

## 1. Introduction. The value and challenges associated with animal belief

It's common to think that animals think. The cat thinks it is time to be fed, the monkey thinks the dominant is a threat. In order to make sense of what the other animals around us do, we ascribe mental states to them. The cat meows at the door because she wants to be let in. The monkey chooses not to take the test because he doesn't remember the answer.

We explain other animal action in terms of their mental states, just as we do with humans. One of us has argued that our science of animal minds requires that animal behavior be explained in such terms, and this doesn't lead to a problematic use of folk psychology or anthropomorphism (Andrews 2016). By "anthropomorphism" we mean the attribution of human psychological, social, or normative properties to non-human animals ("usually with the implication it is done without sound justification" (Shettleworth 2010, 477). And by "folk psychology" we mean the commonsense practice of seeing action as caused or accompanied by mental states like belief and desire, emotions, and seeing people in terms of their moods or personality traits, as well as categorizing complex behaviors as examples of grieving, communicating, or teaching (Andrews 2012). The use of folk psychology when talking about animals need not be anthropomorphic, without it we cannot organize behaviors as types of behavior—as seeing behavior, fear behavior, memory behavior—and without organizing behaviors into types we cannot study those types of behaviors.

Despite our widespread practice of attributing thought to animals, and the arguments in favor of its use in science, the nature of these mental states so many are happy to see in other animals remains unclear. To help bring some focus into the discussion, we will examine the attitude of belief. In this chapter we will examine the various possible statuses of animal beliefs, and the implications of those various views for our folk practice as well as our scientific investigations.

## 2. Representational belief

While everyone uses the term "belief", in our everyday discourse we tend to use the term to refer to one's conviction in the goodness, accuracy, or existence of something ("I don't believe in God" "I believe in her" "I believe the restaurant is closed on Mondays"). Oddly, reference to belief both expresses strong commitment in a proposition, and uncertainty about the truth of a proposition. When psychologists and philosophers speak of belief, what is of interest is more similar to what the folk refer to as "think." The cat thinks it is time for dinner, the monkey thinks he will get the answer wrong if he takes the test. Recent research finds that the folk use of the term "think" also comes in at least two varieties—a thin belief "involves representing and storing P as information" and a thick belief that adds an attitude to the representation of P; one might "like it that P is true, emotionally endorse the truth of P, explicitly avow or assent to the truth of

P, or actively promote an agenda that makes sense given P” (Buckwalter, Rose and Turri 2013, 2).

What is taken for granted here is that belief is some sort of representation. Belief as a representation of information is such the chestnut that it is rarely questioned. There are varieties of representationalist views that differ on the nature of the vehicle; we might represent information propositionally, imagistically, as a map, as causal relations, as analogue magnitudes, some combination of these, etc. The most common vehicle comes from Fodor’s *language of thought hypothesis*, according to which the vehicle of thought has a complex linguistic structure (Fodor 1975). Fred Dretske captures the traditional philosophical view of belief when he describes it as “inner representation of the world,” that is “represented . . . in the internal language of thought” (Dretske 1983: 14). Eliminativists agree that our conception of belief is representational, but they deny that such states exist (see Churchland 1981, Feyerabend 1963, Rorty 1965, Stich 1983). Even those who dislike belief often think of it as representational.

### 2.1. Worries about representational belief in animals

Taking belief to be akin to language results in immediate challenges to understanding how animals that lack language could have beliefs. Michael Dummett raises this worry in his discussion of a dog that is routinely attacked by other dogs when traveling a particular path (Dummett 2010). As the dog walks the path, sometimes he is attacked by one dog, sometimes by a pack, and the dog victim learns to use different techniques in these different situations; he stands his ground when there is only one aggressor, and turns and runs when there are more. We might want to explain the standing-his-ground behavior by saying he thinks there is only one dog on the path. But to make that attribution, the dog would need all the concepts that we attribute to him, including the concept “one,” which requires corresponding numerical concepts that we might never have reason to attribute to the dog. So, we shouldn’t attribute the belief that there is only one dog on the path to our dog victim. Furthermore, there is no substitute concept we can attribute to the dog. As Dummett puts it, “So the dog does *not* have the very thought by which we express the feature of the situation he has recognized. Conversely, we have no linguistic means of expressing just what it is he recognizes. Animals without language cannot have the very same thoughts we express in language” (Dummett 2010, 118).

