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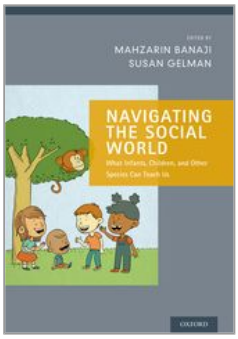

Navigating the Social World: What Infants, Children, and Other Species Can Teach Us
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Why Don’t Apes Understand False Beliefs?

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Abstract and Keywords

The reasons why apes do not understand false beliefs are uknown. However, this chapter shows that looking at precisely what they do and do not understand about the psychological states of others in general—what they understand about goals, intentions, perceptions, and epistemic states—can provide specific insight on what it takes to understand that someone has a false belief. It presents two possible explanations for the difference between knowledge and belief. The first is that understanding a belief as false involves some kind of conflict—a conflict in which the most salient alternative, namely the agent's own knowledge of what is the case, must be suppressed or ignored. The second explanation—which shares some features with the first but aims to specify more precisely why the difficulty arises in specific tasks—is that great apes lack some specific cognitive capacities that are needed in

order to understand false beliefs. The chapter then considers the debate in developmental psychology about when young children understand false beliefs, and whether the current analysis of apes is relevant to this debate.

Keywords: apes, false beliefs, psychological states, intentions, perceptions, epistemic states, knowledge

To give away our punch line at the beginning: We don’t know why apes don’t understand false beliefs. But it turns out that looking at precisely what they do and do not understand about the psychological states of others in general—what they understand about goals, intentions, perceptions, and epistemic states—helps us to be much more specific about what it takes to understand that someone has a false belief.

Apes Understand Goals and Perception

Great apes (most of the research is with chimpanzees) understand that others have goals and intentions (where intentions include not just a goal but a chosen behavioral means to that goal; Tomasello, Carpenter, Call, Behne, & Moll, 2005). The evidence is as follows:

> When a human passes food to a chimpanzee and then fails to do so, the ape reacts in a frustrated manner if the human is doing this for no good reason (i.e., is unwilling), whereas she waits patiently if the human is making good-faith attempts to give the object but failing or having accidents (i.e., is unable, Call, Hare, Carpenter, & Tomasello, 2004).
>
> When a human or conspecific needs help reaching an out-of-reach object or location, chimpanzees help them—which requires an understanding of their goal (Warneken & Tomasello, 2006; Warneken, Hare, Melis, Hanus, & Tomasello, 2007).
>
> When a human shows a human-raised chimpanzee an action on an object that is marked in various ways as a failed attempt toward a goal, the ape, in her turn, actually executes the intended action, not the actual action (Tomasello & Carpenter, 2005).

When a human shows a human-raised chimpanzee a series of two actions on an object, one of which is marked in various ways as accidental, the ape, in her turn, usually executes only the intended action (Tomasello & Carpenter, 2005).

When a human-raised chimpanzee sees a human perform an unusual action to produce an interesting result, she only reproduces it if the human did so freely, not if she was constrained to do so by the situation—she understands something of the circumstances under which the human pursued her goal (Buttelmann, Carpenter, Call, & Tomasello, 2007).

Great apes (most of the research is again with chimpanzees) also understand that others have perceptions and knowledge (where knowledge means just acquaintance with, e.g., someone saw an object at a location a few moments ago and so knows it is now there). Evidence is as follows:

When a human peers behind a barrier, apes move over to get a better viewing angle to look behind it as well (Bräuer, Call, & Tomasello, 2006; Tomasello, Hare, & Agnetta, 1999).

When a human gazes at a barrier and there is also an object further along the scan path, apes look only to the barrier and not to the object—unless the barrier has a window in it, in which case they look to the object (Okamoto-Barth et al., 2007).

When apes beg a human for food, they take into account whether the human can see their gesture (Kaminski, Call, & Tomasello, 2004; Liebal, Call, Tomasello, & Pika, 2004).

