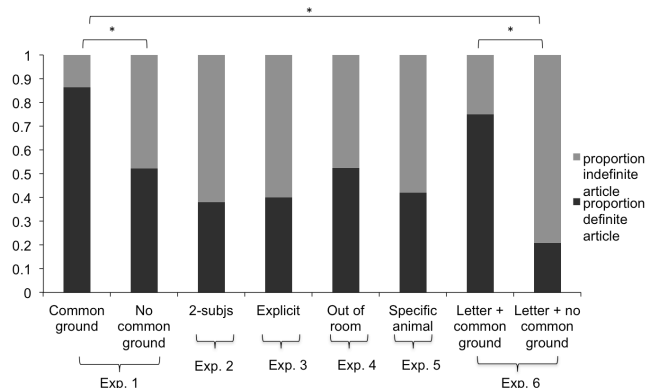
Results & Discussion

Figure 1. Proportion of definite and indefinite article use in Experiments 1-6

In the *Common Ground* condition, 19 of the 22 subjects (86.4%) used the definite article to refer to the animal protagonist. These subjects gave responses like, "The bear ate the fish", and "The monkey traveled and saw the banana and ate it". The 3 subjects who used the indefinite article in this condition gave descriptions like, "A lion found a banana and ate it". Subjects' performance in this condition therefore conformed to our expectation that speakers would use the definite article to refer to items belonging to common ground between speaker and listener.

In contrast, in the *No Common Ground* condition, where subjects were asked to describe the adventure to an unknowledgeable interlocutor, 12 of the 23 subjects (52.2%) used the definite article to refer to the animal protagonist. These subjects gave responses like, "The monkey came

walking in and ate the fish" and "The cow came and decided to eat the strawberry" despite the fact that their interlocutor had no idea what monkey or cow they were talking about. The 10 subjects who used the indefinite article to introduce an unfamiliar referent gave descriptions like, "A dog was walking, saw a fish, and ate the fish" and, "So there was a monkey and the monkey was walking along and he saw a banana just lying there..."

We used Fisher's Exact Test to determine whether the rate of definite article use was independent of condition, and found evidence that subjects in the *Common Ground* condition used the definite article at a different rate than subjects in the *No Common Ground* condition (Fisher's Exact, $p = .023$). This suggests that adults in this task were more likely to use the definite article to refer to an item that was part of common ground than one that was part of privileged ground. Yet despite this difference, adults did not perform as expected on the *No Common Ground*: half of them used the definite article to introduce an item that was novel and unfamiliar to the listener. This high rate of definite article use is especially surprising considering the fact that there were 3 identical lions, bears, etc. originally presented to the subject, and the indefinite article is typically used to pick out one item of many. This suggests that adults often fail to take their interlocutor's perspective into account when choosing between definite and indefinite articles.

It is possible that subjects who answered egocentrically simply assumed shared knowledge on the part of E2 because E2 worked in the lab and was therefore familiar with the experimental setup. However, the experiment was designed such that E2 could never possibly know which item a subject picked on any given session. Thus, even if subjects assumed knowledge on the part of E2 regarding the general task, they should still have recognized that E2 did not know which animal ate what and so they should have used indefinite articles to introduce these unfamiliar referents. Nevertheless, to rule out the possibility that subjects overestimated E2's lack of knowledge due to her involvement in the lab, and to address concerns regarding the use of confederates as conversational partners in language production tasks (see Kuhlen & Brennan, 2012), we conducted a second experiment in which we had naïve subjects perform the role of E2.

Experiment 2

In Experiment 2, we investigated whether the high rate of definite article use that we found in the *No Common Ground* condition of Experiment 1 would still hold if we used naïve subjects instead of confederates as interlocutors in this task.

Participants

We recruited 42 adults (18 females) from the UCSD campus, ranging in age from 18-26, with a mean age of 20.5. All subjects were native speakers of English.

Materials & Procedure

We used the same materials and procedure as in the *No common ground* condition in Exp. 1, except that two naïve subjects were brought into the lab during each session, and one was randomly assigned to the role of the primary subject while the other was assigned to the role of E2.