If animals and humans cannot share the same thoughts, then humans cannot attribute thoughts to animals, for the content will also be a misrepresentation. As Stephen Stich (1979) put it, ascribing content to animals that they do not share is to make an invalid logical inference, to move from attributing an opaque *de dicto* statement to the dog—one that captures *how* the dog thinks about the aggressors—to a transparent *de re* statement—one that refers to the objects, properties, and situations in the world.<sup>1</sup> If we think that Dummett’s dog has the concept “one,” then we should be able to generalize to other numbers, to single objects in other contexts, etc., but such generalizations would lead to false predictions. Given that we cannot say

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<sup>1</sup> Stich was responding to a suggestion by David Armstrong that we can fix the content of animal belief *de re* (Armstrong 1973).

what animals think, Stich suggests it doesn't make sense to say that animals think anything. Without knowing what an animal thinks, the beliefs we attribute to them are empty.

## 2.2 Responses to worries about representational animal belief

Dummett and Stich's worry about animal beliefs have been addressed by those who think that animals have a representational vehicle of thought that we have access to. We can review three kinds of responses. First, similar worries arise when attributing content to other humans—children who do not yet have the adult concept, other cultural groups who use unfamiliar concepts, and even adults of our own culture who disagree about the nature of the concept, such as “life” or “murder.” But this doesn't raise serious problems when it comes to human belief attribution. The child may lack the adult concept of Canada, but adults can still attribute to her the belief that she lives in Canada without raising any worries about what *exactly* she thinks about Canada. Consider the child who learns her father is the one who hides the Easter candy, and we say that she thinks her father is the Easter Bunny. We would completely misrepresent the situation were we to characterize the child's belief as the belief that her father has long ears and hops around hiding candy for children every spring, even though this would be the result of a valid inference from the premises.

Colin Allen explains why we shouldn't worry about capturing the exact content of a thought in our belief attributions to humans or other animals by arguing that language only approximates our cognitive states, which are fluid and come in more shades and degrees than our language can accommodate (Allen 2013). What I mean when I say, “I like to swim” may differ depending on the context; for example, it may sometimes express a thin belief that isn't associated with any affect, and in other cases it may express a variety of thick beliefs that have various degrees of commitment and motivation associated with it.

A second set of replies offer positive proposals about how we can attribute content to nonlinguistic creatures such as nonhuman animals. Allen (2013) thinks we can abstract away from the details of our representations, treat them as multi-dimensional objects, and use a transformational rule to show that two cognitive systems can think the same thing. In developing his account, Allen thinks we will be able to better understand how the problem of imprecision occurs, and how it can be addressed. Mark Rowlands (2012) thinks we can characterize animal beliefs without using concepts that the animals themselves use; by using a specific kind of *de dicto* content he calls tracking:

*(Tracking)*: Proposition  $p$  tracks proposition  $p^*$  iff the truth of  $p$  guarantees the truth of  $p^*$  in virtue of the fact that there is a reliable asymmetric connection between the concepts expressed by the term occupying the subject position in  $p$  and the concept expressed by the term occupying the subject position in  $p^*$  (Rowlands 2012, 58).

Tracking allows us to attribute to the child the belief that her father is the Easter Bunny without forcing us to make predictions about her dad growing long ears and breaking into the children's houses around the neighborhood to hide candy; it

allows us to see patterns of behavior, and gives us terms to characterize those patterns.

José Bermúdez (2003) relies on a similar insight about the relationship between beliefs and patterns of behavior in his development of a success semantics, in which the content of a belief is that which would satisfy the animal's desire by causing the appropriate action. Bermúdez thinks that that we have already learned a lot about the content of animal beliefs via cognition research, and the skepticism Stich expressed about the inability of ever getting close to knowing what an animal believes is unwarranted given what we have found about the way prelinguistic children structure the world via nonverbal paradigms such as looking time, violation of expectation, and anticipatory looking studies cognition (e.g. Spelke 1990, Spelke et al. 1989, Spelke and Van de Walle 1993). Bermúdez concludes that "nonlinguistic creatures are perfectly capable of perceiving a structured world" (81), and that to understand that structure we just need to study it.

