

Contents lists available at [ScienceDirect](#)

Cognitive Development

journal homepage: www.elsevier.com/locate/cogdev

Replications of implicit theory of mind tasks with varying representational demands

Lindsey J. Powell^{a,*}, Kathryn Hobbs^{b,c}, Alexandros Bardis^{b,d}, Susan Carey^b,
Rebecca Saxe^a

^a Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, Cambridge, MA, USA

^b Department of Psychology, Harvard University, Cambridge, MA, USA

^c Collaborative for Educational Services, Northampton, MA, USA

^d Calcot Services for Children, Reading, UK

ARTICLE INFO

Keywords:

Cognitive development
Theory of mind
Infancy
Replication
Social cognition

ABSTRACT

We attempted to reproduce three tests of theory of mind in infants using implicit tasks that have been previously reported in the literature. These efforts were intended as initial steps in larger projects aimed at building on past research to better understand infants' theory of mind capacities and their relationship to preschoolers' explicit theory of mind. One task fully replicated evidence of 2-year-old children's sensitivity to others' ignorance. The results of another task testing for similar capacities in 18-month-old infants also elicited behavior similar to the original findings, although in that case we only conducted one of two conditions critical for demonstrating that performance depended upon theory of mind capacities. In contrast, our violation of expectation tasks failed to reproduce evidence that, by 18 months of age, infants form specific expectations about the actions an agent will engage in on the basis of false beliefs. Instead, looking times were consistent with infants having no clear prediction about the agent's actions under conditions of false belief. We discuss factors that might account for our failure to reproduce the previously reported violation of expectation results on which we were attempting to build. However, we also discuss the consistency of our data with other findings and hypotheses regarding early-developing theory of mind, and consider the possibility that they reflect the veridical abilities of 18-month-old infants, who may track others' knowledge and ignorance but may not consistently represent the contents of others' beliefs.

1. Introduction

For twenty-five years, children's understanding of the inner workings of other minds was studied almost exclusively through what children could say, or predict, explicitly (Flavell, 1999). Children first systematically predict future actions based on false beliefs, explain past actions caused by false beliefs, and talk spontaneously about divergent beliefs, all in the fourth year of life and not before (Bartsch & Wellman, 1995; Perner, Lang & Kloof, 2002; Wimmer & Perner, 1983; Wellman, Cross & Watson, 2001). Although there were always critics, and alternative views (Leslie, 1994; Bloom & German, 2000), the data suggested a fairly coherent and cumulative scientific picture of the child's developing "theory of mind": an earlier stage when preschoolers understood others' perceptions and desires, followed by a later stage when children could also conceptualize meta-representational states like beliefs (Wellman & Liu, 2004; Saxe, Carey & Kanwisher, 2004).

* Corresponding author at: Department of Brain and Cognitive Sciences, 46-4017, 77 Massachusetts Ave, Cambridge, MA 02139, USA.
E-mail address: ljpowell@mit.edu (L.J. Powell).

<http://dx.doi.org/10.1016/j.cogdev.2017.10.004>

Received 16 February 2017; Received in revised form 21 September 2017; Accepted 4 October 2017
0885-2014/ © 2017 Elsevier Inc. All rights reserved.

Early evidence that even one-year-old infants understand others' false beliefs was, consequently, a scientific sensation. The first demonstration used infants' looking as a measure of their expectations (Onishi & Baillargeon, 2005). When the infant saw a person reach for an object where it *really was* instead of where the person *falsely believed it to be*, infants looked longer, showing that the reach violated their expectations. Since 2005, many groups, using many different methods, have found evidence for some understanding of others' beliefs in children under three years of age (e.g. Buttelmann, Carpenter & Tomasello, 2009; Kovács, Téglás & Endress, 2010; Knudsen & Liszkowski, 2012; Hamlin, Ullman, Tenenbaum, Goodman & Baker, 2013; Southgate, Senju & Csibra, 2007; Surian, Caldi & Sperber, 2007; Träuble, Marinović & Pauen, 2010; see Scott & Baillargeon, 2017 for a review). In contrast to the many failed attempts to elicit verbal reasoning or predictions about false beliefs from young 3-year-old children, these tasks indirectly assess infants' and toddlers' understanding of others' beliefs or their awareness of the state of the world by measuring the participants' spontaneously generated attention or behavior. Why the apparently conflicting results? One possibility is that infants' and toddlers' ability to think about other minds is limited by available cognitive resources. Answering an experimenter's direct question about hypothetical future actions (explicit tasks) might demand most of a toddler's available cognitive resources, leaving nothing left over for also thinking about false beliefs (Baillargeon, Scott, & He, 2010; Keen, 2003; Cheng & Holyoak, 1985). By contrast, passive viewing and spontaneous responding (implicit tasks) have minimal cognitive demands, so infants and toddlers can reveal richer abilities.

