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The cognitive demands of remembering a speaker's perspective and managing common ground size modulate 8- and 10-year-olds' perspective-taking abilities

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ABSTRACT

Using "theory of mind" to successfully accommodate differing perspectives during communication requires much more than just acquiring basic theory of mind understanding. Evidence suggests that children's ability to adopt a speaker's perspective continues to develop throughout childhood to adolescence until adulthood. The current study examined the cognitive factors that could account for variations in children's abilities to use a speaker's perspective during language comprehension and whether the same factors contribute to age-related improvements. Our study incorporated into a commonly used communication task two types of memory demands that are frequently present in our everyday communication but have been overlooked in the previous literature: remembering a speaker's perspective and the amount of common ground information. Findings from two experiments demonstrated that both 8- and 10-year-olds committed more egocentric errors when each of these memory demands was high. Our study also found some supporting evidence for the age-related improvement in children's perspective use, with 10-year-olds generally committing fewer egocentric errors compared with 8-year-olds. Interestingly, there was no clear evidence that the memory factors that affected children's perspective use in our experiments were also the factors that drove age-related improvement.

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Introduction

We take into account other people's perspectives in order to successfully navigate through our everyday social interaction. Especially when in communicative situations where our own perspective differs from another interlocutor's perspective, we need to draw on "common ground," an important concept in the psycholinguistic literature that refers to the set of mutual knowledge and beliefs shared between speakers and listeners (Clark & Marshall, 1978, 1981), to guide our communication.

Perspective taking can be seen as a common instance of "theory of mind" use. Until relatively recently, a large number of developmental studies on the research area of theory of mind had focused on answering the question of when children develop this understanding of others' mental states and perspectives (e.g., Astington & Gopnik, 1991; Perner, Leekam, & Wimmer, 1987). Classic accounts suggest that children are egocentric and incapable of understanding others' perspectives before around 7 years of age (Piaget, 1959; Piaget & Inhelder, 1956). More recent evidence suggests that theory of mind concepts develop significantly earlier, between 2 and 7 years of age (e.g., Wellman, Cross, & Watson, 2001), and may even be present in infants (e.g., Kovács, Téglás, & Endress, 2010; Moll & Tomasello, 2006; Onishi & Baillargeon, 2005; Sodian, Thoermer, & Metz, 2007). In contrast, recent research on older children and adults, who have clearly developed a basic understanding of mental states, shows that they are still egocentrically biased, especially when facing communicative situations where differing perspectives need to be taken into account (e.g., Dumontheil, Apperly, & Blakemore, 2010; Keysar, Barr, Balin, & Brauner, 2000; Keysar, Lin, & Barr, 2003). This suggests that using theory of mind abilities in communication requires much more than just acquiring the necessary theory of mind concepts.

Much work on perspective taking has used communication games in which participants need to follow or produce instructions to another interlocutor whose perspective differs from their own. For example, in a commonly used "director task" (e.g., Keysar et al., 2000), participants were asked to follow a director's instruction to move the referred objects around a shelf. Some objects were blocked from the director's perspective and, thus, remained visible only in participants' *privileged ground.* Other objects were visible to both the director and participants and, thus, were in their *common ground.* Critical instructions required participants to move only the matching objects that were visible to both themselves and the director. A large number of studies employing this director task on healthy adults have demonstrated that adults suffer from interference of their own privileged perspective, and this egocentrism is revealed by selecting a distractor that is invisible to the director, by looking at the matching distractor before they reach the target object in common ground, or by taking a longer time to select the target referent when the distractor is present compared with when it is absent (Apperly et al., 2010; Keysar et al., 2000, 2003; Wu & Keysar, 2007). These findings accord with the suggestions that adults suffer from "realist bias" (Mitchell, Robinson, Isaacs, & Nye, 1996) or "curse of knowledge" (Birch & Bloom, 2007), which refers to the phenomenon that adults' judgment of another person's belief is often biased by their privileged knowledge of the reality.

Children, who are less experienced communicators than adults, may suffer more from this egocentric bias when required to accommodate differing perspectives in the director task. Although eye movement data from Nadig and Sedivy (2002) suggested that even 6-year-old children were sensitive to their interlocutor's limited perspective and were able to use this perspective information from the early stage of language processing, egocentrism did not completely evaporate in their study. Indeed, the first experiment in Nadig and Sedivy's study suggested that child speakers were not as reliable as adult speakers at providing adjectives to fully disambiguate the referents when there were two similar candidates in the common ground. Epley, Morewedge, and Keysar (2004) demonstrated that 4- to 12-year-old children acted more egocentrically in the task by reaching for hidden referents more frequently compared with adult participants. The authors provided a plausible explanation that adults and children appeared not to differ in the initial processing stage, during which they both processed information egocentrically, but differed in the later adjustment stage, during which adults were more capable of correcting their egocentric bias and accommodating their interlocutor's differing perspective than were children. Moreover, Epley et al. also observed an incremental improvement in