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Pragmatic development explains the Theory-of-Mind Scale

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ABSTRACT

Henry Wellman and colleagues have provided evidence of a robust developmental progression in theory-of-mind (or as we will say, "mindreading") abilities, using verbal tasks. Understanding diverse desires is said to be easier than understanding diverse beliefs, which is easier than understanding that lack of perceptual access issues in ignorance, which is easier than understanding false belief, which is easier than understanding that people can hide their true emotions. These findings present a challenge to nativists about mindreading, and are said to support a social-constructivist account of mindreading development instead. This article takes up the challenge on behalf of nativism. Our goal is to show that the mindreading-scale findings fail to support constructivism because well-motivated alternative hypotheses have not yet been controlled for and ruled out. These have to do with the pragmatic demands of verbal tasks.

1. The nativist–constructivist debate

Humans are hyper-social. This much is widely agreed. It is also generally agreed that human social *cognition*—involving a capacity to attribute mental states to other people and to anticipate their likely actions—is essential to human uniqueness (Tomasello, 2009), even if it isn't the ultimate source of that uniqueness (Piantadosi & Kidd, 2016). Accordingly, a great deal of effort has been expended over more than 30 years in an attempt to understand the development of human mindreading capacities (Wimmer & Perner, 1983). For most of this period there was a widespread consensus that such capacities are constructed gradually over the course of the preschool years, relying on linguistic and cultural input together with general-learning and theorizing abilities (Gopnik & Meltzoff, 1997; Wellman, 1990; Wellman, Cross, & Watson, 2001). While there were always some in the field who claimed that basic mindreading abilities are innate, and that the appearance of development reflects failures of performance (Leslie, 1994; Scholl & Leslie, 1999), this was decidedly a minority position.

In the past 10 years, however, the field has changed dramatically. There are now dozens of studies of infants aged 6–18 months using a variety of non-verbal methods (including expectancy-violation looking, anticipatory looking, active helping, and more) suggesting that infants understand the goals and beliefs of other agents, and can anticipate actions accordingly. (For example, see: Buttelmann, Carpenter, & Tomasello, 2009; Buttelmann, Over, Carpenter, & Tomasello, 2014; Buttelmann, Suhrke, & Buttelman, 2015; He, Bolz, & Baillargeon, 2012; Kovács, Téglás, & Endress, 2010; Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2010; Southgate & Vernetti, 2014.) It is now widely agreed that these findings reflect an underlying social-cognitive competence of some sort (although see Heyes, 2014, for a dissenting view). What is disputed is how these early abilities relate to those that underlie performance in more traditional verbal tasks. Nativists have seized on the new findings to claim that core mindreading abilities are present throughout infancy, and that early failures on verbal tasks reflect performance difficulties of some sort (Baillargeon, Scott, & He, 2010; Carruthers, 2013). Constructivists, in contrast, have mostly converged on some form of two-systems view, according to which there is an early-developing, implicit, limited-flexibility system that is later supplemented by a slowly-acquired, flexible and explicit, theory of mind (Apperly, 2011; Wellman, 2014).

There are broadly two lines of support for this new constructivist position. One consists of evidence that both implicit and explicit systems exist alongside one another in adults, and that the implicit system operative in infancy has signature limits (Apperly, 2011; Low, Drummond, Walmsley, & Wang, 2014; Low & Watts, 2013; Schneider, Bayliss, Becker, & Dux, 2012; Schneider, Nott, & Dux, 2014). This evidence has been systematically criticized elsewhere (Carruthers, 2016a, 2016b; Christensen & Michael, 2015; Thompson, 2014; Westra, 2016a). The other line of support derives from evidence of an orderly and systematic progression in toddlers' verbally-manifested mindreading abilities,

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which is suggestive of genuine conceptual development. This is most clearly demonstrated by Wellman and colleagues who have created and validated across cultures the *mindreading scale*. This will be our main focus here. Our goal is to show that the data provided by the mindreading scale fail to support constructivism. This is because there are plausible alternative explanations—mostly pragmatic in nature—that have not yet been controlled for and excluded.

2. The mindreading scale

Wellman and Liu (2004) undertook two studies. The first was a meta-analysis of investigations of mindreading development in which children's understandings of different types of mental state were pitted against one another using otherwise-matched tasks. (All of the studies reviewed involved verbal presentations and required the children to give verbal answers.) Their analysis showed that the first milestone children pass is understanding that different people can have different desires, and that these differences will lead them to act differently. These tasks are reliably easier than ones in which children are required to understand that different people can have different beliefs. The latter tasks are in turn easier than ones in which children are required to understand that someone can be ignorant of a fact by virtue of lacking perceptual access to it. Finally, understanding ignorance is reliably easier than understanding that people can have, and act on, beliefs that are false.

