

## Talking about Minds: Social Experience, Pragmatic Development, and the False Belief Task

Evan Westra  
Department of Philosophy  
Email: ewestra@umd.edu

*I present a nativist proposal about theory of mind development that takes into account both children's social experiences and the maturation of their executive capacities. Specifically, I argue that we can understand the shift in children's performance on standard false belief tasks around four years of age partly as the result of learning about the pragmatics of belief discourse, and partly due to the maturation of their response-conflict inhibition capacity. In contrast to current nativist accounts, which explain this shift solely in terms of maturing executive resources, my "pragmatic development account" can accommodate evidence normally cited in support of empiricism about theory of mind development, including a wide range of evidence showing that social and linguistic experiences affect when individuals eventually succeed on the false belief task. Additionally, the pragmatic development account has the resources other phenomena in the theory of mind development literature, including the developmental priority of desire reasoning over belief reasoning.*

### **Introduction:**

Since it became a topic of empirical research, the study of children's theory of mind – their understanding of the underlying psychological nature of behavior – has been dominated by the discovery that younger children systematically fail false belief tasks, and start to succeed sometime after their fourth birthdays (Wellman, Cross, & Watson, 2001; Wimmer & Perner, 1983). The debate regarding the interpretation of this discovery has divided philosophers and psychologists along nativist and empiricist lines. Empiricists have claimed that the shift in performance on false belief tasks around children's fourth year signaled their acquisition of a genuinely meta-representational concept of belief (Gopnik & Wellman, 1992; Perner, 1991). Nativists argued that younger children's failures reflected a performance error related to children's underdeveloped executive and attentional resources and the processing demands inherent to the task, rather than a fundamental lack of competence with the concept of belief (Fodor, 1992; Leslie, Friedman, & German, 2004). In the two decades after the false belief task was first introduced as a measure of theory of mind development, both the empiricist and nativist camps remained firmly entrenched (see, for example, Scholl & Leslie's (2001) response to Wellman et al. (2001)). More recently, new methods for studying false belief understanding in preverbal infants appear to have vindicated the nativist position (Baillargeon, Scott, & He, 2010; Barrett et al., 2013; D. Buttelmann,

Carpenter, & Tomasello, 2009; D. Buttelmann, Over, Carpenter, & Tomasello, 2014; F. Buttelmann, Suhrke, & Buttelmann, 2015; Kovács, Téglás, & Endress, 2010; Senju, Southgate, Snape, Leonard, & Csibra, 2011; Southgate & Verneti, 2014). These studies seem to show that while younger children do systematically fail false belief tasks that attempt to elicit explicit, intentional responses, infants as young as 6 months of age appear to understand false beliefs in tasks where success is measured by their spontaneous, non-elicited responses, either with anticipatory looking, violation-of-expectation or active helping paradigms. Interpreting these findings has created a great deal of controversy, with a number of authors arguing that implicit measures do not demonstrate genuine meta-representational abilities (Butterfill & Apperly, 2013; Gallagher & Povinelli, 2012; Heyes, 2014; Perner, 2010). I will not be addressing these arguments in this paper, however. In what follows, I will be taking a nativist interpretation of these findings for granted, so that I may engage with other, as of yet unresolved issues within prominent nativist accounts of theory of mind development.<sup>1</sup>

I argue that even if they are right about the new infancy data, nativist accounts of children's understanding of mental states still have room for improvement when it comes to explaining various individual differences in children's performance on elicited response, verbal false belief tasks (hereafter FBTs). Specifically, accounts that emphasize the on-line demands that these tasks place on children's executive resources cannot explain why certain forms of social experience appear to influence when young children start to succeed on FBTs. Empiricists about theory of mind typically cite such findings as evidence *against* nativism; the goal of this paper is to show how they are in fact consistent with an innate basis for theory of mind. In so doing, I seek to emphasize an element of the nativist research program that has not been adequately appreciated by non-nativists (nor, perhaps, sufficiently emphasized by nativists themselves): contemporary nativist approaches to the mind are meant as explanations for how individual learning takes place; they do not deny that individuals ever learn at all, or that innate knowledge is never enriched (*pace* Fodor (1975)). In the case of theory of mind, nativist interpretations of early competence ought to be consistent with a role for individual experience. It's therefore incumbent upon the nativist about theory of mind

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<sup>1</sup> For nativist replies to the above-mentioned arguments, see Baillargeon et al. (2010); Carruthers (2013) and Scott & Baillargeon (2014).

to show how various types of experience can lead to individual differences in theory of mind development.

My proposal, which I'll call the *pragmatic development account*, is that while young children are capable of representing beliefs early on in development, they are not yet very good at *talking about them*. In spite of the fact that they constantly attribute beliefs, desires, goals and intentions to other agents, understanding when these pre-linguistic concepts are implicated in conversation is not just a matter of acquiring the right vocabulary. Young children do not initially expect people's beliefs to be a topic for conversation – they have to learn this through experiences with the pragmatics of belief discourse– that is, during social interactions in which facts about mental states are implicated in conversation. Through these repeated interactions, children acquire a familiarity with the contextual and linguistic cues that signal the conversational relevance of beliefs. As a result, different levels of experience with mentalistic discourse can affect how children interpret questions like the ones they must answer in FBTs.

