



## Full length article

## Desire understanding in 2-year-old children: An eye-tracking study

Amrisha Vaish<sup>a</sup>, Robert Hepach<sup>b</sup>, Tobias Grossmann<sup>a</sup><sup>a</sup> University of Virginia, United States<sup>b</sup> Leipzig University, Germany

## ARTICLE INFO

## Keywords:

Desire understanding  
Theory of mind  
Eye tracking  
Pupil dilation

## ABSTRACT

‘Much research has investigated children’s understanding of others’ mental states in terms of beliefs, but far less is known about their understanding of others’ desires. To fill this gap, we used an eye-tracking paradigm to test 2-year-old children’s desire understanding by measuring their anticipatory looking behavior as well as changes in their internal arousal (i.e., changes in pupil dilation). Children showed increased pupil dilation when an adult reached for an object she had previously emoted negatively towards (the object incongruent with her desire). Children also showed weaker evidence of anticipating that an adult will reach for an object that she had emoted positively towards (the object congruent with her desire). These results suggest that 2-year-olds robustly *recognize* whether or not an individual’s actions are consistent with her desires, and seem to have a budding capacity to *predict* an individual’s actions based on her desires. Thus, by age 2 years, children are on their way to acquiring a robust desire psychology.

Adults construe others’ behaviors in terms of internal states such as beliefs and desires. The development of this Theory of Mind begins early in childhood. Whereas early belief understanding has been extensively investigated over the past several decades (see Wellman, 2014), the development of desire understanding has received far less attention. Yet the ability to understand others’ desires and preferences is central to our social interactions, as it allows us to predict and explain others’ actions and reactions to events and objects in the environment and is thus vital for smooth social interactions. Our aim in the present study was thus to advance the study of Theory of Mind development by assessing young children’s understanding of others’ desires.

The meager work on the development of desire understanding stands in stark contrast to the vast research on early belief understanding. That extensive body of research had classically shown that children robustly grasp others’ beliefs by 4 years of age when tested on explicit tasks such as the Sally-Anne task (see, e.g., Wellman, 2014, for a review). In recent years, however, researchers have employed non-verbal measures to demonstrate implicit belief understanding at younger ages (see Baillargeon et al., 2010, for a review). For instance, by the second year, infants look longer when they see an actor searching for an object in a location that is incongruent with her false belief about its location than in a location that is congruent with her false belief (Onishi & Baillargeon, 2005; see also He et al., 2012; though see Yott & Poulin-Dubois, 2016). In addition, researchers have developed an innovative non-verbal method to assess children’s anticipation of others’ actions (Southgate et al., 2007; see also Senju et al., 2009). Specifically, these researchers used an eye-tracker to record infants’ anticipatory looking, i.e., to assess where young children expected an actor to look for a hidden object. Two-year-olds correctly anticipated that an adult would look in the location congruent with her belief about its location. Importantly, this was only the case for those children who formed predictions about the adult’s goal-directed behavior on a previous (familiarization) trial. Subsequent work found that 18-month-old infants did not show a similarly robust ability to anticipate an actor’s actions based on her false beliefs (Thoermer et al., 2012).

Such non-verbal approaches have greatly advanced the study of early belief understanding. Moreover, the two types of non-verbal measures provide distinct but converging evidence for a robust implicit understanding of false beliefs. Specifically, looking time methods such as those used by Onishi and Baillargeon (2005) provide evidence for young children’s ability to recognize belief-incongruent actions *after* the fact. It has been suggested that such post-hoc responses are importantly different from *anticipating* the

correct action *before* it occurs (Daum et al., 2012; Woodward & Cannon, 2013). Specifically, whereas post-hoc responses to actions involve comparing expectations about an action to the outcome of an action *after* it has been completed, action anticipation requires generating an expectation about an action *before* it is complete and thus entails using incomplete information to make a decision in advance about what is likely to happen (Daum et al., 2012; Gredebäck & Melinder, 2010). As such, action anticipation seems to be a more proactive and challenging process than responding to completed actions. Indeed, some research does suggest that action anticipation emerges later than infants' responses to completed actions (Daum et al., 2012; Gredebäck & Melinder, 2010). The research on belief understanding using measures of anticipatory looking, in conjunction with the research measuring post-hoc responses, demonstrate that a robust and active grasp of false beliefs emerges by 2 years of age (Southgate et al., 2007; Thøermer et al., 2012).