When chimpanzees compete with one another for food, they take into account whether their competitor can see the contested food (Hare, Call, Agnetta, & Tomasello, 2000), and they even attempt to conceal their approach from a competitor (p.82) (Hare, Call, & Tomasello, 2006; Melis, Call, & Tomasello, 2006).

When chimpanzees compete with one another for food, they take into account whether their competitor knows the

location of the contested food (because he witnessed the hiding process a few moments before; Hare, Call, & Tomasello, 2001; Kaminski, Call, & Tomasello, 2008).

Interestingly and importantly, the vast majority of these studies have counterparts in human children, with the typical age of success being around 1 to 2 years of age. The conclusion is thus that apes and young children both understand in the same basic way that individuals have goals (and intentions) in the form of an internal representation of some desired state of the world. They also understand in the same basic way as young children that individuals perceive (and know) things in the world and that this affects their goal-directed actions. In a review of all the extant literature, Call and Tomasello (2008) conclude that great apes, like human 1-year-olds, operate with a kind of perception-goal psychology about how others “work” as psychological beings.

But Not False Beliefs

In contrast to all of these positive findings on the social cognition of great apes, in the past few years our laboratory has produced four solid negative results on the ability of great apes to understand others’ false beliefs. What makes the negative results solid is that we have appropriate control conditions that rule out the possibility that subjects did not understand basic task requirements, were overwhelmed by task demands, and so forth. In addition, two of the studies were conducted with human 4- to 5-year-olds with positive results, and the other two are very similar to experimental paradigms in the literature in which 4- to 5-year-old children also show proficiency (the standard change-of-location and change-of-content tasks).

Table 2.3.1 lists some of the specifics of the four studies. For the sake of simplicity, let us simply describe two of them. In one of the studies of food competition cited earlier (Hare et al., 2001), we directly compared a knowledge-ignorance test and a false-belief test. The basic idea was this. In a competitive situation, a subordinate chimpanzee knew that a dominant would get the food if she could see it. In one study we manipulated whether the dominant saw the hiding process: Was she knowledgeable or ignorant about the hidden food’s

location? If the dominant was ignorant, then the subordinate should expect her to go to the two hiding locations randomly. In another study, the dominant saw the food being hidden in one location, but then while she was not looking it was moved to another location—and the subordinate saw all of this. In this case, the dominant was not just ignorant but had a false belief about where the food was located. If subordinates understood this, then they should have been able to predict that she would go to the “false” location, that is, the place where the food was no longer hidden. But they did not. In general, they behaved similiarly in the ignorance condition and the misinformed (false belief) condition: In both cases they assumed she would be guessing where the food was located. Kaminski et al. (2008) used a very different experimental paradigm—but also with both a knowledge-ignorance and a false-belief test—and found exactly the same result.

In another one of these studies, Krachun et al. (2010) use a change of contents paradigm. Chimpanzee subjects first learned that a human experimenter always placed grapes in one bucket and banana pieces in a different bucket. Then the experimenter continued this training, but first placed the grape or the banana in a small box before putting the box inside the bucket. Now came the test. The experimenter placed, for example, a grape in the box and closed it in preparation

Table 2.3.1. Summary Characteristics of Five Studies Finding That Chimpanzees Do Not Understand False Beliefs

	Partner	Social Relation	Control	Training	Response
Call & Tomasello (1999)	Human	Cooperation	Various	Train	Object choice
Krachun et al. (2009)	Human	Cooperation	True belief	Little train	Object choice
Hare et al. (2001)	Chimp	Competition	Ignorance	No train	Food competition

	Partner	Social Relation	Control	Training	Response
Kaminski et al. (2008)	Chimp	Competition	Ignorance	Little train	Chimp chess
Krachun et al. (2010)	Human	Neutral	Ignorance	Train	Object choice

(p.83) for putting it in the bucket. But then a research assistant switched the grape for a piece of banana and re-closed the box. In the false-belief condition this occurred while the experimenter had her back turned or was out of the room, whereas in a true-belief condition the experimenter watched the assistant making the switch. In such studies with young children, by about 4 to 5 years of age they understand that in the true-belief condition the experimenter knows about the switch and so will place the box in the bucket corresponding to its new content, whereas in the false-belief condition she does not know about the switch and so will place the box in the bucket corresponding to the old content (what she falsely believes to still be in there). In contrast, Krachun et al. (2010) found that chimpanzees made no difference between the two conditions. In an otherwise very different paradigm employing a change-of-location task with both false-belief and true-belief conditions, Krachun et al. (2009) found very similar results.