The pragmatic development account is not wholly new. Siegal and Beattie (1991) proposed a Gricean account of younger children's habitual failure on FBTs. They argued that three-year-olds are typically too inexperienced to pick up on experimenters' conversational implicatures during the FBT; as a result, they fail to grasp the relevance of mentalistic factors to the experimenters' questions, opting instead for a more familiar, world-oriented interpretation. Thus, when children hear "Where will Sally look for her marble?" they interpret it as, "Where will Sally have to look for the marble *in order to find it?*" rather than "Where will Sally look for her marble *first?*" Siegal and Beattie supported this interpretation by showing that three year olds tended to pass a modified version of the FBT in which they were asked the latter question, even though they would still fail when asked the first. Later, Surian and Leslie both replicated Siegal and Beattie's findings and expanded upon them by showing that a similar manipulation failed to improve the performance of a control group of individuals with autism spectrum disorder (a population widely believed to suffer from a chronic theory of mind deficit) (Surian & Leslie, 1999). Lewis et al. (2012) and Dudley et al. (2014) also propose a version of the pragmatic development account to explain the development of children's understanding of the verbs "think" and "know;" their research will be

discussed in more detail below. In this paper, I argue that this type of account can explain a wide range of individual differences in FBT performance as well as other key developmental findings in the theory of mind literature. I also emphasize how consideration of pragmatic, social factors in fact complements standard nativist accounts of children's performance on FBTs.

### **1. A challenge for existing nativist accounts**

Many of the prominent nativist accounts of theory of mind development have focused on the demands that the FBT places on executive functioning. Baillargeon and her colleagues have argued that children fail this task because it overwhelms their executive resources. Baillargeon's *response account* posits that younger children are unable to cope with the demands of simultaneously attributing a false belief, selecting a response to the experimenter's question, and inhibiting a prepotent tendency to answer the experimenter's question with her own knowledge, perhaps due to still immature connections between mindreading and executive regions of the brain (Baillargeon et al., 2010). Carruthers (2013) holds a similar view, but emphasizes that all three components of FBTs – attributing a false belief, interpreting the experimenter's question, and generating a response that will communicate the appropriate information to the experimenter – involve mindreading (see also Sperber & Wilson, 2002). According to this *triple mindreading account*, executing each of these tasks simultaneously places heavy demands on both processing resources internal to the mindreading system and general executive resources, both of which may be insufficiently developed in younger children. Along similar lines, Leslie and colleagues have argued that success on FBTs is modulated by the development of a domain general *selection processor* responsible for inhibiting the mindreading system's tendency to attribute the subject's own beliefs to others by default (Leslie, German, & Polizzi, 2005; Leslie & Polizzi, 1998).

All of these accounts have been bolstered by findings that suggest that when the executive demands of the FBT are reduced, children start to pass before their fourth birthday (Rubio-Fernández & Geurts, 2013), as by the finding that explicit false belief queries disrupt automatic perspective tracking even in adults (Rubio-Fernández, 2013; Schneider, Lam, Bayliss, & Dux, 2012). They also cohere well with a wide range of

findings showing that advanced executive capabilities are predictive of earlier success on the FBT (for a review and meta-analysis, see Devine & Hughes, 2014). Specifically, early success on the FBT is predicted by the development of the component of executive functioning that is responsible for children's performance on response-control inhibition tasks, which require children to simultaneously inhibit dominant responses while selecting competing, subdominant ones, which is consistent with all three of the accounts described above (Benson & Sabbagh, 2005; Carlson, Moses, & Breton, 2002).

These accounts are all correct in pointing out that executive factors play an important role in success on FBTs; in fact, I will argue that executive factors actually play an additional role in theory of mind development beyond what is described above.

However, any account that appeals solely to the maturation of children's executive abilities as an explanation of how they come to pass the FBT is ultimately underequipped when it comes to explaining the various experience-related factors that influence explicit false belief performance. For instance, it's been shown that the extent to which a child's mother talks about mental states predicts how early that child will begin to succeed on FBTs (Ruffman, Slade, & Crowe, 2002; Symons, Fossum, & Collins, 2006; Symons, 2004). Beyond maternal interactions, children with older siblings also appear to have an advantage on the FBT (Perner, Ruffman, & Leekam, 1994; Ruffman, Perner, Naito, Parkin, & Clements, 1998). Further, interventions that train children on various aspects of mental state discourse have tended to improve children's performance on FBTs (Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003; Slaughter & Gopnik, 1996; Wellman, 2012).

Exposure to language in general also has dramatic effects on when children are able to pass the FBT. Deaf children born to hearing parents who are exposed to sign-language late in life are significantly delayed on explicit false belief tasks when compared to both hearing children and deaf children born to deaf parents (whose FBT performance is comparable to that of hearing children) (Peterson, Wellman, & Liu, 2005; Wellman, Fuxi, & Peterson, 2011). Notably, this delay is not the result of any sort of congenital neurological abnormality (as is the case with children on the autism spectrum, who also exhibit atypical performance on false belief tasks) but is instead due to purely environmental factors. In spite of this delay, late-signing deaf children still reliably

display the same developmental progression through various types of theory of mind problems as typically developing children (e.g. succeeding on problems involving diverse desires before problems involving false beliefs; see section 4). However, late-signing deaf children are able to succeed earlier on FBTs after they are exposed to theory of mind-based interventions using “thought bubbles” that draw attention to individual’s mental states (Wellman & Peterson, 2013).