Results & Discussion

Eight of the 21 primary subjects (38.1%) in this task used the definite article to refer to the animal protagonist (e.g., "The lion ate the banana") when describing the "adventure" to another naïve subject with no knowledge of the characters and events involved. We found no evidence that subjects in this condition used the definite article at a different rate than subjects in the *No Common Ground* condition in Exp. 1 (Fisher's Exact, p = .38).

These results therefore suggest that the high percentage of egocentric responses in Exp. 1 cannot be attributed simply to the fact that we used confederates in that task – and, more specifically, to an assumption on the part of subjects that E2 shared knowledge about the objects involved in the study. Subjects used the definite article about 40% of the time in this task, despite the fact that their interlocutors clearly had no prior knowledge about the study.

The relatively high rate of definite article use in this task as well as in Exp. 1 thus suggests that adults do not always take their interlocutor's mental states into account when producing referential expressions. In Exp. 3-6, we attempt to identify factors that may affect whether speakers take their interlocutor's knowledge states into account when producing referential expressions.

Experiment 3

In Exp. 3, we investigated whether subjects would be more likely to use the indefinite article to refer to items in privileged ground when given the strongest possible explicit evidence about their interlocutor's (E2) lack of common ground.

Participants

We recruited 21 adults (14 females) from the UCSD campus, ranging in age from 18-23, with a mean age of 20.3. All subjects were native speakers of English.

Materials & Procedure

We used the same materials and procedure as in the *No Common Ground* condition in Exp. 1, except that E1 emphasized E2's lack of knowledge by telling subjects, "Ok now my friend is going to come in. She didn't get to see what happened on the adventure so she's going to ask you to tell her. Remember, she has no idea what happened, and she doesn't even know what animal you picked."

Results & Discussion

One subject in this task used neither the definite nor the indefinite article. This subject referred to the animal protagonist as "My pet gorilla". Eight of the remaining 20 subjects (40%) used the definite article (e.g., "The monkey just came and ran and ate the banana"). We found no evidence that subjects in this condition used the definite article at a different rate than subjects in the *No Common Ground* condition in Exp. 1 (Fisher's Exact, p = .54). Thus, even when explicitly reminded of their interlocutor's lack of knowledge, a significant portion of adults in this task still failed to use the indefinite article to introduce an item that was not part of common ground.

Experiment 4

In this experiment, we examined whether adults would be more likely to take their interlocutor's knowledge into account when they were removed from the room where the "adventure" had taken place and taken to a completely new location. We hypothesized that this might encourage subjects to refresh their discourse model to accommodate the knowledge states of a new interlocutor.

Participants

We recruited 21 adults (19 females) from the UCSD campus, ranging in age from 18-22, with a mean age of 20. All subjects were native speakers of English.

Materials & Procedure

We used the same materials and procedure as in the *No Common Ground* condition in Exp. 1, except that after the "adventure", E1 asked subjects to follow her out of the lab and into a completely new room where E2 was sitting at a computer doing work. E1 then instructed subjects to tell E2 what happened on the adventure, while E1 waited outside.

Results & Discussion

Eleven of the 21 subjects (52%) used the definite article to refer to the animal protagonist. We found no evidence that subjects in this condition used the definite article at a different rate than subjects in the *No Common Ground* condition in Exp. 1 (Fisher's Exact, p = 1). Thus even when subjects were removed from the location of the adventure, they still often failed to take their interlocutor's lack of knowledge into account when choosing between the definite and indefinite article to refer to the chosen animal.

Experiment 5

In all of the experiments described thus far, the cost associated with inappropriately using the definite article to refer to an object in privileged ground was relatively low. In Exp. 5, we investigated whether subjects would be more careful about their choice of articles when using the definite article could actually lead to confusion and miscommunication. At the beginning of the experiment, subjects and E2 established common ground about a plastic cow and dog. Then, E2 left the room while E1 came in and asked subjects to choose one of three stuffed animal dogs or

one of three stuffed animal cows to go on the "adventure". We hypothesized that subjects would be less likely to use the definite article to refer to the animal protagonist of the "adventure" when speaking to E2, since E2 might mistakenly think "the dog" or "the cow" referred to the plastic dog and cow from the beginning of the experiment.

Participants

We recruited 32 adults (12 females) from the UCSD campus, ranging in age from 17-23, with a mean age of 20. All subjects were native speakers of English.