It is a truism in experimental psychology that negative results can have many different explanations. To conclude with any confidence that subjects do not have a certain competency, there must be control conditions, which share all of the task demands of the main conditions in which the subjects perform competently. Each of these four studies of chimpanzees’ understanding of false beliefs—that is, their lack of understanding—had a very convincing control condition in which subjects performed well, two of them a true-belief control and two of them a knowledge-ignorance control. This means that the negative results cannot be attributed to subjects not following the procedures or otherwise being distracted by task demands. One can never say never in science—perhaps someone will come up with a more clever, more sensitive test next week—but our considered opinion at this point is that chimpanzees and other great apes simply do not comprehend false beliefs.

What Is the Explanation?

So what is so different about knowledge and belief? Or about true belief and false belief? We think there are two answers to this question that are not mutually exclusive.

The first is that understanding a belief as false involves some kind of conflict, and indeed, in the tasks used, a conflict in which the most salient alternative, namely the agent’s own knowledge of what is the case, must be suppressed or ignored. When a child is asked about another person’s knowledge or true belief, the correct answer is what she, the child, already believes to be true. No conflict. But, as is well known, questions about false belief require the child to suppress or ignore her own knowledge (overcome the pull of the real or the curse of knowledge) in order to identify what the other person falsely believes.

Evidence that this conflict between perspectives is a cause of children’s difficulty with false-belief tasks is provided by studies correlating children’s executive function skills with their false-belief skills (e.g., Carlson, Moses, & Breton, 2002; Sabbagh, Moses, & Shiverick, 2006). While working memory and some inhibitory skills such as planning and delay of gratification do not predict success on the false-belief task, inhibitory control tasks that involve some conflict (e.g., the bear-dragon test) do (Carlson et al., 2002). Because chimpanzees and other apes never pass the false-belief task, correlational studies of this type are not possible. It is widely believed that great apes have poor skills of inhibitory control and other executive functions, but in actuality the evidence is mixed depending on the task applied (Call, 2010; Vlamings, Hare, & Call, 2010). We are currently assessing a wide battery of tasks of self-regulation with chimpanzees, and it is already clear that they are not without some skills. Whether they have the kind of skills necessary to suppress their own belief to assess another’s false belief is at the moment unknown.

Another explanation—which shares some features with the first but aims to particular more precisely why the difficulty arises in specific tasks—is that great apes lack some specific cognitive capacities that are needed in order to understand

false beliefs. In the philosophical literature, beliefs occupy a special place. The reason is that beliefs are differentiated from knowledge-by-acquaintance because with beliefs the subject knows that she might be wrong. If I am familiar with something, I just am familiar with it. But if I believe something, that means that there is some possibility that I might be in error.

The best-known philosophical analysis is that of Davidson (1982). Davidson introduces the notion of “triangulation,” which is very similar to the notion of “joint attention” from developmental psychology. The claim is that the notion of error can only arise in social situations in which another person and I simultaneously focus on the same object or event —but somehow differently. If I believe one thing, and then round the corner to find out that something else is the case, this does not require me to notice, let alone conceptualize, the discrepancy between reality and my former (p.84) belief, because they are not two different perspectives on the same situation simultaneously—perhaps the world changed as I was rounding the corner. However, when two people are looking at the same thing at the same time, “space is created” (to use Davidson’s metaphor) for the concept of error to enter the picture.