Some of the most striking evidence for the importance of experiential factors in theory of mind development comes from a natural experiment that took place in Nicaragua during the last few decades of the 20<sup>th</sup> century. In 1977, an expanded elementary school for special needs children was opened in Managua. Here, for the first time, deaf children in Nicaraguan came into extended contact with one another. Although their education was conducted in Spanish, amongst themselves the students began to develop their own novel system of gestural communication, an amalgamation of the various children’s idiosyncratic home-sign gestures. This system of gestural communication was expanded as older students passed it on to new ones, and rapidly developed into a full-fledged sign language known today as Nicaraguan Sign Language, or NSL (Senghas, Kita, & Ozyürek, 2004). Importantly, the version of NSL acquired by its earliest speakers was less complex than the one acquired by later speakers, particularly with respect to mental state terms (Pyers & Senghas, 2009). In a longitudinal study comparing the performance of earlier “first cohort” and later “second cohort” speakers of NSL, Pyers and Senghas found that first cohort speakers systematically failed a non-verbal elicited-response version of the FBT, while second cohort speakers were generally successful. In a follow-up several years later, the performance of the first cohort speakers on the FBT had significantly improved. Pyers and Senghas attributed this improvement to an intermingling between first and second cohort speakers of NSL, leading the first cohort speakers to acquire a greater facility with mental state discourse. Note that one could not plausibly attribute the change in the first cohort speakers’ performance on the FBT to a development in executive abilities (as the nativist might for the parallel change in performance in 3-4 year olds), as these subjects were adults at the time of the first test, and likely possessed fully mature executive resources. Indeed, both the difference between first and second cohort NSL speakers and the change in first cohort speakers’

performance appear to be the result of social experiences specifically related to mental state discourse.

Explanations of FBT performance that appeal solely to the on-line demands that the task places on executive resources do not tell us much about why these kinds of experiences affect when an individual ultimately overcomes those demands. Even if important maturational changes to children's executive resources do occur between the ages of three and four, and individual differences in executive functioning do correlate with individual differences on the FBT, it's not obvious how these internal cognitive developments could explain why an individual's social experiences also seem to matter for their performance on the FBT. This suggests that, in addition to executive factors, a child's social environment makes an independent contribution to her performance on the FBT.

## **2. The pragmatic challenges of mental state discourse**

A number of constructivist empiricist accounts have argued that the acquisition of language plays an important, perhaps necessary role in the development of theory of mind, but there is wide disagreement about which aspects of language are relevant. Various authors have proposed a crucial role for complementation syntax (de Villiers & Pyers, 2002), mental state vocabulary (Montgomery, 2005), and the social experience that comes with linguistic interactions (Dunn & Brophy, 2005; Harris, de Rosnay, & Pons, 2005; Tomasello & Rakoczy, 2003); however, in a recent meta-analysis of the theory of mind and language literature, Milligan, Astington, and Dack (2007) were unable to identify a special role for any single aspect of language independent of general language ability. In all, after controlling for age, they determined that linguistic factors accounted for roughly 10% of the variance in theory of mind abilities (for comparison: in their meta-analysis, Devine and Hughes (2014) determined that, after controlling for age and verbal ability, executive functioning and false belief understanding had approximately 8% shared variance). However, their meta-analysis did not evaluate the impact of studies concerning the effects of social experience on theory of mind development, such as the training studies of Hale and Tager-Flusberg (2006) and Lohmann and Tomasello (2003) mentioned in the previous paragraph. This leaves open

the possibility that the social experience afforded by language makes an independent contribution to theory of mind development as measured by the FBT. In particular, different levels of experience with mental state discourse appear to have noticeable effects on FBT competence. Empiricist accounts that emphasize social factors typically claim that such experiences are conducive to the construction of new mental state concepts. As children observe and engage in social interactions, according to this approach, they begin to detect progressively higher-order relational patterns in behavior. Gradually, they note the relationships between these observed regularities and words that refer to mental states. Together, these relational patterns and mentalistic vocabulary items bootstrap children into a genuinely representational theory of mind (Low & Simpson, 2012; San Juan & Astington, 2012). But from a nativist perspective, this kind of interpretation will not do, since by hypothesis the relevant concepts are already present. How then is the nativist to interpret this sort of evidence?

To answer this question, we need to note something important about talking about mental states: learning to do it is hard. This is because words that express mental state words lack observable referents. We cannot see beliefs, desires, or intentions.<sup>2</sup> All we ever witness are the behaviors that issue from them. Further, any single behavioral event could be aptly characterized by multiple mentalistic and non-mentalistic descriptions (for instance, a particular facial expression might be described as mentalistically as “giving disbelieving look” or as non-mentalistically as “raising an eyebrow”). Our knowledge of another person’s mental states is thus underdetermined by our observations of behavior. According to nativists about theory of mind, we are able to overcome this learning problem *in thought* because we automatically interpret behaviors via innately channeled inference mechanisms that output mental state concepts. However, learning to apply these concepts in *linguistic interactions* is another story. A novice speaker of a language, even one who possesses a full repertoire of mental state *concepts* still faces a learning problem when it comes to interpreting utterances as being *about* mental states. After all, the nativist’s hypothesis is about where our conceptual understanding of mental states comes from, not how we learn to talk about

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<sup>2</sup> The learning problem for mental state verbs appears to be much greater for belief-verbs than for desire-verbs (Rakoczy et al., 2007; Wellman & Woolley, 1990). I discuss how my view accounts for this data below.



mental states. Even if innate mindreading mechanisms compensate for the under-determination of mental state information at the level of thought, under-determination may nevertheless still pose a problem when it comes to understanding when these concepts are implicated in conversation. These challenges are evident in the development of children's use of mental state verbs. In contrast to physical action verbs like "throw" or "run," which are acquired before the second birthday (Huttenlocher, Smiley, & Charney, 1983), most children do not begin to produce "think" and "know" until their third year (Shatz, Wellman, & Silber, 1983).