The key challenge now is to build a picture of the child's developing theory of mind that incorporates these new results. If infants and toddlers *can* track others' knowledge, where do the boundaries and limits of their abilities lie? Do infants and 4-year-old children have similar knowledge about others' false beliefs, and differ mainly in their ability to express that knowledge? Or is there developmental change in the scope, flexibility, or content of young children's concepts of beliefs? Relatedly, many implicit tasks are subject to richer and leaner interpretations. Some tasks could be passed by participants tracking only others' knowledge or ignorance (i.e. their "awareness") of an object or event, whereas other findings suggest a much richer capacity for inferring and representing the contents of others' beliefs (Baillargeon et al., 2010; Martin & Santos, 2016; Perner & Ruffman, 2005; Wellman, 2011). And, as in all active areas of research, more specific tests of infants' knowledge have yielded conflicting findings across research groups (Grosse Wiesmann, Friederici, Singer & Steinbeis, 2016; Kulke, Reiß, Krist, & Rakoczy, 2017; Thoermer, Sodian, Vuori, Perst, & Kristen, 2012; Yott & Poulin-Dubois, 2016).

To address these important questions, many researchers, including ourselves, sought to build on the early reports of belief understanding in 1- and 2-year-old children. Such attempts often involve initial phases in which a laboratory seeks to replicate the findings on which it wishes to build. Here we report the results of four such attempts to reproduce published findings, conducted in anticipation of performing follow up experiments to better understand how infants' early theory of mind, measured by implicit tasks, is related to their performance on explicit tasks as preschoolers. Our original plan was not to publish standalone replications – successful or failed – but to publish the results of additional, original experiments. The data are presented here in the same spirit: to help future researchers who may wish to build on existing studies.

We conducted close replications of studies by Knudsen and Liszkowski (2012) and Buttelmann et al. (2009), as well as two experiments based on published violation of expectation paradigms (Onishi & Baillargeon, 2005; Song, Onishi, Baillargeon & Fisher, 2008; Träuble, Marinović & Pauen, 2010), with procedural changes based on both our novel experimental goals and the original authors' advice. We found evidence consistent with the claim that infants and toddlers routinely track others' awareness of the state of the world. Across two large, well-powered samples, however, we failed to replicate evidence that infants form action expectations based on specific false beliefs. We also tested the possibility that variable performance reflected a real individual difference between infants who do, versus those who do not, understand false beliefs, and found no evidence for this hypothesis either. Both practical and theoretical lessons can be learned from these experiments.

2. Experiment 1

Several of our attempts at reproducing prior findings were components of a study testing if theory of mind performance on implicit tasks in infancy shares two features of explicit theory of mind performance in older children: coherent individual differences across tasks (Wellman & Liu, 2004) and a relationship to individual differences in executive function (e.g. Carlson & Moses, 2001). The study included measures of working memory and inhibitory control, as well as two implicit theory of mind measures: one interactive helping task and one violation of expectation (VOE) looking time task. Because our goal was to measure individual differences in the ability to track others' mental states, for both task types we ran only trials that tested for the attribution of false belief or ignorance, and not control trials in true belief conditions.

We tested an initial version of the VOE task by collecting a large, well-powered sample (over 2.5 times larger than the samples in the studies on which it was based; Simonsohn, 2015), and then used a revised version of this task in the main experiment on the relationship between implicit theory of mind task performance and executive functions. These two experiments are reported separately below as Tasks 2 and 3. Many of the participants in the initial VOE task also completed the interactive helping task, and the procedure for the helping task was not changed when we transitioned to the main experiment. In the Task 1 report below, we have thus collapsed across all participants tested with this common procedure for the sake of power, but we also discuss how performance on this task related to looking times elicited by the two VOE procedures when presenting Tasks 2 and 3.

2.1. Task 1: Interactive helping

Interactive tasks test infants' or toddlers' capacity to represent others' awareness or beliefs by observing how participants choose

Download English Version:

<https://daneshyari.com/en/article/7272196>

Download Persian Version:

<https://daneshyari.com/article/7272196>

[Daneshyari.com](https://daneshyari.com)