



This article is part of the topic “Memory and Common Ground Processes in Language Use,” Sarah Brown-Schmidt, Melissa C. Duff, and William S. Horton (Topic Editors). For a full listing of topic papers, see [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1756-8765/earlyview](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1756-8765/earlyview)

Mindreading and Psycholinguistic Approaches to Perspective Taking: Establishing Common Ground

Ian Apperly

School of Psychology, University of Birmingham

Received 29 September 2017; accepted 11 October 2017

Abstract

In this commentary on “Memory and Common Ground Processes in Language Use,” I draw attention to relevant work on mindreading. The concerns of research on common ground and mindreading have significant overlap, but these literatures have worked in relative isolation of each other. I attempt an assimilation, pointing out shared and distinctive concerns and mutually informative results.

Keywords: Mindreading; Theory of mind; Perspective taking; Common ground; Mutual knowledge

1. Introduction

Research on mindreading has been mainly concerned with how a “theory of mind” develops in children (e.g., Wellman, 2014) and the neural correlates of mindreading in adults (e.g., Molenberghs, Johnson, Henry, & Mattingley, 2016). However, growing evidence on the cognitive basis of mindreading (e.g., Apperly, 2010, 2012) is better aligned with the concerns of the psycholinguistic approach to common ground. Integrating this work requires conceptual clarity about the multiple ways in which we may adapt to another’s perspective, as well as recognition of insights offered by the differing approaches.

2. Perspective sensitivity versus perspective representation

Let us take for granted that people enjoy more successful communication when they are sensitive to differences in their perspectives. Then how do people do this?

Communicators may represent each other's beliefs, knowledge, desires, and intentions, and frame utterances and interpretations in light of these perspectives (e.g., Sperber & Wilson, 2002). Alternatively, communicators may become sensitive to each other's perspective through "ordinary processes" of memory and attention (e.g., Horton & Gerrig, 2005; this issue; Pickering & Garrod, 2004). This is possible because in many cases, the information made available from priming, automatic memory retrieval, and attention cueing track closely enough with the content of a partner's perspective that it can serve the job of coordinating between speakers without the need for perspectives to be represented. As the papers in the special issue demonstrate, one of the most impressive conclusions from psycholinguistic work on common ground is that memory and attention processes surely do serve such an important role in enabling communicators to co-ordinate. This deserves much wider attention in the literature on mindreading, which commonly presumes that mental states are represented in support of social coordination, while in fact this is often unnecessary.

However, contextual effects on memory and attention do not fully solve the problem of epistemic co-ordination between speakers and listeners. For example, memory for co-presence is a powerful cue for shared knowledge, but it cannot take account of differences in what co-present communicators can see or hear, which of course influence what they know, think, or feel. Likewise, while there are cues related to what a speaker sees or hears—such as eye gaze, body orientation, or direction of action—that may predict what she is talking about (e.g., a glass of wine), such cues provide limited or no information about how she perceives it (e.g., as half full, or half empty). Thus, co-ordination between speakers does not just depend upon the lowest denominator of common knowledge but may involve differences in perspective that cannot be collapsed into one such representation. While cue- and memory-based approaches would enable communicators to be sensitive to perspective in some such cases (and surely does), systematic success would require perspective *representation* and require that differences in perspective remain an enduring element in the representations that guide co-ordination in the discourse. A key question is whether such information is available with sufficient speed and efficiency to inform processing of a fast-moving discourse. An emerging literature on the cognitive basis of mindreading provides some answers to this question, suggesting that the availability of such information cannot be taken for granted.

3. What do we know about mindreading?

Mindreading is not monolithic, and for present purposes it will be useful to distinguish the processes of *inferring* the perspectives of others, *storing* that information, and *using* that information (Apperly, 2010; Ferguson, Apperly, Ahmad, & Bindermann, 2015). To