It is important to stress that the learning problem when it comes to talking about beliefs can arise *even for someone with an adult understanding of mental state concepts*. To illustrate, suppose that you are a novice French speaker visiting a friend in Montreal. The day you arrive, you take a walk with her and her daughter in a park. During your walk, you witness the daughter recoiling from a dog running off its leash. The dog's owner, a francophone, gestures towards her and says, "*Elle pense que le chien soit agressif.*" As a non-francophone, there are many ways for you to interpret this utterance given the observable context. One interpretation might simply be a physical description of the event itself: "She is recoiling from the dog." The correct interpretation would, of course, be "She thinks the dog is aggressive," but note that there is nothing about the child's bodily motions nor the dog owner's gestures that privileges this latter interpretation over the former. Even though you possess mature mental state concepts, and you may even have independently arrived at the thought, *she thinks the dog is aggressive*, you may still lack the information needed to infer that this is what the speaker wishes to communicate to you. Without further evidence, you have no grounds to assume that the mentalistic interpretation is more salient. This is not a problem with your understanding of other minds – it's a problem with applying that understanding in a particular interpretive act. Resolving this problem is a matter of picking up on the right contextual and linguistic cues that enable you to infer the right speaker meaning behind the utterance. If such cues are not present, or if you do not notice them, then your interpretation of the speaker's utterance will not appeal to belief concepts.

Papafragou et al. (2007) illustrate this fact about belief-verbs in an elegant series of experiments. They hypothesized that both children and adults would be more likely to

describe a scene in terms of actors' beliefs when they are provided with additional cues that make mentalistic interpretations more salient. Specifically, the authors predicted that the presence of syntactic cues from sentences with clausal complement structure (e.g. "Sally believes THAT the marble is in the box,") or situational cues in which a character acts on a false belief would prompt subjects to use more belief words. They presented both adults and children between the ages of three and five with silent scenarios showing actors engaged in various activities. Some of these scenarios showed actors performing simple actions, while others showed the actors acting on false beliefs (e.g. absent-mindedly drinking from a flower vase that had been placed where their water glass was while they were not looking). In some cases, these scenes were accompanied with nonsense sentences containing either a clausal complement structure introduced by 'that' (e.g. "Vanessa LODS that she ziptorks the siltap"), a transitive structure with a direct object ("Vanessa VAMS the torp"), or an intransitive structure ("Vanessa TROMS"). Across their experiments, they found that both the false belief scenario and the clausal complement cue substantially increased both adults' and children's references to beliefs when describing what they saw. This effect was strongest when both cues were co-occurring; when such cues were absent, they tended to describe the scene using non-mentalistic vocabulary. These results show that talk of beliefs needs to be prompted by the appropriate cues – it does not issue seamlessly from mere observation.

Another factor adding to difficulties associated with learning to talk about beliefs is that the verb "think" is not always used to attribute propositional attitudes. Often, "think" is used in indirect speech acts as a way of proffering a complement clause that the speaker takes to be true. To illustrate, consider the following exchange:

Agnes: When does the game start?

Roberta: I think that it starts around 7pm.

Interpreted literally, Roberta has responded to Agnes' question by self-attributing a belief about the game. But this interpretation would be bizarre: facts about Roberta's mental states are orthogonal to the question under discussion, and Roberta's referring to them would seem to violate the maxim of quantity by bringing up irrelevant

information. Of course, we do not interpret Roberta's utterance in this manner because it is clear that the primary illocutionary act being performed is not, in fact, about Roberta's mental states, but rather about the game itself; similarly, the primary illocutionary act behind the familiar "Could you pass the salt?" is a request for salt, not a call for reflection about whether there are possible worlds in which the addressee is a salt-passer (Searle, 1975). In the exchange above, Roberta is using "think" as a way of indirectly endorsing the truth of the complement clause, namely, that the game starts at 7pm. Used in this manner, sentences of the form "S thinks that P" become pragmatically enriched so that they imply that the speaker takes its complement takes P to be true; in contrast, literal, attributive uses of "S thinks that P" are neutral with respect to the truth of P. Thus, utterances containing "think" often require an additional inference about speaker meaning to determine whether it is being used indirectly or attributively, which in turn impacts whether or not the complement clause is being asserted as true (Simons, 2007).

