ABSTRACT. In *Thinking without Words* I develop a philosophical framework for treating some animals and human infants as genuine thinkers. This paper outlines the aspects of this account that are most relevant to those working in animal ethics. There is a range of different levels of cognitive sophistication in different animal species, in addition to limits to the types of thought available to non-linguistic creatures, and it may be important for animal ethicists to take this into account in exploring issues of moral significance and the obligations that we might or might not have to non-human animals.

KEY WORDS: animal cognition, animal ethics, thought without language

In *Thinking without Words*, I develop a philosophical framework for treating (at least some) animals and human infants as genuine thinkers. A genuine thinker, I take it, is a creature that behaves in ways that reflect its thoughts about the environment—and hence a creature whose behavior needs to be explained in psychological terms. That many animals are genuine thinkers is taken for granted by much research in cognitive ethology, but scientists and philosophers have often been skeptical of what they take to be anecdotal evidence and tacit anthropomorphism. The aims of my book are

- to set out clear criteria for identifying when psychological explanations are required for non-linguistic creatures;
- to show how precise and determinate thoughts can be attributed to non-linguistic creatures;

---

*I am grateful for comments on an earlier version from Robert Francescotti and Clare Palmer.

• to show how the psychological explanations that we give of animal and infant behavior are continuous with the psychological explanations that we give of language-using creatures;
• to explore the differences between thinking without words and language-based thinking.

This paper outlines the aspects of this account that are of most relevance to those working in animal ethics. There is a range of different levels of cognitive sophistication in different animal species, in addition to limits to the types of thought available to non-linguistic creatures, and it may be important for animal ethicists to take this into account in exploring issues of moral significance and the obligations that we might or might not have to non-human animals.

1. Psychological and Non-Psychological Explanations of Behavior

Psychological explanations come into play when non-psychological forms of explanation provide insufficient explanatory and predictive leverage. Typical non-psychological forms of explanation appeal to mechanisms of associative conditioning and what are known as “innate releasing mechanisms.”

Pavlovian or classical conditioning occurs when an association is reinforced between an unconditioned stimulus (e.g., food or pain) and a conditioned stimulus (e.g., the sound of a bell). The unconditioned stimulus typically generates an unconditioned response (e.g., salivation). As a result of conditioning the unconditioned response is generated by the conditioned stimulus. Many forms of animal training are based on classical conditioning. It is classical conditioning that makes clicks and whistles effective rewards for dogs and dolphins. In instrumental (or operant) conditioning the process of reinforcement (or punishment) applies to actions rather than physiological responses.

According to behaviorist models of animal behavior, all animal behavior is the product of either classical or instrumental conditioning, and conditioning is certainly the type of animal learning most frequently studied in the laboratory. Ethologists, however, have also appealed to innate releasing mechanisms to explain behavior in the wild.² Innate releasing mechanisms are fixed and instinctive sequences

² See, for example, N. Tinbergen, The Study of Instinct (Oxford: Oxford University Press, 2003).
of movements. For example, when newly hatched herring gulls encounter stimuli matching the adult herring gull beak in color, length, and movement they respond by pecking. Innate releasing mechanisms have the following characteristics.3

- They are triggered by specific stimuli.
- They always take the same form.
- They occur in all members of the relevant species.
- Their occurrence is largely independent of the individual creature’s history.
- Once launched they cannot be varied.
- They have only one function.

Innate releasing mechanisms and conditioned responses are both invariant responses to stimuli. When the animal registers the relevant stimulus the appropriate response results in a way that can in general be fully understood, explained and predicted without any appeal to an intermediary between stimulus and response.4 Psychological explanations of behavior only become necessary when no such invariant input–output links can be identified. The essence of a psychological explanation is that it explains behavior in terms of how the creature in question represents its environment, rather than simply in terms of the stimuli that it detects. Psychological explanations typically make reference to how the organism perceives its environment, to what it believes about the environment, and to what it desires to achieve. These beliefs, desires, and perceptions allow organisms to respond flexibly and plastically to their environments—the same situations can afford different actions if a creature brings different beliefs and desires to it, or perceives it in different ways.

How are we to determine which animals count as genuine thinkers? By identifying species whose members behave in ways that do not seem to be explicable in non-psychological terms. Any such judgment is provisional and defeasible, since it might always turn out that we have been insufficiently imaginative in thinking about the non-psychological possibilities. What is not provisional and defeasible, however, is the judgment that many species will prove to contain

---


genuine thinkers. The weight of the evidence points strongly to the impossibility of characterizing all animal behavior in non-psychological terms.