The issue was formulated in a developmental context by Moll and Tomasello (2007a) as follows. The notion of triangulation presupposes that we are both focused on the same object and that we share the knowledge that we do. Only if this shared knowledge (or joint attention or intersubjectivity) about this shared object structures our social interaction is the notion that we have different perspectives intelligible. If you look out of the window at the house across the street and I look out of the window as well but focus on a bicycle in front of the house, we do not have different perspectives, but simply different objects of perception: We just see different things. However, if we share attention to the bicycle but see it from different points of view, then it is appropriate to say that you have one perspective on it while I have another. Of course, once children understand that there are different ways of seeing the same thing, another person need not be present to complete the triangle in every case: The “generalized other” can now

take the place of another individual. The child has come to realize that “one” (whether self or other) could be wrong about things or see things differently. But, initially in ontogeny, a joint attentional interaction with another person is required to elicit the clash of perspectives necessary in order to comprehend perspectival differences.

This analysis is relevant in the current context because it is arguably the case that great apes do not participate in joint attention or any other form of triangulation. From the empirical studies cited earlier, we know that chimpanzees can detect when someone cannot see something, even in situations where they themselves can see it. But they do not need the concept of perspective to do this. They are competing with the other, and they are computing his line of sight to see whether he has seen the food they are contesting. Either he does or he does not, but this does not involve the kind of confrontation of perspectives that false belief understanding entails, and the reason it does not is that the food is not a shared target of “our” attention—it is simply blocked from your vision. What creates the possibility of error and doubt is a common epistemic target but with a “space” between you and me that enables the possibility of different perspectives and error to arise.

At the moment there is no evidence that great apes engage in anything like joint attention (or shared knowledge or intersubjectivity) in the human manner. They do look back and forth from objects to social interactants (Carpenter Tomasello, & Savage-Rumbaugh, 1995), but they show none of the phenomena of child development that depend on joint attention. They do not comprehend human pointing gestures whose intended referent is recoverable only if they are in joint attention with the human pointer (see Tomasello, 2006, for a review); they do not attempt to establish joint attention with others by pointing themselves, even when given adequate opportunities; and they are not able to judge whether something is old or new to a person based on whether they have shared attention on that item with the person previously (Tomasello & Carpenter, 2005). With one another in the wild, whereas again there is mutual visual monitoring of conspecifics, there are no phenomena that would seem to be

generated by any form of joint attention or mutual knowledge (e.g., such things as communicative conventions, social norms, social institutions, etc., which all depend in one way or another on shared “agreements” on how we do things).

And so the second answer is that because apes do not participate with others in any form of joint attention, they do not have any sense of different perspectives on the same entity, and therefore they do not comprehend that it is possible for someone to be in error or to have doubts about whether their own “take” on the situation is the right one.

What About Children?

There is currently a very important debate in developmental psychology about when young children understand false beliefs, and perhaps the current analysis of apes is relevant to this debate. Classically, as everyone knows, young children were thought to understand false beliefs when they passed either the Sally Anne task (change of location) or the Smarties task (change of content), at about 4 to 5 years of age (Wellman, Cross, & Watson, 2001). But, as everyone also knows, several recent studies have been interpreted as demonstrating false-belief understanding (or at least sensitivity to false beliefs) in 1- to 2-year-olds (e.g., Buttelmann, Carpenter, & Tomasello, 2009; Onishi & Baillargeon, 2005; Senju, Csibra, & Southgate, 2007). These studies use different methods than the classic tasks, and so the debate represents clashes about methods and definitional criteria as well as substantive theories. **(p.85)**