This, in combination with the referential opacity of mental state terms, means that interpreting utterances containing "think" poses substantial challenges for the novice speaker. Indeed, corpus analyses of child-directed speech reveal that the overwhelming majority of adults' uses of think are of the indirect variety; correspondingly, most of younger children's early uses of "think" are tend to be indirect and first-personal in nature, rather than genuine attitude ascriptions (Bloom, Rispoli, Gartner, & Hafitz, 1989; Diessel & Tomasello, 2001; Shatz et al., 1983). Children below the age of four also seem to show non-adult-like comprehension of "think," and often seem to treat it as equivalent to "know" (Johnson & Maratsos, 1977; Moore, Bryant, & Furrow, 1989). Multiple authors have interpreted younger children's difficulties with epistemic verbs as evidence of an underlying conceptual deficit: younger children make mistakes with "think" and "know" because they lack the concepts those words express (Perner, Sprung, Zauner, & Haider, 2003; Tardif & Wellman, 2000). However, Dudley et al. (2014) and Lewis et al. (2012) have proposed that children's difficulty with these verbs is due to pragmatic rather than conceptual factors (see also Lewis, 2013). According to this hypothesis, three-year-olds do in fact have the appropriate semantics for "think," but they tend to make incorrect inferences about the intentions behind the utterances in which they occur, treating literal uses of mental state verbs as indirect by default. This

'pragmatic development hypothesis' predicts that experimental manipulations that make attributive interpretations of utterances containing mental state verbs more salient should lead to more adult-like performance on comprehension tasks.

To test this prediction, Lewis et al. (2012) presented a sample of four-year olds with vignettes in which cartoon characters played a game of hide-and-seek. After watching one or more characters hide, participants first interacted with a puppet that would ascribe beliefs to the seeker (e.g. "Dora thinks Swiper is behind the toy box,") and then were asked by the experimenter whether or not what the puppet said was correct. In their first experiment, participants tended to give incorrect truth-value judgments when the puppet accurately ascribed false beliefs to the seeker. However, in their next experiment, a *second* seeker with conflicting beliefs about the location of the hider was added to the vignette. In this experiment, participants' truth-value judgments about the puppet's belief ascriptions improved across all conditions. To explain this improvement, the authors suggest that children in the 1-seeker condition failed because they defaulted to an indirect interpretation of the puppet's use of "think", which led them to infer that the puppet was in fact proffering a false statement. By introducing another conflicting perspective to the scenario, the authors were able to highlight the relevance of the first seeker's beliefs in the child's conversation with the experimenter, which led the children to interpret the puppet as using "think" attributively and give the correct answer. This suggests that the subjects' initial responses were not based on a failure to represent the character's beliefs, but rather a failure to correctly interpret the speaker meaning behind the original belief ascription made by the puppet.

Notably, standard nativist accounts of children's theory of mind development that stress the development of executive functioning would not have predicted this result. Such an account would have predicted that the addition of the second seeker would have made the task harder, since adding another perspective to the situation would have given the subjects yet another concurrent mindreading task and increased the executive burden of the task. The fact that adding the second seeker did not have this effect is further evidence that demands on executive functioning are not the crucial factor in FBTs.

Building on the work of Lewis and colleagues, Dudley et al. (2014) were able to demonstrate adult-like comprehension of “think” in three-year-olds by making the differing presuppositions of the verbs “think” and “know” salient in an interactive game. In this study, children’s task was to guess the location of a toy hidden in one of two boxes. Children received clues in the form of attitude reports about a “shy” puppet that would whisper its beliefs about the location of the toy into the experimenter’s ear. To succeed on these tasks, children had to understand that “S thinks that P,” “S knows that P,” “S doesn’t think that P,” and “S doesn’t know that P” each provide different degrees of evidence about the truth or falsity of P; in other words, in order to use the clues provided to them, participants needed an adult-like semantics for “thinks” and “knows.” Dudley and colleagues found that three-year olds successfully interpreted clues involving “thinks,” suggesting they possessed a mature semantic understanding of the verb that they were able to draw on when it was relevant to their immediate goal of finding the toy. Thus, it appears that children are capable of comprehending at least some mental state verbs in an adult-like manner before their fourth birthday, provided that parenthetical interpretations have been excluded by contextual and linguistic factors.

One thing that the Dudley et al. (2014) and Lewis et al. (2012) studies tell us is that we should expect younger children to have difficulties on FBTs that ask them what a particular agent *thinks* (e.g. Jacques & Zelazo, 2005; Low & Simpson, 2012): in those tasks, children are likely defaulting to an indirect interpretation of the verb, rather than an attributive one. However, many standard FBTs ask a child where a particular character will *look* (e.g. Wimmer & Perner, 1983), and it’s less obvious how the above results shed light on those tasks. But these studies, along with Papafragou et al. (2007), also reinforce the broader point that mentalistic interpretations of speech are in general less salient than non-mentalistic ones in the absence of the cues to their contextual relevance. This gives an important insight into how a younger child might interpret an experimenter’s queries during a FBT. As the experimenter asks, “Where will Sally look for her marble?” the child makes a pragmatic inference about what the experimenter really wants to know right from the onset of the wh-question (Rubio-Fernández, 2013). What she infers will depend upon which information she thinks is relevant in that context. If the child attends to the right cues, she may infer that answering the question

under discussion requires that she appeal to facts about the agent's mental states; however, if these cues are not present, or if the child is not sensitive to them, then it would not be at all obvious to her that in order to tell the experimenter what he wants to know, he must consider facts about the psychology of the agent. It could be that this possibility does not even occur to the child; if it does, it may still lose out to other contextual factors that make the actual location of the marble seem more relevant.

