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When the body reveals the mind: Children's use of others' body orientation to understand their focus of attention



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ABSTRACT

A considerable amount of research has examined children's ability to rely on explicit social cues such as pointing to understand others' referential intentions. Yet, skillful social interaction also requires reliance on and learning from implicit cues (i.e., cues that are not displayed with the explicit intention to teach or inform someone). From an embodied point of view, orienting movements and body orientation are salient cues that reveal something about a person's intentional relations without being explicit communicative cues. In three experiments, the current study investigated the development of the ability to use body information in a word learning situation. To this end, we presented 2-year-old children, 3.5-year-old children, and adults with movies on an eye-tracking screen in which an actor oriented her upper body to one of two objects while uttering a novel word. The results show that the 3.5-year-old children and adults, but not the 2-year-old children, related the novel word to the referred object (Experiments 1 and 2). Yet, when the actor oriented her body to one object while pointing to the other object, children of both age groups relied on the pointing cue (Experiment 3). This suggests that by 3.5 years children use another's body orientation as an indicator of her intentional relations but that they prioritize explicit social cues over the implicit body posture cues. Overall, the study supports theoretical views that an appreciation of others' intentional relations does not emerge as an all-or-nothing ability but rather emerges gradually during the course of early development.

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Introduction

Following others' social cues and understanding others' referential intentions plays a pivotal role in successful social interaction and social learning, for example, in early language acquisition (e.g., Tomasello, 2003). During the last two decades, developmental research has investigated the ontogenetic origins and development of young children's understanding of others' intentional relations. These studies have provided converging evidence that already in their first year of life infants become able to follow others' explicit cues, particularly eye gaze and pointing (e.g., Deák, Flom, & Pick, 2000; Moore, 2008; Paulus, 2011; Sodian & Thoermer, 2004). Likewise, studies on the social basis of early word learning have provided ample evidence that infants rely on these social cues to acquire novel words (e.g., Baldwin, 1993; Brooks & Meltzoff, 2005; Fenell & Waxman, 2010; Hollich et al., 2000; Houston-Price, Plunkett, & Duffy, 2006; Paulus & Fikkert, 2014). This ability is fragile until the end of the second year of life (Moore, Angelopoulos, & Bennett, 1999), easily disturbed in persons with autism spectrum disorders (Aldaqr, Paulus, & Sodian, 2015), and an explicit understanding of these cues develops during the third year of life (Doherty, Anderson, & Howieson, 2009). Nonetheless, a large set of studies shows that already infants appreciate others' referential intentions in pedagogical contexts, suggesting an early ability to learn from others.

Notwithstanding the relevance of learning from explicit social cues (i.e., cues that are used with the intention to communicate with or teach others), humans are very proficient in reading others' intentional relations (i.e., physical or mental activities directed at real or imagined objects; Barresi & Moore, 1996) from a variety of other cues. These include gait characteristics, body movements, and involuntary facial expressions (e.g., Sebanz & Shiffrar, 2009; van't Wout & Sanfey, 2008). Indeed, research has provided ample evidence that adults show a high proficiency in reading others' body language (de Gelder, 2009; de Gelder et al., 2010). For example, they integrate facial and body information, and in the case of conflict body information affects their ratings of facial information (Meeren, van Heijnsbergen, & de Gelder, 2005). Moreover, it has been shown that adults are able to infer others' beliefs (Grezes, Frith, & Passingham, 2004b) and intentions to deceive (Grezes, Frith, & Passingham, 2004a; Sebanz & Shiffrar, 2009) from cues inherent in their body movements. These cues are commonly not shown with the explicit intention to inform or teach the other; rather, they are bodily expressions of an actor's intention, hence also called "embodied intentions" (cf. Johnson, 2007). Consequently, we refer to these cues as being implicit (social) cues. Note that this conceptual differentiation between explicit and implicit social cues focuses on the role of these cues in communicative contexts and does not presuppose how the cues are processed by the perceiving agent (i.e., it does not map to the implicit–explicit knowledge distinction advocated by, for example, Apperly & Butterfill, 2009). Particularly from an embodied perspective on deictic reference, orienting movements such as body posture orientation are, therefore, excellent examples for implicit cues that show something about a person's mind and intentions (e.g., Ballard, Hayhoe, Pook, & Rao, 1997). The ability to appreciate these cues and react to them in social interaction constitutes an important part of skilled interpersonal communication and social competence (e.g., Hargie, 2011). Consequently, for a full understanding of the development of social competence, it is important to study young children's developing appreciation of implicit cues such as body postures.

From a theoretical perspective, it would be highly interesting to explore the development of young children's ability to understand others' body posture cues. Theories on the developmental origins of early social cognition make different predictions with respect to the developmental timeline of children's developing appreciation of others' social cues. Some researchers (e.g., Baron-Cohen, 1995; Leslie, 1994) presume that a general cross-situational understanding of others' intentional relation is present at the end of the first year of life (as indicated by terms such as "intention reading" and "intention understanding"; see also Tomasello, Carpenter, Call, Behne, & Moll, 2005). Thus, some scholars have argued that the different forms of joint attention show tight synchrony, emerge together, and are indicative of a general understanding of others' intentionality. This perspective predicts that an understanding of others' body orientation should—given that there is no principled difference between the different kinds of social cues assumed—develop in parallel with their understanding of other cues. If this were true, already infants should appreciate the body postures expressing others' intentions.

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