A third response to the worry about specifying animal belief on a representational account of belief is to challenge the assumption that the vehicle of representation is linguistic. Others have described animal belief as nonconceptual. Let's return to Dummett's example of the dog. While the first pass attempt to ascribe content to the dog referred to the number concept "one," it may be that the dog has another kind of numerical representational system instead of a conceptual one. The findings that many species can discriminate between arrays of objects shows evidence of numerosity without language. Pigeons (Rilling & McDiarmid 1965), rats (Mechner 1958), monkeys (Hauser et al. 2003), chimpanzees (Biro and Matsuzawa 2001), orangutans (Shumaker et al. 2001), and dolphins (Kilian et al. 2003) are among the species that have demonstrated some understanding of number. However, they do not appear to represent numerosities as integers, because they find it much more difficult to discriminate between small differences in number than between large ones. These capacities have also been found in human babies (Xu and Spelke 2000) and human adults (Barth and al. 2003). This general trend has been characterized by Weber's law, according to which the ability to discriminate two magnitudes is a function of their ratio. While some take this as evidence of an approximate number system mapped onto a language of thought (e.g. Susan Carey 2009), Jacob Beck (2012) argues that the animal capacity to keep track of numerosities cannot be explained this way, because it implies a systematicity that isn't evidenced by the animal and child behavior. Instead, because the approximate number representations cannot be expressed in sentences that obey the generality constraint, this behavior indicates the existence of a nonpropositional representational system of analogue magnitudes.

Other representationalists who think that animals have beliefs that do not take a representational vehicle include José Bermúdez 2003; Elisabeth Camp 2009; and Michael Rescorla 2009. Camp argues that beliefs can be represented as images such as diagrams or maps. In response to an argument primatologists Dorothy Cheney and Robert Seyfarth offer in favor of a linguistic representational vehicle for baboon belief (Cheney & Seyfarth 2007), Camp (2009) argues that the features of thought that Cheney and Seyfarth point to as evidence of language of thought in baboons can also be evidence of a non-sentential representational system. The view that animals can have perceptual beliefs that ought not be understood in terms of propositional attitudes has also been defended by Glock (2000, 2010).

## 2.3 Conclusions about animal representational belief

The worries about ascribing belief by using language to nonlinguistic animals are based largely on a realist commitment to the existence of a language of thought that easily maps onto spoken language. Turning to use nonlinguistic representation helps avoid the worry about language, but doesn't capture our practice of ascribing belief to animals linguistically, and can't immediately vindicate our inclusion of nonlinguistic creatures into the subjects of our folk psychological practices. Of the views presented above, Rowlands' and Allen's best accommodates our typical practice of ascribing beliefs to animals, babies, people with cognitive disorder, and people across cultures who might lack our concepts (and some of these might lack concepts all together). They both appeal to the use of language to track behaviors in others, without any commitment to the exact structure of the cognitive system that behaves in this way. These views lead us to consider an entirely different approach to the nature of belief that is nonrepresentational. If representational commitments haven't helped us better understand animal cognitive systems, perhaps examining nonrepresentational accounts of belief will further our scientific and philosophical research on animal minds.

## 3. Non-representational accounts of belief

While representationalism remains the most widely accepted view about the nature of belief, there are a number of nonrepresentational accounts that have recently gained popularity. In this section we'll discuss some of the main nonrepresentational accounts of belief and how they might help us study animal minds. Particularly, we will look at behaviorist and interpretationist views of belief and what these theories can say about the question of animal minds.