Strikingly, there has been very limited effort to develop similar non-verbal approaches to studying young children's desire understanding. Some foundational work indicates that children can reason about others' desires by 3 years of age. For instance, when presented with hypothetical scenarios or vignettes, 3-year-olds can infer that a person who desires an object will search for that object and persist in the search until the object is found (e.g., Wellman & Bartsch, 1988; Wellman et al., 2000; Wellman & Woolley, 1990). In work with younger children, 18-month-olds (but not 14-month-olds) were found to give an adult a food she expressed a preference for more than one she expressed dislike of, indicating an understanding of others' desires (Repacholi & Gopnik, 1997). However, subsequent efforts to replicate this finding have produced mixed results. In two studies that used a procedure very similar to Repacholi and Gopnik's (1997), 18-month-olds and 2-year-olds did not demonstrate desire understanding (Carlson et al., 2004; Wright & Poulin-Dubois, 2012). On the other hand, a more recent study using the violation-of-expectation paradigm found that 18-month-olds (but not 14-month-olds) looked longer when an agent acted incongruently rather than congruently with her desire (Yott & Poulin-Dubois, 2016; see also Phillips et al., 2002; Vaish & Woodward, 2010). These mixed findings leave unclear whether young children do indeed interpret others' behaviors in relation to their desires. Moreover, no prior work has explored whether young children can predict others' actions on the basis of their desires.

Our goal in the present study was to advance the study of desire understanding by employing an eye-tracking paradigm recently established in the false belief literature (Southgate et al., 2007) and combining it with a pupillometry paradigm. Note that we do not use the term 'understanding' to mean comprehending the concept of desires or consciously reasoning about desires, but rather to mean a sensitivity to or an implicit grasp of desires and the ability to act in - or form implicit expectations about - the world based on information about desires.

We explored whether 2-year-olds can predict that an individual will reach for an object she previously emoted positively rather than negatively towards. Our decision to test 2-year-olds was based on prior work using the eye-tracking method, which has shown that 2-year-olds can anticipate an agent's actions based on her false beliefs whereas infants younger than 2 years cannot (Southgate et al., 2007; Thøermer et al., 2012).

Importantly, eye-tracking technology also offers an additional non-verbal measure of reaction: pupil dilation. Pupil dilation reflects changes in a person's internal arousal similar to changes in heart rate or skin conductance (Bradley et al., 2008; Kahneman et al., 1969; Libby et al., 1973). Such changes in internal arousal are thought to be part of an orienting response towards novel information (Nieuwenhuis, De Geus, & Aston-Jones, 2011; Preuschoff, 't Hart, & Einhäuser, 2011; see Hepach & Westermann, 2016, for a review). Infants show increased pupil dilation to impossible physical and unusual or incongruent social events (Gredebäck & Melinder, 2010; Hepach & Westermann, 2013; Jackson & Sirois, 2009; Sirois & Jackson, 2012). Such increases in pupil dilation conceptually parallel increases in looking time to novel or unexpected events (Jackson & Sirois, 2009; Sirois & Jackson, 2012).

An advantage of measures of pupil dilation is that responses occur within a matter of seconds, thus allowing for more dynamic presentation of stimuli (Hepach & Westermann, 2016). Specifically, unlike looking time, pupil dilation is not a cumulative measure. As a result, pupil dilation data do not have to be collected on a still image until the participant looks away from the presentation screen. Rather, the dynamic nature of pupillary changes allows for video presentations or presentations of live stimuli, during which participants can remain engaged while changes in attention are recorded over very brief time intervals (see Hepach & Westermann, 2016, for a review).

Thus, in addition to measuring predictive looking, we added a novel piece to this paradigm by also measuring changes in children's pupil dilation (i.e., their reaction) to seeing the individual reach for the positive versus the negative object. Using eye-tracking thus allowed us to tap into both children's *predictions of* and their subsequent *reactions to* an individual's actions in relation to her desires, which other behavioral tests of children's mental state understanding have not yet been able to do.

Based on Southgate et al.'s (2007) findings showing that 2-year-olds use an actor's false belief to accurately anticipate her actions, we hypothesized that if 2-year-olds use desires to predict others' actions, they should accurately anticipate the actor's reach for the object that she previously emoted positively towards. Furthermore, we explored whether desire understanding is also evident in children's reactions to seeing an individual subsequently acting congruently versus incongruently with her desires. Based on prior positive findings with children in the second year (Onishi & Baillargeon, 2005; Repacholi & Gopnik, 1997; Southgate et al., 2007; Yott & Poulin-Dubois, 2016), we expected that 2-year-olds would show greater pupil dilation (i.e., surprise or arousal) upon seeing an actor reach for an object that she previously emoted negatively rather than positively towards.

## 1. Methods

### 1.1. Participants

A total of 49 2-year-old children were included (26 females;  $M = 25$  months, 8 days;  $Range = 24$  to 26 months; 25 children in

Download English Version:

<https://daneshyari.com/en/article/7272847>

Download Persian Version:

<https://daneshyari.com/article/7272847>

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