For instance, Siegal and Beattie (1991) suggest that children may interpret the question under discussion as "Where will Sally *find* the ball?", given that obtaining the ball is Sally's ultimate goal in the FBT scenario, and children treat the impending resolution of this goal to be highly salient. Helming and colleagues (2014) offer a slightly different, though perhaps complementary explanation: altruistically concerned that Sally should fulfill her goal, children in the FBT assume that the experimenter is in fact soliciting their assistance; they thus interpret "Where will Sally look for her ball?" as "Where *should* Sally look for her ball?" But regardless of how the child in fact interprets the false belief query, the fact remains that the string of words uttered by the experimenter underdetermines the child's judgment about how to respond. In order for the child to answer correctly, she needs to be receptive to information signaling that facts about mental states are contextually relevant, such that she can both suppress erroneous interpretations of the experimenter's question and select the appropriate one.

At this point, the importance of social experience for belief discourse becomes clear: children who have had more opportunities to observe and participate in conversations about minds seem to be better attuned to the linguistic and contextual cues that signal the conversational relevance of psychological facts. They may, for instance, gradually encounter more situations in which non-mentalistic interpretations of speech fail to explain speakers' behavior, forcing them to entertain alternative, mentalistic interpretations. In this manner, children may come to learn that the mentalistic concepts they deploy to interpret the behavior of others are also regularly implicated (either explicitly or implicitly) in everyday speech, especially in contexts involving diverse beliefs (Lewis et al. 2012), testimony (Dudley et al. 2014) and false beliefs (Papafragou et al., 2007). This newly acquired knowledge prompts children to adjust their prior expectations about the potential relevance of belief-facts to their inferences

about speaker meaning. This may in turn help them better disambiguate parenthetical and non-parenthetical uses of “thinks,” and, most importantly for our current discussion, accurately interpret experimenter queries in the FBT.

This experience could be achieved via exposure to maternal “mind-minded” conversation (Ruffman et al., 2002), interactions with older siblings (Perner et al., 1994; Ruffman et al., 1998), or various forms of explicit training (Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003). Notably, the absence of these experiences would lead to corresponding delays on FBTs. Late-signing deaf children, for instance, are not exposed to mental state discourse until primary school, and consequently they show delays in explicit false belief performance (Wellman et al., 2011); yet, when they are exposed to mentalistic training interventions, they rapidly improve (Wellman & Peterson, 2013). The first cohort of Nicaraguan signers did not even possess mental state vocabulary when Pyers and Senghas (2009) first tested their explicit false belief competence, which they systematically failed. Several years later, after being exposed to the mental state vocabulary of the second cohort, their performance markedly improved. According to this account, what developed in the interim was not a new set of mental state concepts; rather, it was their sensitivity to the contextual factors that rendered mental states conversationally salient. For the late-signing deaf-children, their general deficit in linguistic experience meant that they lacked crucial experience with belief discourse; Wellman and Peterson’s intervention succeeded in compensating for this deficit. For the first-cohort Nicaraguan signers, the language itself was impoverished with respect to mental state terms, which resulted in impoverished experience with mental state discourse. These findings, which resist explanation under accounts that appeal solely to the executive demands of the FBT to explain systematic failures, are convincingly explained under the pragmatic development account. But more importantly, they point to the specific importance of experience with mental state vocabulary in improving children’s performance on the FBT, even when mental state terms fail to arise in conversation. These experiences provide a developmental scaffold for the ability to understand when psychological facts are conversationally relevant.

### **3. Revisiting the role of executive functioning in the FBT**

The pragmatic development account does not undermine the claim that FBTs place substantial demands on on-line executive processes, but it does mean that we need to revise and elaborate upon how we think these demands actually impact children's performance on the task. The initial non-salience of mental states helps us understand why younger children default to a reality-biased response rather than simply responding at chance: given the information they have deemed contextually relevant based on their conversational experiences, the reality-biased answer is just the best response available. After all, most of a child's prior experience and current evidence would support the interpretation that the experimenter is asking about the location of a hidden object (or the actual contents of a container); therefore, the child complies. At this point, the child's failure on the task amounts to a lack of attentiveness to relevant features of the task, rather than a processing overload. This is perhaps the most counterintuitive element of the pragmatic development account: while we, as adults, see younger children's reality-biased responses on FBTs as a bizarre breakdown in rationality, there is an important, internalistic sense in which this reply is actually epistemically justified for them given their prior experiences.

However, as children begin to recognize the relevance of belief facts in conversation, they must inhibit the highly salient reality-biased interpretation in order to put that information to good use. This requires that children exercise their response-conflict inhibition capacity; if this capacity is not sufficiently mature, then children's difficulties with the FBT will persist, perhaps leading to improved but still inconsistent success rates. As children's capacity for response-conflict inhibition develops, they become increasingly able to suppress the reality-biased interpretation and solve the FBT. In other words, even though pragmatic factors account for their initial failures on the task, and social learning explains how these pragmatic obstacles are diminished, children's eventual success on the FBT depends on the development of their executive resources.