There is a basic distinction, then, between creatures that behave in ways that require psychological explanation and those that do not. This may mark a morally significant dividing line. It is worth noting, however, that sentience seems to be required for some forms of associative learning. If the unconditioned stimulus is pleasure or pain, or anything whose status as reward/punishment is a function of its phenomenal character, then only sentient creatures are capable of learning through conditioning. If sentience is what matters for moral significance, then it is already built into some non-psychological models of explanation. Nonetheless, it is hard to imagine that moral significance is not a matter of degree—and even if it is not a matter of degree we will still need to make judgments of relative moral significance. Either way the distinction between “merely sentient” creatures and thinking creatures is likely to be relevant.

2. PROPOSITIONAL AND NON-PROPOSITIONAL THINKING IN NON-LINGUISTIC CREATURES

It might be accepted that animals of a certain species at a certain stage of development are thinkers, in the sense that they behave (at least some of the time) in ways that require psychological explanation. But there are different types of thinking at the non-linguistic level. The basic distinction is between propositional and non-propositional thought.

According to Michael Dummett, the types of thinking available to animals are just a subset of the central types of thinking available to language-using creatures. Dummett accepts that there can be non-linguistic thoughts, which can be had both by animals and by language-using creatures, but he calls them “proto-thoughts.” These proto-thoughts “do not have the structure of verbally expressed thoughts;” they are not “full-fledged thoughts;” they “cannot float free [of the environment], but can occur only as integrated with current activity;” and the vehicle of non-linguistic thought is “spatial images superimposed on spatial perceptions.” There can be non-

---

linguistic thoughts, but these are not “accurately expressible in language.” This is what I call the “minimalist conception of non-linguistic thought.”

According to the minimalist approach, all non-linguistic thinking is

- context-bound;
- essentially pragmatic and dynamic;
- vehicled by spatial images superimposed on spatial perceptions;
- unstructured.

Proto-thoughts thus construed count as instances of thinking-how rather than thinking-that (to draw an analogy with Gilbert Ryle’s well-known distinction between knowing-how and knowing-that). Dummett explicitly assimilates them to complex behavioral skills. Their purpose is essentially the control of responses to the environment, rather than the acquisition of information about it. They do not have a determinate content that can be put into words. In all these respects they are fundamentally different from beliefs, desires, and other propositional attitudes.

One of the central claims of Thinking without Words is that the minimalist conception cannot be a complete account of non-linguistic thought. Non-linguistic thought goes beyond perception, because there are forms of animal behavior that we can only explain by thinking of the creatures performing those actions as having full-fledged beliefs and desires. By this I mean that these are beliefs and desires that represent the world in ways that can be accurately reported in sentences of something not too dissimilar to English—but not identical to English, since we will need a vocabulary that reflects the differences between how we “carve up” the world into objects and how the environment is perceived by different types of animal. Psychological explanations of this type are propositional attitude explanations.

The types of behavior that most obviously pose problems for the minimalist conception are those that go beyond the “here and now.” When animals represent contingencies between actions and outcomes, perhaps in thinking about how to tailor means to ends, they are going beyond the sensorimotor schemas envisaged by the minimalist conception. Similarly, when they engage in tool use and other forms of long-range planning. Wild chimpanzees, for example,

---

make two different types of wands for dipping into ant and termite nests from different types of branches. They make wands for dipping into ant swarms by taking a stick several feet long and stripping the side leaves and leafy stem. For dipping into termite nests, on the other hand, they use wands made from vines or more flexible twigs that are considerably shorter and that have a bitten end, unlike the ant wands.

Of course, as with the initial determination of whether we are dealing with thinkers at all, careful experimental work is required to identify when propositional explanations are required. This is probably the most intensively studied and controversial area of animal cognition. It is also potentially the area of most interest to animal ethics. This is also the area where most philosophical work is required to explain the truth-conditions of the thoughts ascribed to non-linguistic creatures and how to go about attributing such thoughts.

If it is argued that moral significance depends upon the capacity for genuine thought, then it is natural (but not, of course, compulsory) to think that there are degrees of moral significance correlated with degrees of cognitive sophistication. The dividing line between thinking of the minimalist kind and thinking of the propositional kind may well be important.

3. **THE LIMITS OF NON-LINGUISTIC THOUGHT: INTENTIONAL ASCENT AND SEMANTIC ASCENT**

As far as animal ethics is concerned, what animals *cannot* do is likely to be just as important as what animals can do. Many discussions of moral significance make it contingent upon particular types of cognitive achievement. Some of these cognitive achievements could be implicated in the types of non-linguistic thinking we have already discussed. Suppose, for example, that moral significance were thought to be restricted to creatures capable of a concern for their own future. One might take the ability to engage in certain types of long-range planning to be evidence for such concern.