Inspired by these meta-analytic findings, Wellman and Liu (2004) constructed a sequence of matched tasks, extended to include a test of children's ability to understand that someone can act in a way incongruent with her true feelings.[1] They included a diverse-desires task (DD), a diverse-beliefs task (DB), a knowledge/perceptual-access task (KA), a false-belief task (FB), and a hidden-emotions task (HE). They tested 75 children aged 3–5 on all of these tasks, finding evidence of a robust developmental progression that matched the meta-analytic findings, with an understanding that people can hide their true emotions being hardest of all. In fact, a large majority of the children performed in a manner consistent with the following order of ease of passing: DD > DB > KA > FB > HE. Since Wellman & Liu's initial study, over 80% of some 500 children tested in the USA, Canada, Australia, and Germany have displayed abilities consistent with this pattern (Kristen, Thoermer, Hofer, Aschersleben, & Sodian, 2006; Peterson, Wellman, & Liu, 2005). Moreover, congenitally deaf children born of hearing parents (who are introduced to full-blown sign-languages much later in childhood than normal) follow the same developmental progression, only significantly delayed (Peterson & Wellman, 2009; Peterson et al., 2005).

Wellman and colleagues have also found that this developmental sequence is cross-culturally robust, with one intriguing exception: preschool children from "collectivist" cultures (specifically, China and Iran) tend to find the knowledge-access (KA) task easier than the diverse beliefs (DB) one, thus exhibiting the sequence DD > KA > DB > FB > HE (Duh et al., 2016; Shahaeian, Peterson, Slaughter, & Wellman, 2011; Wellman, Fang, Liu, Zhu, & Liu, 2006). This is thought to reflect a cultural emphasis on differences of opinion in "individualist" countries such as the USA, and a correspondingly greater emphasis on education, knowledge, and the importance of learning from those in authority in "collectivist" ones.

In addition, Rhodes and Wellman (2013) combined use of the mindreading-scale tasks with microgenetic measures (a form of longitudinal study in which behavior is sampled very frequently, which effectively amounts to a form of training). Children in the study were pre-tested on the mindreading scale, and those in the experimental condition then underwent a number of regular microgenetic training sessions over the course of six weeks. In each of these sessions children had to complete two new false-belief prediction tasks. They were then shown the correct outcome of the scenario, and were asked to explain the character's action. Consistent with previous intervention studies (Amsterlaw & Wellman, 2006; Lohmann & Tomasello, 2003), training on false-belief tasks tended to have a positive effect on performance at post-test. More interestingly, it was also found that children's scores on the mindreading scale at pre-test predicted the effectiveness of the training. Children who could already pass the knowledge-access task at pre-test were more likely to pass the false-belief task at post-test than children who could only pass the diverse-beliefs task at pre-test. Using similar methods, Wellman and Peterson (2013) obtained comparable training effects for older late-signing deaf children.

Wellman (2012, 2014) argues that this overall body of data supports a constructivist account of mindreading development, and is correspondingly problematic for nativist theories. Children are said to be constructing a causal framework for understanding the operations of the mind, drawing on their own experiences and their observations of others. Some aspects of the developing theory (particularly the idea that the mind contains states that *represent* aspects of reality, needed for an understanding of false belief) are said to be intrinsically harder to construct than others. But construction of the theory also depends on cultural input. Those who are on the cusp of constructing a full-blown representational theory of mind are most likely to transform intensive conceptually-relevant forms of social experience into full false-belief competence, but such experience still benefits children at an earlier stage in the mindreading-scale progression. In contrast, if mindreading capacities are innate, then it is said to be very unclear why performance should exhibit these regularities, or why cultural differences and individual training-experiences should make any difference.

Wellman draws a false contrast here, however. For nativism is consistent with cultural learning. What is innate, it can be said, is a domain-specific learning mechanism. (Compare what nativists say about the innateness of the language-faculty, which is obviously designed for learning.) Specifically, a nativist can claim that infants are innately endowed with certain core concepts (perhaps desire, belief, pretense, happy, sad, see, and tell) and certain basic principles of attribution (such as "seeing leads to believing"). Thereafter novel concepts can be acquired, and new principles of attribution learned, relying both on individual experiences and cultural input. So from this perspective it isn't surprising that culture might make a difference, nor that training might help performance. Moreover, it may be that the kind of learning that actually contributes to passing the tests making up the mindreading scale doesn't require enrichment of the target mental-state concepts at all. Rather, as we will see, it may be a matter of learning to recognize cues that signal the current topic of conversation or the most likely intent behind a question.

In addition, it is far from obvious that Wellman's own constructivist framework is internally coherent. Specifically, it is unclear that the delay between an ability to pass diverse-belief tasks and a capacity to pass false-belief tasks makes theoretical sense, from a constructivist perspective. This is because both tasks require a grasp of the representational nature of mind. In order to understand that two people can have different beliefs about the same subject matter, one needs to understand that the subject matter in question can be represented differently. But this is the *same* understanding as has often been thought to underlie grasp of the possibility of false belief, together with the ability to pass (verbal)

[1] Some of the tasks included in Wellman and Liu's (2004) initial battery of tests were dropped from follow-up studies, and will not be discussed here.