Of the existing nativist accounts of younger children's systematic failures on the FBT, the pragmatic development account has the most in common with the triple mindreading account (Carruthers, 2013). Both views highlight the fact that interpreting the experimenter's query involves mindreading, and propose that this is where the problem starts. However, they differ with respect to how this interpretive element in the



FBT leads to error. According to the triple mindreading account, the FBT query overwhelms children's mindreading resources, causing them to cease to represent the mentalistic information and default to a reality-based response. According to the pragmatic development account, that mentalistic information is still processed, represented, and available, but the child fails to use it because she deems it irrelevant to the question under discussion. In other words, the triple mindreading account tells us that the error is the result of a flaw in the still-developing mindreading system, whereas the pragmatic development account tells us that the error results from the child assigning a low prior probability to the mentalistic interpretation of the FBT query in an otherwise functional system.

The main reason why we should prefer the pragmatic development account over the triple mindreading account and other processing load accounts is that it is better able to explain why various experiential factors predict individual differences in FBT performance. However, a defender of one of these accounts might question whether the pragmatic development account is compatible with all of the data that speak to the integral relationship between mindreading and executive resources. Specifically, she might challenge the claim that beliefs still get represented during the FBT. Indeed, there is some evidence that automatic perspective tracking (which nativists take to be a component of the innate ToM system) can be disrupted by multiple factors. For instance, Schneider and colleagues (2012) showed in an eye-tracking study that automatic perspective tracking in adults is disrupted when subjects are placed under a working memory load (i.e. while completing an *n*-back task). Similarly, Rubio-Fernández (2013) showed that adults' automatic perspective tracking is momentarily disrupted right at the onset of the *wh*-question in the FBT, which the author interprets as an effect of the pragmatic demands on interpreting the question. These findings would seem to suggest that automatic perspective tracking is largely dependent on executive resources, and that interference of various kinds can throw it off track.

In actual fact, this sort of objection is not fatal to pragmatic development account, although each of the above-mentioned studies requires its own reply. First, the Schneider et al. (2012) data: importantly, the present account does not claim that pragmatic errors are the *only* reason that a child might fail the FBT. Obviously, if some

versions of the FBT place a child under a heavy cognitive load, this too could cause the child to fail; in this regard, the Schneider et al. (2012) findings are consistent with the proposed account. In order for these findings to undermine the pragmatic development account, they must cast doubt on its central developmental claim, which is that children's *systematic* failures on the FBT prior to their fourth birthday are the result of pragmatic error. Notably, studies with adults can only offer us indirect insight into this sort of developmental change. However, even if we grant that the disturbance caused to adults' perspective tracking by working memory load probably occurs in children as well, this still does show that such a disturbance is responsible for children's systematic failures on the FBT; in fact, we have good reason to believe that it is not. Recall that the strongest correlations between early success on the FBT and executive functioning are specific to response-conflict inhibition, not working memory (Carlson et al., 2002). This gives us an independent reason to believe that the relationship between working memory and automatic theory of mind processing does not explain the developmental change that takes place between a child's third and fourth birthday. So, although working memory load may contribute to difficulties on some versions of the FBT, as the Schneider et al. (2012) data suggest, this is probably not what makes younger children systematically fail the task. Thus, these data fail to undermine the central developmental claim of the pragmatic development account.

Next, let us consider the challenge posed by the Rubio-Fernandez (2013) data. The defender of the triple mindreading account might claim that the disturbance in perspective tracking caused by the onset of the *wh*-question is evidence that the automatic theory of mind system has ceased representing the agent's beliefs altogether and instead shifted to the task of interpreting the experimenter's beliefs. But while there is evidence that the subject's visual attention shifts away from the agent's perspective at the onset of the *wh*-question, the further claim that that this perspectival information has simply disappeared is not uniquely supported by the findings in question. It's just as plausible, given the evidence, that the relevant perspectival information continues to be represented, but that younger children simply fail to use it. On my account, the onset of the disruption caused by the *wh*-question does not overwhelm children's mindreading resources – it simply changes the subject, leading children (and perhaps, momentarily, adults) to attend to other features of the situation. Thus, the Rubio-Fernandez (2013)

data is not inconsistent with the pragmatic development account. In sum, the current account, the triple mindreading account, and other nativist alternatives would appear to be on a par with respect to these adult perspective tracking data. Given that the current account also explains the above-mentioned individual differences in FBT performance, nativists about ToM ought to prefer it to the alternatives.

The pragmatic development account also makes a few predictions that would serve to distinguish it from other nativist accounts. Building on the surprising 2-seeker result from Lewis et al. (2012), the pragmatic development account predicts that the addition of conflicting perspectives to an FBT might actually lead to improved performance in younger children on if the difference in perspectives served to make the agent's beliefs more conversationally salient. More generally, manipulations that make the content of the agents' beliefs more relevant to the child's goals (like in Dudley and colleagues' interactive game design) ought to improve performance even when holding the executive demands of the task constant. Testing these predictions would certainly require some ingenuity to create the appropriate experimental controls, but as we've seen, such experiments can indeed be implemented. The pragmatic development therefore offers theory of mind nativists both a compelling way to account for apparent counterevidence, and a set of empirical predictions to guide future research.