In the current analysis, we can argue that children should actually be expected to begin understanding false beliefs soon after their first birthdays because that is when they start sharing attention with others and begin to show an understanding that others may not know things they themselves know—where “knowing” in this context simply means to be familiar or acquainted with an object (e.g., Moll & Tomasello, 2007b; Tomasello & Haberl, 2003). However, something is still missing at this point. In the analysis of Moll and Meltzoff (in press), infants during the second year of life can *take* the perspective of others, but they struggle when

different perspectives *confront* one another (see Perner, Stummer, Sprung, & Doherty, 2002). In the case of false beliefs and different visual perspectives the clash or confrontation may be obvious because the alternatives are mutually exclusive: believing an object to be in a certain location or seeing a visual array from a specific viewpoint makes it impossible to have a different construal or view of the situation at that time (I cannot at the same time believe the chocolate to be in the drawer and in the cupboard, or see the turtle right-side-up and upside-down). But a confrontation of perspectives can come about even when they are not incompatible or mutually exclusive in this sense. For example, a particular animal can be called both a “horse” and a “pony” (in the alternative naming task; Doherty & Perner, 1998) or a “deceptive object” can be a sponge that has an appearance of a rock (in the appearance-reality task; e.g., Flavell, 1993). However, children younger than 4 to 5 years nonetheless *treat them* as somehow mutually exclusive or as competing for the same “role” of naming the object’s identity. They do not allow for, at least in their explicit judgments, other ways of “seeing” an object besides the one that is most obvious to them at the time. The ability to resolve confronting perspectives thus enables children at around 4 to 5 years of age to pass not just false-belief and visual perspective-taking tasks but also appearance-reality and alternative naming tests.

For this account to work, it would need to be the case that the infant studies showing an understanding of or sensitivity to false beliefs do not involve confronting perspectives. This is clearly true in a study using active behavioral measures. Buttelmann et al. (2009) had 18-month-olds watch while an adult placed her favorite toy into a box. He then left the room (in the false-belief condition) and the child and a research assistant moved the toy to a different box. The adult then returned and approached the box in which she had placed her toy and tried to open it. The research assistant told the child to “help him.” The children did not try to help him open the box he was struggling with, but rather went and retrieved the toy from the other box. In a true-belief condition in which the adult stayed in the room and watched the transfer, children did not go fetch the toy but rather tried to help them open the

box he was struggling with. The reason why there are no conflicting perspectives here is that the infant is not trying to determine the adult’s belief but rather his goal. She is asking herself: “What is he trying to do?” and she is answering it differently depending on the knowledge state of the adult. But because the focus is not on the belief itself, it does not end up being confronted with the child’s own knowledge of the situation. In Senju, Csibra, and Southgate’s (2007) study, infants simply looked to the location in anticipation of where an agent would emerge based on his belief (i.e., one location if he believed the reward was there and another location if he believed the reward was there), but again, without having to make a reference to the other’s belief directly, which would lead to a confrontation with the child’s own knowledge. In Onishi and Baillargeon’s (2005) study, since it simply involves looking times, infants only need to notice that something is not going as it normally does (people usually look for objects where they last saw them, but this adult is not doing that). The more general point is that there is no possibility of error in looking-time experiments, because the infant is just attending to what grabs her attention, not making a judgment.

In any case, the current proposal is that understanding false beliefs requires understanding that another person and I share attention to or knowledge of one and the same reality (which we know together), while at the same time having different perspectives on it. Although chimpanzees and other great apes understand goals and perception, they do not understand false beliefs because they do not fulfill the prerequisite of sharing attention with others (in the sense that they do not mutually know they are doing this), and so the notion of perspective does not arise at all. One-year-old human children share attention and develop a rudimentary and, at first, implicit understanding of perspectives inside such joint attentional frames. They thus perform well in tests that are set up in a way that other agents act in accordance with a false belief—as long as they need not (p.86) explicitly reason about the false belief or predict the behavior that follows from it, because this is exactly what requires comparing or confronting of perspectives. Older children become much better at comparing different perspectives when they confront one

another in various ways, and this enables them to pass false belief and many other tasks from the standard “theory of mind” battery that are more demanding than the infant studies in these ways (see Moll & Tomasello, in press).

The larger theoretical perspective—brought into especially clear relief in the great apes—is that understanding false beliefs is not like understanding goals, perception, and other “simple” mental states. Understanding false beliefs requires grasping the possibility of different views of the same thing, which relies on more basic skills of joint attention to establish the shared reality about which there may be differing beliefs.

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