aid with establishing common ground, I will relate phenomena from research on mindreading to a widely used paradigm from psycholinguistics in which participants follow instructions from a director whose perspective differs from their own (e.g., Keysar, Barr, Balin, & Brauner, 2000; Keysar, Lin, & Barr, 2003). In the Visual Perspective Taking form of this director task, the speaker/director issues instructions (e.g., “Move the ball with the stripe down one shelf”) from behind an array of objects on shelves, some of which are mutually visible (common ground), whereas others are blocked from her visual perspective (so fall in participants’ privileged ground). On critical trials a distractor object in privileged ground fits equally well or better with the director’s instruction than the target item in common ground. The question is whether participants show signs of ruling out the privileged ground distractor, and if so, whether (a) they do this in “anticipation” of using it to constrain reference, (b) they do this only once they must “integrate” common ground with the director’s instruction (Barr, 2008), or (c) whether they nonetheless make an egocentric error by selecting an object from privileged ground. Notably, the director is typically co-present and oriented toward the shelves throughout the task, so these potentially useful cues cannot assist identification of common ground, lending weight to the supposition that success on this task depends on representing the director’s perspective, and not just perspective sensitivity. What research on mindreading adds to such tasks is a separation of component mindreading processes, so for example, it is possible to distinguish between processes by which someone’s perspective is inferred, stored, and used.

3.1. Inferences

Under what conditions do we infer other people’s perspectives? One approach is to suppose that mindreading inferences are like other “bridging inferences” (Corbett & Doshier, 1978) that go beyond the given information to make sense of a discourse or situation. And indeed, there is evidence that, like classical bridging inferences, mindreading inferences are not automatic but are often made spontaneously (without explicit instruction, e.g., Back & Apperly, 2010). For example, when viewing a video in which a character failed to witness the changed location of an object, response times to probes about her false belief indicated that belief was only inferred when it was perceived to be relevant, and not when participants only had to attend to the changing location of the object (Apperly et al., 2006). Also consistent with other bridging inferences, the rate of spontaneous inferences about perspective depends upon context and participants’ motivation for social interaction (Elekes, Varga, & Kiraly, 2016; Surtees, Apperly, & Samson, 2016).

However, at least some mindreading inferences seem to show more automaticity, with simple visual perspectives being calculated even when task-irrelevant (Samson, Apperly, Braithwaite, Andrews, & Bodley Scott, 2010) and under cognitive load (Qureshi, Apperly, & Samson, 2010), and simple false beliefs being calculated without instruction, and without participants’ awareness (Schneider, Bayliss, Becker, & Dux, 2011). Interpretation of these results remains controversial (e.g., Heyes, 2014), but our working hypothesis is that they reflect “minimal” mindreading processes that enable representation of others’ mental states for some (simpler) cases, but not others (Apperly and Butterfill, 2009).

Perhaps the most important conclusion for psycholinguistic research is that while people can, and do, represent others' perspectives, it cannot be taken for granted that such information will be available to act as a constraint on processing. When anticipation effects are observed in the VPT-director task, this suggests that inferences about perspective have indeed been made in advance and are biasing attention toward common ground items (Barr, 2008). However, consistent with evidence from the mindreading literature, recent evidence on variants of the VPT-director task suggests that the presence of anticipation effects is indeed dependent upon participants' motivation and cognitive resources (Cane, Ferguson, & Apperly, 2017; Ferguson et al., 2015), and it may be observed for simple perspectives (e.g., whether or not the Director has seen an object), but not more complex ones (e.g., whether s/he knows what it really is; Mozuraitis, Chambers, & Daneman, 2015).

3.2. *Storage*

What are the consequences of holding in mind a perspective that directly conflicts with our own? Apperly, Back, Samson, and France (2008) presented participants with verbal statements concerning the real contents of a box and a character's false belief about the contents (e.g., "He thinks the ball on the table is red; really the ball on the table is blue") which removed any need for a belief inference. After a retention interval of 2–5 s participants saw visual test probes for either piece of information (e.g., a picture of the man with a thought bubble in which the object on the table was blue). Since participants neither had to infer a mental state nor use it to predict behavior or inform other inferences, this task selectively targeted *storage* of another's perspective. Participants responded more slowly to both belief and reality probes in the false belief condition compared with a baseline condition, suggesting a processing cost due to interference between conflicting belief and reality information when this is held briefly in mind. Importantly, it remains unclear whether similar effects occur for longer term storage. For psycholinguistic research on common ground, this evidence suggests that in a situation that warrants perspective representation (because perspective may be relevant) the associated cognitive costs may affect language processing irrespective of whether perspective information is ultimately used.