### 3.1 Behaviorism and dispositionalism

Taken broadly, behaviorism claims that beliefs can best be understood in terms of observable behavior, or 'dispositions to behave,' meaning patterns of behavior that can reliably be correlated with specific beliefs. Gilbert Ryle, viewed by many as the main proponent of behaviorism (although some have argued this label is ill-fitting, see Tanney 2012), argued that it is a category mistake to take the referents of terms like 'belief,' 'thinking,' and 'imagine,' to be privately accessible, internal states of a subject. Ryle (1949) argued that the meaning of any mental-predicate is some behavioral disposition, or loosely connected collection of behavioral tendencies in which a subject might engage in a given situation. As Ryle says,

"Dispositional words like 'know', 'believe', 'aspire', 'clever', and 'humorous' are determinable dispositional words. They signify abilities, tendencies or pronenesses to do, not things of one unique kind, but things of lots of different kinds. Theorists...are apt to notice this point, but to assume that there must be corresponding acts of knowing or apprehending and states of believing; and the fact that one person can never find another person executing such wrongly postulated acts, or being in such states is apt to be

accounted for by locating these acts and states inside the agent's secret grotto." (1949, 118-119)

Behaviorism arose as a response to the two main views of the mind at the time – dualism and identity theory. What these two theories share is a commitment to the referents of mental state terms being private internal states of the subject. Both dualism and identity theory create a gap between mental state terms, such as belief, and the thing to which the term allegedly refers, whether it is an immaterial mental substance or a state of the central nervous system. The motivation behind behaviorism is that there is no substantive gap between mental states and physical bodies, and therefore no corresponding explanatory gap between mental state terms and the entities to which they refer. We can see that motivation in two early advocates of behaviorist-friendly views, Wittgenstein (1953-68) and Sellars (1963). At its best, behaviorism purports to be aligned both with common sense notions of belief and scientific study of the mind.

When it comes to animal minds, behaviorism presents a view with the potential for explanatory parity. Since behavior of various sorts is common to us all, then perhaps the mechanisms of mind we seek to explain, both human and animal, are similarly shared. Wittgenstein and Sellars both put a lot of emphasis on the role language, or linguistic behavior, plays in constituting mental states. Seemingly stressing the differences between human and animal, Wittgenstein famously wrote in *Philosophical Investigations* that, "If a lion could talk, we could not understand him" (PI p.223). The received interpretation of this aphorism is that even if a lion were able to speak one of humans' natural languages, the lack of shared practices, experiences, and living conditions between the cat and us would make any utterance untranslatable. If we extrapolate from this that in order for any creatures to understand one another their verbal and nonverbal behaviors must be embedded in shared ways of life, then it might seem hopeless that we could ever say much about the beliefs or minds of nonhuman animals. This type of skepticism toward our ability to know animal minds is also found in Sellars. Sellars explicitly address the question of animal representations in *Mental Events* (1981), arguing that intentionality is the 'mark of the mental,' and that 'concepts pertaining to the intentionality of thoughts' are 'derivative from concepts pertaining to meaningful speech' (section 8-10). Sellars concedes that animals may have representational systems, but since according to his view animals do not have complex linguistic abilities, or the intentionality that comes with them, are therefore incapable of belief/thought. We count Sellars' as having a fundamentally non-representational view of the mind due to the inferentialist semantics he advances, which places the source of meaning in publically accessible, intersubjective, linguistic practice. This view claims that the meaning of any given word/phrase can only be parsed by tracing out its inferential relations to other words/phrases in the language. When it comes to states of belief and knowledge, according to Sellars they are individuated by the same sort of inferential relations - to believe the tie is green is to believe that it is colored and that it is not red or blue. He says,

The essential point is that in characterizing an episode or a state as that of *knowing*, we are not giving an empirical description of that episode or state; we are placing it in the logical space of reasons, of justifying and being able to justify

what one says” (EPM: §36, in SPR: 169; in KMG: 248).

Since nonhuman animals will presumably not have mastered such inferential relations, they might be said to have brute sensory concepts on Sellars’ view, but not beliefs in the robust way humans do (the same will go for human children).

While most researchers in the field have rejected behaviorism as an overarching theory of mind, elements of the view have been preserved in some contemporary accounts of belief, and recent approaches are more optimistic towards the study of animal minds. Dispositionalism is the view that what we are referring to when we talk about someone’s beliefs is her likeliness to act in certain ways. How do we know if Tamara believes that her cat got out of the house? If she runs out the front door calling the kitty’s name, scanning the street and the nearby yards with her eyes, and says that she’s lost her cat, then we can conclude that she believes the cat got out. Dispositionalism differs from classic behaviorism in that it purports only to be an analysis of belief (and sometimes other propositional attitudes), making no claims about the nature of other mental states such as emotion, sensation, imagination, or memory.