Materials & Procedure

At the beginning of the session, E2 introduced subjects to a plastic cow and a plastic dog and told them that they were going to play a quick memory game. E2 then placed the cow and dog in boxes, moved the boxes around quickly, and then asked subjects to guess which box each animal was in. Then E2 told subjects, "Now my friend [E1] is going to come in and play a different game with you." E1 came in and the rest of the study proceeded exactly as in the *No Common Ground* condition in Exp. 1.

Results & Discussion

Two subjects in this task used neither the definite nor the indefinite article to refer to the animal protagonist. One of these subjects used no article at all ("Cow was walking along...") while the other referred to the animal as "Mr. Dog". Eight of the remaining 19 subjects (42.1%) used the definite article to refer to the dog or cow in the adventure, despite the fact that they and E2 shared common ground about a different dog and cow. We found no evidence that subjects in this condition used the definite article at a different rate than subjects in the *No Common Ground* condition in Exp. 1 (Fisher's Exact, p = .186). Thus, adults continued to use the definite article about half of the time when addressing an unknowledgeable interlocutor, despite the fact that doing so could lead to miscommunication.

Experiment 6

In this experiment, we investigated whether subjects would be more likely to use the indefinite article to refer to items in privileged ground when first asked to write a letter to a friend describing the adventure. We hypothesized that in writing a letter to an interlocutor who clearly was not present and therefore had no common ground whatsoever about the experiment, subjects would be forced to create a completely new discourse model.

Participants

We recruited 45 adults (35 females) from the UCSD campus, ranging in age from 18 to 23, with a mean age of 21.0. All subjects were native speakers of English.

Materials & Procedure

The same materials and procedure were used as in Exp. 1. However, after E1 acted out the scene with the chosen animal and food item, she handed subjects a blank piece of paper and told them to "think of a friend – someone who doesn't live in San Diego – and write a letter to that person explaining what happened on the adventure." When subjects finished writing the letter, E1 collected it from them. In the *Common ground* condition, E1 then asked subjects, "Now I want you to tell me: what happened on the adventure?" In the *No common ground* condition, E1 told subjects, "Ok now my friend is going to come in. She didn't get to see what happened on the adventure so she's going to ask you to tell her." E1 then left the room as E2 entered. E2 asked subjects, "What happened on the adventure?"

Results & Discussion

Twenty subjects participated in the *Common ground* condition. In the letter to a friend, two subjects used neither the definite nor indefinite article to refer to the animal protagonist (e.g., referring to the animal as "my bear friend" instead). Of the remaining 18 subjects, 5 subjects (27.8%) used the definite article to refer to the animal protagonist in their letter. When speaking to E2, 15 subjects used the definite article (75%) to refer to the animal protagonist.

Twenty-five subjects participated in the *No common ground* condition. In the letter to a friend, two subjects used neither the definite nor indefinite article to refer to the animal protagonist. Of the remaining 23 subjects, 4 (17%) used the definite article to refer to the animal protagonist. When speaking to E2, one subject used neither the definite nor indefinite article to refer to the animal protagonist. Of the remaining 24 subjects, 5 (20.8%) used the definite article.

We found evidence that subjects in the *Common Ground* condition in this task used the definite article at a different rate than subjects in the *No Common Ground* condition (Fisher's Exact; p = .0006). We also found evidence that subjects in the *No Common Ground* condition in this experiment used the definite article at a different rate than those in the *No Common Ground* condition from Exp. 1. (Fisher's Exact; p = .036), indicating that subjects were more likely to use the indefinite article to refer to the animal protagonist in the adventure when addressing an unknowledgeable interlocutor if they had been previously asked to write a letter describing this adventure to a friend. This suggests that the act of writing the letter broke the established discourse or made the interlocutor's lack of knowledge more salient to speakers. Crucially, though, subjects did not persist in using the indefinite article when addressing their interlocutor in the *Common Ground* condition.

General Discussion

In Exp. 1, we found that about half of our adult subjects used the definite article to refer to an item that was new and unidentifiable to their listener when retelling the events of a

short scene. In Exp. 2, we ruled out the possibility that this high rate of failure was due to the fact that we used a confederate in Exp. 1. In Exp. 3, 4, and 5, respectively, we showed that this high rate of egocentric uses of the definite article persisted even when subjects were explicitly reminded of their interlocutors' ignorance, when they were taken out of the experiment room to a new location, and when using the definite article had the potential to lead to miscommunication. Finally in Exp. 6, we showed that subjects' were more likely to use the indefinite article when addressing an unknowledgeable interlocutor if they were asked to write a letter to a friend beforehand.

