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## How you act matters: The impact of coordination on 4-year-old children's reasoning about diverse desires



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### ABSTRACT

Cooperation is generally found to have a more positive impact than competition on children's high-level social understanding (e.g., diverse desires, false beliefs); however, recent evidence has shown that competition could also improve such understanding. Differences in coordination level during interactions with others may potentially explain these inconsistent results. In this study, we tested the impact of coordination on children's ability to reason about diverse desires in both competitive and cooperative conditions. Four-year-old children played a competitive (Experiment 1,  $N = 48$ ) or cooperative (Experiment 2,  $N = 48$ ) game with an adult. They were then tested for their understanding of diverse desires in a gift selection condition that was difficult for children of this age. Coordination levels were manipulated as high versus low in both games. Results showed that coordination enhanced children's performance in reasoning about diverse desires, allowing children to conduct desire inferences and perspective taking simultaneously in both conditions. This finding accords well with the constructivist view that social understanding could be shaped by the underlying structure of the social interaction in which one participates. More important, it adds to our knowledge about how social interaction enhances one's social understanding at an early age; specifically, it highlights the decisive role of coordination in this process.

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## Introduction

Understanding diverse desires (i.e., that diverse individuals can have distinct desires) is key to one's social functioning in that it allows us to make flexible interpretations and predictions of others' intentional actions and adjust our own actions accordingly. It requires one not only to possess the ability to infer others' desires but also to appreciate the subjective nature of desire and take the right perspective (Cassidy et al., 2005). Children's understanding of diverse desires and other mental reasoning develop throughout the whole childhood (Weimer, Parault Dowds, Fabricius, Schwanenflugel, & Suh, 2017), and the most notable enhancement takes place at around the age of 4 or 5 years (e.g., Atance, Bélanger, & Meltzoff, 2010; Gopnik & Slaughter, 1991; Moore et al., 1995). A constructivist viewpoint contends that participating in certain types of social interaction plays a critical role in the formation of such understanding (Carpendale & Lewis, 2004; Moll & Tomasello, 2007). In previous related studies, cooperation generally improved children's ability to perform high-level mental understanding such as diverse desires and false beliefs (e.g., Jin, Li, He, & Shen, 2017; Zan & Hildebrandt, 2003). Studies on competition produced inconsistent results; whereas some suggested that competition had no effect on mental understanding (e.g., Jin et al., 2017), others argued that it helps children to better reason about others' mental states (e.g., Sigirtmac, 2016). We infer from these results that action coordination between individuals likely accounts for the impact (Sebanz, Bekkering, & Knoblich, 2006). The current study is going to determine whether coordination improves children's understanding of diverse desires.

How children develop understanding of the subjective nature of desires and other mental states is consistently a topic of heated debate among researchers. Whereas the majority of researchers have long been focused on the vital role of physical maturation (e.g., Baron-Cohen, Leslie, & Frith, 1985; Gopnik & Wellman, 1992; Harris, 1992), the impact of social environment is largely ignored. Both Piaget (1977/1995) and Vygotsky (1978) had described how mental development has its foundation in everyday activities. According to their theories, a constructivist hypothesis of social cognitive development stressed that social understanding is built and shaped within the context of social interaction (Carpendale & Lewis, 2004, 2015).

An increasing body of evidence supports this hypothesis—that social interaction does have a significant effect on the development of social understanding. For example, positive relations that involve abundant interactions with parents and siblings are closely related to children's advantage in social understanding (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Jenkins & Astington, 1996; Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996), whereas early social deprivation leads to delays and deficits in social functioning (Colvert et al., 2008; Rutter et al., 2007). Likewise, early language use is correlated with the development of social mental functioning (Deleau, 2012); children engaging in more talking about mental states showed significant advantages (Dunn et al., 1991; Ruffman, Slade, Devitt, & Crowe, 2006), whereas deafness led to delay and deficits (Peterson & Siegal, 2000) in mental reasoning.

Not all social interactions have the same impact on the development of social understanding. Among the various types of social interaction, cooperation and competition are most widely discussed concerning diverse roles in social development. Moll and Tomasello (2007) proposed that cooperation, but not competition, drives the construction of human-specific high-level social understanding. In accordance with this hypothesis, cooperation is widely found to be correlated with better high-level social understanding such as false belief (Bay-Hinitz & Wilson, 2005), role taking (Bridgeman, 1981), and sharing and skillful negotiating (Hamann, Bender, & Tomasello, 2013; Zan & Hildebrandt, 2003). Studies on competition usually considered it to have no significant benefit for social understanding (Bridgeman, 1981; Cosier & Dalton, 1988; Jin et al., 2017; Johnson, 1975; Lanzetta & Englis, 1989). For example, a recent study showed that participating in cooperative and competitive interactions had distinct impacts on 4-year-old children's ability to reason about diverse desires (Jin et al., 2017). Participants were tested with their understanding of diverse desires in a gift selection context after playing a 3-min cooperative or competitive fishing game with an adult. These children became generally readier to select a gift according to the recipient's desire after cooperation but not after competition. However, a few findings suggest that competition also helps children with mental reasoning. For example, in another recent study (Sigirtmac, 2016), 5-year-olds who received

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