Dispositionalism has both a conservative and liberal form. A conservative dispositionalist, like Braithwaite (1933), typically has physicalist motivations, seeking to get a full reduction of mentalistic concepts into behaviors, along the lines of the more classical Analytic Behaviorism. On the other hand, a liberal dispositionalist is not seeking any clean reduction, and allows appeals to other mental states in analyses of belief. The goal of liberal dispositionalism is not to defend physicalism or any reductive project, but instead to rightly characterize the logic of belief attributions. Some notable liberal dispositionalists include Marcus (1990, 1993) and Schwitzgebel (2002, 2013). On Marcus’ account, the state of believing is necessarily action guiding, to believe something is simply to behave in a way that is consistent with that thing obtaining. For Marcus, believing is a nonlinguistic relation between a subject and a way the world can be, therefore this relation can be had by animals and young children alike. Eric Schwitzgebel develops and defends a neo-Rylean view he calls *phenomenal dispositionalism* (2002). Phenomenal dispositionalism breaks with classic behaviorism by allowing not only observable behaviors, but also cognitive processes, in its analysis of belief. Illustrating his notion of disposition, Schwitzgebel says,

Consider a favorite belief of philosophers: the belief that there is beer in the fridge. Some of the dispositions associated with this belief include: the disposition to say, in appropriate circumstances, sentences like ‘There’s beer in my fridge’; the disposition to look in the fridge if one wants a beer; a readiness to offer beer to a thirsty guest; the disposition to utter silently to oneself, in appropriate contexts, “There’s beer in my fridge’; an aptness to feel surprise should one go to the fridge and find no beer; the disposition to draw conclusions entailed by propositions that there is beer in the fridge (e.g. that there is something in the fridge, that there is beer in the house); and so forth. (2002, p 251)

For Schwitzgebel, the possession of a belief is not binary, as it would be for a representationalist. It’s not the case that a person either has or doesn’t have a particular belief. Instead, depending

on how many of the stereotypical behaviors associated with the given belief someone exhibits, we are able to say that she *really* believes that p, doesn't believe that p at all, or perhaps only half-heartedly, or semi, believes that p. Phenomenal dispositionalism seems well equipped to be extended to other animals. While verbalization is *one* type of behavior, it's not necessary or exhaustive of a belief state. This view renders a commonsense result – that animals have beliefs in many of the same ways humans do, but simply lack one of the behaviors we often engage in (i.e. sophisticated verbal behavior). Given that on this view, believing is more of a spectrum than a binary matter, an animal's behaviors could still register as possessing certain beliefs to certain degrees.

### 3.1 Interpretationism

Another way to go non-representational about beliefs is interpretationism. Interpretationism shares dispositionalism's focus on patterns of behavior, and denies relevance of internal representational structures, but emphasizes the pragmatic and practical elements of belief attribution. For the interpretationist, believing is a matter of being able to locate behavior (whether it's your own, a neighbor's, or a llama's) in a web of reason, and not of possessing a certain kind of mental state. Dennett (1977, 1991) and Davidson (1984) have been the most prominent proponents of this strategy, though they disagree about the question of animal beliefs.

For Davidson, the distinction between having beliefs and not having beliefs comes down to language (1982). According to his view, propositional attitudes like belief, desire, and intention depend on other similar states, and without the presence of a complex pattern of behavior realized in language, genuine thought is impossible. He writes,

My thesis is not...that each thought depends for its existence on the existence of a sentence that expresses that thought. My thesis is rather that a creature cannot have a thought unless it has language. In order to be a thinking, rational creature, the creature must be able to express many thoughts, and above all, be able to interpret the speech and thoughts of others. (1982, p. 100)

But the linguistic constraint present in Davidson's interpretationism is not essential to that form of non-representationalism, and instead the product of other arguments he offers about mind and language.