3.3. *Use*

Most mindreading tasks require participants to use information about what someone else thinks to predict resulting actions, emotions, or other mental states, but few attempt to separate this requirement from any need to infer what the person thinks or to store this information. Indeed, one of the few tasks that manage some separation is the VPT-Director Task. Here, the simple visual perspective difference between director and participant means that the ability to make the required mindreading inference should not be a strong constraint on performance. Moreover, the time course allows identification of an "integration" phase when participants must combine information about the director's perspective

with the unfolding linguistic input. These considerations suggest that the task assesses *use* of information about perspective, more than inference or storage. Perhaps the most striking result from this paradigm is the high rate of errors, whereby participants select an object that the director cannot see. Of course this laboratory task surely overestimates the rate of errors in real discourse, not least because the design deliberately deprives participants of most cues that could enable them to be sensitive to perspective without representing the director's perspective. Nonetheless, these error rates are higher in participants with higher traits for autism and psychosis (Abu-Akel, Wood, Hansen, & Apperly, 2015), self-reported symptoms of depression (Nilsen & Duong, 2013), and induced positive mood (Converse, Lin, Keysar, & Epley, 2008), suggesting that they are a valid indicator of variation in social communication performance. Also error rates and/or other indices, such as decision time and rate of change in preference for the target compared with the distractor, are positively influenced by motivation and adversely influenced by concurrent working memory load (Cane et al., 2017; Lin, Keysar, & Epley, 2010) and the complexity of the director's instruction (Wang, Frisson, Ali, & Apperly, 2015).

3.4. Biases and frames of reference

If I know the glass has wine in it but you do not, then this fact is in my privileged ground, and I am at risk of being biased egocentrically by this information. If you are also aware of the wine and I am sensitive to this, then it is in common ground. But what if you think it's white and I think it's rosé? Here, the glass of wine is in common ground, but we nonetheless have different perspectives on it, giving rise to "privileged ground" on both sides. Representing others' perspectives in this way can give rise to a distinctive bias—"altercentric interference"—whereby participants become slower and more error-prone at judging their own perspective when it is in conflict with what someone else thinks or sees (Back & Apperly, 2010, Kovács, Téglás, & Endress, 2010; Samson et al., 2010). It follows that during communication we should expect altercentric bias, whereby a competitor in the partner-privileged-ground causes interference with targets in common or participant-privileged-ground. Note that the very idea of partner-privileged-ground is nonsensical if one considers common ground to arise only from the action of memory and attention processes on participants' first-person representations, but it follows naturally if it is accepted that participants sometimes represent their partner's alternative perspective on the conversational topic. This points to an important clarification of Duran et al. (this issue) who suggest that common ground is "other-centered." It does indeed appear that we entertain "other-centered" representations of other people's perspectives, but we represent these alongside our own perspective, with common ground being the intersection between these two sets.

4. Summary

In the mindreading tradition, perspective sensitivity through priming and other memory and attentional processes is typically the dull hypothesis, to be excluded in order to

conclude that a behavior is based upon perspective representation. Psycholinguistic work on common ground highlights the risk of throwing out the baby with the bathwater, by showing the critical work that such “ordinary processes” actually perform in the service of social coordination. I believe this is by far the best evidence that “submentalizing” (Heyes, 2014) is often sufficient for sensitivity to others’ perspectives, but if the psycholinguistic and mindreading literatures are to be integrated, it remains critical to distinguish perspective sensitivity from perspective representation.

I have also argued that we do sometimes represent others’ perspectives during communication, and that research on mindreading provides evidence on the conditions for this to happen. Most important, representations of others’ perspectives cannot be taken for granted as a constraint on reference resolution; the likelihood that others’ mental states will be inferred, stored, or used depends upon dispositional characteristics of the participants, their motivation, and their cognitive resources; but once such information is represented it can act as a counterweight to other biases, such that there may be no special priority for participants’ egocentric perspective.