#### **4. Other advantages of the pragmatic development account**

An appreciation of the importance of social learning for FBT performance also reveals an additional role for executive functioning that goes unmentioned in the standard nativist accounts. Several authors have claimed that measures of executive functioning correlate with theory of mind abilities because executive functioning facilitates the acquisition of mental state concepts (Carlson & Moses, 2001; Moses, Malle, & Hodges, 2005; Russell, 1996). Given that executive functioning appears to play an important role for learning in other abstract conceptual domains, such as mathematics, this is a very plausible suggestion (Blair & Razza, 2007; Bull & Scerif, 2010; Espy et al., 2004). Consistent with such accounts, Benson, Sabbagh, Carlson, & Zelazo (2013) found that children's initial performance on executive functioning tasks predicted the effectiveness of interventions aimed at improving children's performance on FBTs. However, on the

current proposal, we might interpret these results slightly differently: rather than facilitating the emergence of mental state concepts, executive resources appear to play an important role in learning the pragmatic cues associated with mental state discourse. Children who are better able to inhibit the tendency to default to non-mentalistic interpretations in the presence of the appropriate syntactic and contextual cues will be better positioned to notice further contextual factors that tend to co-occur with belief discourse, which would amplify their advantage on FBTs. Thus, executive processes may play a role in a child's success on FBTs over and above managing the inhibition of non-mentalistic interpretations, namely by facilitating important aspects of social learning during mind-minded conversations.

The pragmatic development account also helps us understand another major developmental finding in the theory of mind literature, namely that children consistently succeed on verbal tasks that implicate the concept of desire well before those that involve false beliefs (Hadwin & Perner, 1991; Rakoczy, Warneken, & Tomasello, 2007; Wellman & Woolley, 1990). Explaining these findings has proven challenging for nativists, who hold that basic conceptual understanding of both belief and desire emerge in the first year of life. Leslie and colleagues (Leslie et al., 2004) have argued that desire-based tasks are less demanding on a child's executive resources than FBTs; however, Rakoczy et al. (2007) have shown that the desire-false belief gap persists even when both types of task are matched for logical complexity. An initial prediction of the pragmatic development account is that the explanation for this phenomenon is likely to have its roots in children's conversational experiences, and indeed, there is reason to believe that this might be the case. As Rakoczy and colleagues (2007) have pointed out, explanations of behavior tend to refer to desires only, leaving the relevant belief attributions implicit in the conversational common ground.<sup>3</sup> For instance, if I see Sally opening up the cookie jar, I can explain her behavior adequately by saying, "Sally is opening the jar because she wants a cookie," without mentioning her beliefs. This is because I know that you're likely to infer on your own that Sally believes that the jar contains cookies, since my explanation only makes sense given such a

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<sup>3</sup> See also Steglich-Petersen and Michael (forthcoming) for an explanation of why this is the case.

presupposition.<sup>4</sup> Further, as we learned from Papafragou et al. (2007), it is ordinarily only in situations involving either ignorance or false belief that tend to explicitly refer to beliefs, whereas talk of desires occurs in a much wider range of situations. This leads to the prediction that belief talk simply occurs less frequently in everyday speech; and indeed, there is some evidence that this is in fact the case (Smiley & Huttenlocher, 1989; Taumoepeau & Ruffman, 2006). Moreover, the multiple uses of epistemic verbs would render that input much noisier than desire-verbs, making it even harder for children to detect the relevant patterns. One would expect, then, that proficiency with desire-discourse would precede proficiency with belief-discourse, as the input for the former would be both greater and more easily interpretable than the input for the latter. Thus, according to the current account, children succeed on tasks involving desire before they succeed on tasks involving belief because desire-discourse is more frequent and poses fewer pragmatic demands than belief-discourse.

### **Conclusion:**

It is worth noting that the pragmatic development account is not meant to show that the FBT tells us *nothing* interesting about theory of mind development. Even if it does not demarcate a transition to a fully representational theory of mind, the FBT tracks significant elaboration of a child's theory of mind abilities. As children become better able to participate in belief discourse, they gain access to new source of knowledge into other minds, namely, the testimony of others. Insofar as this improves children's ability to track, predict and explain mental states, passing the FBT signals a major development in their theory of mind abilities. Nevertheless, under the current proposal this development would consist in an elaboration upon existing knowledge rather than a radical conceptual change. Through their conversational experiences, children gain insight into the dynamics of belief discourse, which broadens their evidential basis for mental state attribution.

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<sup>4</sup> This is a weak form of *presupposition accommodation*, which takes place whenever speakers dynamically update the set of propositions that are taken to be a part of the common ground in response to changes in the conversational context. Thus, for example, a felicitous utterance of "It was Jon who broke the doorknob" presupposes that the doorknob has been broken, and this leads the listener to infer that "the doorknob has been broken" is now a part of the common ground (Stalnaker, 1998).

In this paper, I've illustrated how learning to use psychological information in conversation poses substantial challenges for young children that have nothing to do with whether or not they possess the concept of *belief*. Recognizing the dissociation between a child's mental state concepts and her capacity to understand when mental states are conversationally relevant highlights a new way of interpreting the relationship between children's early social experiences and their performance on FBTs. A child innately endowed with the concepts of *belief*, *desire*, *intention* and *goal* must still learn from her social environment how and when these concepts get implicated in conversation. If her social environment is enriched or impoverished with respect to belief discourse, this will have an impact on when and how she learns to talk about other minds. The development of her executive functioning plays dual roles in this process, both during the tasks that measure her competence with belief discourse, and during the social learning process through which she acquires that competence. The pragmatic development account thus provides the theory of mind nativist with a framework for accommodating a wide range of variation in FBT performance brought on by differences in individuals' social experiences, as well as set of empirical predictions for testing and extending that framework and enriching our understanding of theory of mind development.

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