Dennett's intentional systems theory offers a form of interpretationism more congenial to nonhuman animals (2009). According to this account, being able to interpret others and ourselves as minded beings has evolutionary value, because adopting an 'intentional stance' towards another creature affords unique predictive and explanatory powers. Given that a subject is rational, we are more likely to understand their actions and predict what they will do next if we attribute certain beliefs (and other mental states) to them. And when it comes to both other people and nonhuman animals, couching behavior in terms of mental states *does* seem to help us predict and explain. When my cat scratches at the cabinet door, it's not random senseless behavior. There are treats in that cabinet, and being able to say Meursault *believes* the

treats are in the cabinet and *wants* to have some is a helpful interpretation of the observable behavior. Dennett calls treating others as having beliefs, desires, and intentions taking an 'intentional stance.' (1989) While there is some criticism (Andrews, 2012) of the view that belief attribution is necessary for prediction and explaining, there's something novel and potentially promising in the interpretationist's insistence that believing is more a matter of how we *treat* certain beings, and less a matter of *possessing* the right kind of states or physical structure.

One worry about Interpretationism is that it makes belief look not particularly truth apt. There may be a number of perfectly good rationalizing explanations of an agent's behavior, and no way to tell which is the 'correct' belief to attribute. For instance, you see a young woman run screaming from a building. This kind of behavior would ordinarily seem very strange. But if you judge that the woman *believes* that the building is on fire, her behavior now makes sense. It may turn out upon gathering more evidence that the woman believes no such thing, but that she's rehearsing her part in a play and is only *acting* as if she believes the building is on fire. One of these explanations is better than the other, the objection goes, and it's the one that's true. But an interpretationist doesn't necessarily have to be too concerned with this objection. A proponent of the view merely has to point out that in gathering more evidence (talking to the woman) you were able to offer a better interpretation of the behavior, one adjusting for new information and a richer pattern. It's only 'better' because more is now known, but there is still further evidence that could unseat the rehearsing interpretation.

### 3.2 Conclusions about non-representational beliefs

While few scholars accept logical behaviorism as a thoroughgoing theory of the mind, contemporary offshoots of that view, such as dispositionalism and interpretationism, may offer a plausible and promising account of a subset of mental states – propositional attitudes in general, and belief in particular. These non-representationalist views claim to have the benefit of avoiding some of the more serious metaphysical problems that representational views face, like the problem of mental causation and issues of naturalizing the mind. Perhaps most attractively, non-representational theories tout the intuitive idea that observable behavior is intimately involved in what it means to believe, not in just a contingent way, but rather in some essential sense. Further, by viewing verbal behavior as *just one* of the many types of actions and cues we assess when deciding what someone believes, non-representationalist views offer perhaps the most promising path forward in understanding the nature of animal thought as different only by degree, not in kind, from human thought.

## 4 Implications

While it may still be an open question whether or not belief is a representational state of an organism, there is no doubt that empirical research on animal minds largely assumes the existences of representations of some sort. This is likely due to the late coming of the cognitive revolution to animal behavior, and the acceptance of what psychological behaviorists such as Skinner had researchers so long deny—namely intervening variables with causal power.

Psychologists such as Charles Gallistel (1993) advocate understanding animal minds in terms of computational representations rather than associations. Even some psychologists who think association can go a long way to understanding animal minds still point to role representation can play given the complexity of some associative processes (Shettleworth 2010), though other associationists think that traditional folk psychology can be accommodated by an associative cybernetic model that doesn't involve representation (De Wit & Dickinson 2009).

The commitment to representation is clear in the debate about mindreading, or theory of mind, in other animals. The question stems from the assumption that in order to predict and explain behavior, humans attribute the belief and desire that causes that action; Premack and Woodruff (1978) wanted to know if the chimpanzee also thought about others' beliefs in this way. In the 35 years psychologists have spent investigating that question, they largely accepted the idea that chimpanzees must be representing something in order to make predictions about what others will do.