Our finding that English-speaking adults often use the definite article to refer to an object in privileged ground thus suggests that considering interlocutors' mental states during language production is effortful and does not always come naturally. This is consistent with models of language production which posit that utterance formation is initially egocentric, and that it is only at a secondary and more effortful stage that speakers correct their utterances by taking other peoples' perspectives into account. However, as Wardlow Lane and Ferreira (2008) point out, these models do not really explain why adults fail to take interlocutor knowledge into account when they are not faced with any time constraint or additional processing load, as in our experiments. These models also do not fully explain the variability present in our study – i.e., the fact that consistently half of the adults in our studies failed to take their interlocutors' lack of knowledge into account while the other half succeeded.

However none of these accounts can explain why adults failed to take their interlocutor's perspective into account in Exp. 3, where they were explicitly reminded of E2's lack of knowledge. In this experiment, subjects did not have to expend any additional cognitive resources determining what information was part of common ground and what information was privileged – they were told outright that their interlocutor lacked knowledge about the characters and events in the adventure. One possible explanation for this behavior is that the ability to create new discourse models is not under conscious control. Another possibility is that, as Wardlow-Lane and Ferreira (2008) suggest, speakers simply choose to leave some of the burden of establishing reference to the listener. This idea may be consistent with evidence suggesting that speakers do not typically go out of their way to accommodate their speakers by, for instance, avoiding syntactic ambiguity (e.g., Arnold et al., 2004).

Finally, the results of our studies have important implications for research on child language acquisition. The fact that a high proportion of adults failed to take their interlocutor's perspective into account when choosing between definite and indefinite articles suggest that children's apparent egocentrism with these articles (e.g., Karmiloff-Smith, 1979, Maratsos, 1976) is not necessarily indicative of a developmental delay.

References

Abbott, B. (2004). Definiteness and Indefiniteness. In Horn, L., & Ward, G. (Eds.). *The handbook of pragmatics,* Wiley-Blackwell.

Arnold, J. E., Wasow, T., Asudeh, A., & Alrenga, P. (2004). Avoiding attachment ambiguities: The role of constituent ordering. *Journal of Memory and Language*, *51*, 55-70.

Brennan, S. & Clark, H. (1996). Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology-Learning Memory and Cognition, 22*, 1482.

Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. *Perspectives on socially shared cognition, 13,* 127-149.

Clark, H. (1996). *Using language* (Vol. 4). Cambridge: Cambridge University Press.

Heller, D., Skovbroten, K. & Tanenhaus, M. K. (2009). Experimental evidence for speakers' sensitivity to common vs. privileged ground in the production of names. In K. van Deemter, A. Gatt, E. Krahmer & R. van Gompel (eds.) *Workshop on the Production of Referring Expressions: Bridging the gap between computational and empirical approaches to reference* (PRE-CogSci 2009), Amsterdam.

Horton, W. S., & Keysar, B. (1996). When do speakers take into account common ground? *Cognition, 59*, 91-117.

Karmiloff-Smith, A. (1979). *A functional approach to child language: A study of determiners and reference.* Cambridge, MA: Cambridge University Press.

Keysar, B. (2007). Communication and miscommunication: The role of egocentric processes. *Intercultural Pragmatics, 4*, 71-85

Kuhlen, A. K., & Brennan, S. E. (2013). Language in dialogue: when confederates might be hazardous to your data. *Psychonomic bulletin & review, 20*, 54-72.

Maratsos, M. (1976). The use of definite and indefinite reference in young children: an experimental study of semantic acquisition. Cambridge, MA: Cambridge University Press.

Pickering, M., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and brain sciences, 27*, 169-190.

Schaeffer, J., & Matthewson, L. (2005). Grammar and pragmatics in the acquisition of article systems. *Natural Language & Linguistic Theory, 23,* 53-101.

Wardlow, L., & Ferreira, V.S. (2003). Finding common ground: How do speakers block privileged information? Poster presented at the Architectures and Mechanisms for Language Processing conference, Glasgow, Scotland.

Wardlow Lane, L., & Ferreira, V. (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*, 1466.