References

- Abu-Akel, A., Wood, S., Hansen, P., & Apperly, I. (2015). Perspective-taking abilities in the balance between autism tendencies and psychosis proneness. *Proceedings of the Royal Society London B*, 282, 1808.
- Apperly, I. A. (2010). *Mindreaders: The cognitive basis of “theory of mind.”* Hove, UK: Psychology Press/Taylor & Francis Group.
- Apperly, I. A. (2012). What is “theory of mind”? Concepts, cognitive processes and individual differences. *Quarterly Journal of Experimental Psychology*, 65(5), 825–839.
- Apperly, I. A., Back, E., Samson, D., & France, L. (2008). The cost of thinking about false beliefs: Evidence from adult performance on a non-inferential theory of mind task. *Cognition*, 106, 1093–1108.
- Apperly, I. A., & Butterfill, S. A. (2009a). Do humans have two systems to track beliefs and belief-like states? *Psychological Review*, 116(4), 953–970.
- Back, E., & Apperly, I. A. (2010). Two sources of evidence on the non-automaticity of true and false belief ascription. *Cognition*, 115(1), 54–70.
- Barr, D. J. (2008). Pragmatic expectations and linguistic evidence: Listeners anticipate but do not integrate common ground. *Cognition*, 109, 18–40.
- Cane, J., Ferguson, H. J., & Apperly, I. A. (2017). Using perspective to resolve reference: The impact of cognitive load and motivation. *Journal of Experimental Psychology: Learning Memory and Cognition*, 43, 591–610.
- Converse, B. A., Lin, S., Keysar, B., & Epley, N. (2008). In the mood to get over yourself: Mood affects theory-of-mind use. *Emotion*, 8(5), 725–730. <https://doi.org/10.1037/a0013283>.
- Corbett, A. T., & Doshier, B. A. (1978). Instrument inferences in sentence encoding. *Journal of Verbal Learning and Verbal Behaviour*, 17, 479–491.
- Elekes, F., Varga, M., & Kiraly, I. (2016). Evidence for spontaneous level-2 perspective taking in adults. *Consciousness and Cognition*, 41, 93–103.
- Ferguson, H. J., Apperly, I. A., Ahmad, J., & Bindermann, M. (2015). Task constraints distinguish perspective inferences from perspective use during discourse interpretation. *Cognition*, 139, 50–70.
- Heyes, C. (2014). Submentalizing: I’m not really reading your mind. *Psychological Science*, 9, 121–143.
- Horton, W. S., & Gerrig, R. J. (2005). Conversational common ground and memory processes in language production. *Discourse Processes*, 40, 1–35.

- 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*, 32–37.
- Keysar, B., Lin, S., & Barr, D. J. (2003). Limits on theory of mind use in adults. *Cognition, 89*, 25–41.
- Kovács, Á. M., Téglás, E., & Endress, A. D. (2010). The social sense: Susceptibility to others' beliefs in human infants and adults. *Science, 330*(6012), 1830–1834.
- 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*, 551–556.
- Molenberghs, P., Johnson, H., Henry, J. D., & Mattingley, J. B. (2016). Understanding the minds of others: A neuroimaging meta-analysis. *Neuroscience & Biobehavioral Reviews, 65*, 276–291.
- Mozuraitis, M., Chambers, C. G., & Daneman, M. (2015). Privileged versus shared knowledge about object identity in real-time referential processing. *Cognition, 142*, 148–165.
- Nilsen, E. S., & Duong, D. (2013). Depressive symptoms and perspective-taking within a communicative context. *Cognition & Emotion, 27*, 335–344.
- Pickering, M. J., & Garrod, S. (2004). Towards a mechanistic psychology of dialogue. *Behavioral and Brain Sciences, 27*, 169–226.
- Qureshi, A., Apperly, I. A., & Samson, D. (2010). Executive function is necessary for perspective-selection, not Level-1 visual perspective-calculation: Evidence from a dual-task study of adults. *Cognition, 117*(2), 230–236.
- Samson, D., Apperly, I. A., Braithwaite, J., Andrews, B., & Bodley Scott, S. E. (2010). Seeing it their way: Evidence for rapid and involuntary computation of what other people see. *Journal of Experimental Psychology: Human Perception and Performance, 36*(5), 1255–1266.
- Schneider, D., Bayliss, A. P., Becker, S. I., & Dux, P. E. (2011). Eye movements reveal sustained spontaneous processing of others' mental states. *Journal of Experimental Psychology: General, 141*(3), 433–438.
- Sperber, D., & Wilson, D. (2002). Pragmatics, modularity & mindreading. *Mind and Language, 17*, 3–23.
- Surtees, A., Apperly, I. A., & Samson, D. (2016). I've got your number: Spontaneous perspective-taking in an interactive task. *Cognition, 150*(43–52).
- Wang, J. J., Frisson, S., Ali, M., & Apperly, I. A. (2015). Language complexity modulates 8- and 10-year-olds' success at using their theory of mind abilities in a communication task. *Journal of Experimental Child Psychology, 149*, 62–71.
- Wellman, H. M. (2014). *Making minds: How theory of mind develops*. Oxford, UK: Oxford University Press.