Following a suggestion stemming from commentaries on Premack and Woodruff's original paper, Daniel Dennett (1978), Jonathan Bennett (1978), and Gilbert Harman (1978) suggested that the real way to find out if chimpanzees can think about others' beliefs is to determine whether chimpanzees can think that others have *false* beliefs. This suggestion led to the false belief task, which was designed to examine when children start developing the concept of belief. The classic test involves an object that is moved such that one character sees it, and the other does not. As developed by psychologists Hans Wimmer and Josef Perner (1983) participants were shown a show in which a puppet names Maxi hides a piece of chocolate and leaves the room. While Maxi is out, his mother finds the chocolate and moves it to another location. When Maxi comes back in the room to get his chocolate, the child is asked where Maxi will go to look for his chocolate. If children predict that Maxi will look for the chocolate where he left it, they then pass the test. But the child who predicts that Maxi will look for the chocolate where it really is fails. Passing the test is interpreted as being able to reason about beliefs, and children do this around 4 to 5 years of age (Wellman et al. 2001).

Early chimpanzee versions of the task failed to find evidence that they reason about false belief (Call and Tomasello 1999; Krachun et al. 2009; Kaminski et al. 2008). Research on chimpanzee's ability to think about other mental states, such as perception, have had greater success (Hare et al. 2000, 2001). But while chimpanzees act as though they know what others can and cannot see in many cases, this behavioral evidence wasn't enough to convince the skeptics that chimpanzees *really* understand seeing; they wondered whether the chimpanzee is thinking about the mind, or about patterns of behavior. Knowing that there is an intervening variable of some sort wasn't enough, because it might not be of the right sort--namely mentalistic (e.g. Lurz 2011). The debate became an issue of whether the chimpanzee is a mindreader who thinks about the mental state of others, or a behavior-reader who think about the behaviors of others (Povinelli and Vonk 2003; 2004).<sup>2</sup>

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<sup>2</sup> More recently, chimpanzees (Karg et al. 2015) and ravens (Bugnyar et al. 2016) have passed a version of the perceptual mindreading task that many skeptics take to be convincing evidence. Furthermore, now that we have evidence that chimpanzees engage in anticipatory looking (Kano and Call 2014), chimpanzees can be tested in anticipatory looking false belief tasks.

If instead of taking a representational view of the mind, researchers were to adopt instrumentalism they might conclude that there is no real difference between behavior-reading and mindreading if they both permit the same behaviors. Even if the chimpanzee doesn't mindread in all the circumstances an adult human might mindread, limited attributions could still be useful to predict behavior, such as in cases when she knows what another chimpanzee can and cannot see, but not in other cases.

While a representationalist about belief might take these data to be compelling reasons to reject the claim that chimpanzees engage in belief reasoning, a non-representationalist might suggest that different ways of testing chimpanzee belief attribution are called for, since, for them, falsity is not what gives belief its point (except, of course, for Davidson, whose lingualist commitment makes him a strange bedfellow of some representationalists on this issue; Davidson claims that "error is what gives belief its point" (Davidson 1975, 20)). Rather, robust patterns of behavior that are "usefully and voluminously" (Dennett 2009) predicted and explained through the attribution of a mindreading capacity need to be investigated, not via a piecemeal studies of a particular kind of belief—false belief—in a very specific context—an unseen moved object—that may not have any relevance to a chimpanzees' way of life.

Instead of focusing on false belief moved object tasks, researchers can examine those situations that might naturally elicit belief reasoning in chimpanzees. Chimpanzees' fission-fusion social structure, gives chimpanzees ample opportunity to lack the same information; chimpanzees may worry whether another chimpanzee saw a predator or knows that a dominance coup had occurred, when each's goals are as they collaboratively hunt a monkey, or when a communicative message fails or a the partner acts outside the standard schema.

## 5 Conclusion

In this chapter we've outlined some of the central ways theorists approach the study animal minds, trying to make sense of the seemingly uncontroversial claim that animals think. There is reason and evidence in support of the idea that when we attribute beliefs to our fuzzy, feathered, and finned friends we're not merely anthropomorphizing, but describing a basic fact. Despite the common practice of attributing thought to animals, and the scientific evidence in favour of doing so, the nature of the mental states we easily observe in other animals remains unclear. To be fair, there is still a lot of contentious debate about the nature of *human* belief, and so we shouldn't be too discouraged by the lack of consensus on animal minds. We can note that the past century as seen revolutionary progress in the way we approach the study of animal minds, and that there are now a number of promising theoretical paths to take towards a more comprehensive understanding of the topic.

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