---

There is a number of ways of thinking about moral considerability, however, that cannot in principle be applied to non-linguistic creatures—or, at least, not if one of the central arguments of *Thinking without Words* is sound. In Chapter 8, I argued that higher-order thought (thinking about thinking) is language-dependent. In this section, I shall present a revised version of the basic argument. In the following sections, I draw out some of the limitations that the unavailability of higher-order thoughts has upon animal cognition.

By a “higher-order thought” I mean a thought that takes another thought as its object. Thoughts about another’s mental states count as higher-order thoughts, for example, as does reflection on one’s own mental states. W. V. O. Quine once described semantic ascent as “the shift from talking in certain terms to talking about them.” By analogy we can characterize intentional ascent as the shift from thinking in certain ways to thinking about those ways of thinking. My argument, in effect, is that intentional ascent requires semantic ascent—that we can only think about thoughts through thinking about words.

We should distinguish first-order target thoughts from the higher-order thoughts that might be directed at them. My belief that $p$ is a target thought. It is the object of my higher-order belief that I believe that $p$. Target thoughts must be represented to be the objects of higher-order thoughts. There are all sorts of things going on below the threshold of consciousness when we think (perhaps thinking involves manipulating sentences in a subpersonal language of thought, for example). But these subpersonal events are not what we think about when we think about our own thoughts. There is a difference between thinking about thoughts and thinking about the machinery of thinking. So the question is: How must target thoughts be represented in order for them to be the objects of higher-order thoughts?

There are two possibilities. On the one hand representation might be secured symbolically through the complex symbols of a natural language. A thought would be represented, therefore, through its linguistic expression and would appear as a potential object of thought *qua* linguistic entity. On the other hand representation might be secured in an analog manner, through some kind of pictorial model. On this conception of the vehicles of thought, which we find

---

developed in different ways in mental models theory in the psychology of reasoning, and in the conception of mental maps put forward by D. Braddon-Mitchell and F. Jackson, the vehicle of a thought is a pictorial representation of the state of affairs being thought about.\footnote{The theory of mental models was first proposed in K. Craik, \textit{The Nature of Explanation} (Cambridge: Cambridge University Press, 1943), and is most comprehensively developed in P. Johnson-Laird, \textit{Mental Models} (Cambridge: Cambridge University Press, 1983). For mental maps see D. Braddon-Mitchell and F. Jackson, \textit{The Philosophy of Mind and Cognition}, 2nd Edition (London: Blackwell Publishers, 2006), Chapter 10.}

The argument in favor of public language sentences and against pictorial models rests upon considerations of structure and inferential role. I am assuming that thoughts are individuated at least in part by their inferential role. What makes a given thought the thought that \( p \) is partly a matter of the inferential relations in which it stands to other thoughts. Some of these relations are entailment relations (the thoughts that entail \( p \) and the thoughts that \( p \) entails), but they also include evidential relations (the thoughts whose holding true would be good evidence for thinking that \( p \) holds true, and the thoughts that would be judged more likely to be true if \( p \) were true). Any thinker capable of thinking a higher-order thought directed at a target thought must, almost by definition, have some grasp of the individuation conditions of the target thought. He must have some grasp of what it is that he is thinking about. There is nothing peculiar here to higher-order thoughts. This is just an application of the very general requirement that to think about anything one must have some sort of "cognitive access" that enables one to pick that thing out. It follows that a higher-order thinker must have some sort of grasp of the entailment and evidential relations in which the target thought stands.\footnote{The thinker who merely thinks such thoughts (as opposed to thinking \textit{about} them) does not have to grasp these entailment and evidential relations. They simply have to think in ways that \textit{respect} them.}

At least some of these entailment and evidential relations are a function of the structure of the thought that \( p \). In order to understand the inferential role of a thought we need to be able to view it as made up of distinguishable components that can feature in further thoughts and, moreover, we need to be able to view it as made up from those components in a way that determines its semantic value (thereby capturing the difference between the true thought \textit{Bogotá is the capital of Colombia} and the false thought \textit{Colombia is the capital of Bogotá}).

\[\begin{align*}
\text{Bogotá is the capital of Colombia} & \\
\text{Colombia is the capital of Bogotá} & 
\end{align*}\]
We may say, therefore, that the structure of the thought must be perspicuous in the consciously accessible representation that is the target of the higher-order thought.

The final step in the argument is that the structure of a thought cannot be perspicuous in the right sort of way in thoughts that are represented in a pictorial manner. The qualification is important, since pictorial representation in mental maps and mental models does depend upon a notion of structural isomorphism between the models/maps and what they represent. The relations holding between elements of the mental model/map can be mapped onto the relations holding between objects in the represented state of affairs. This comes across very clearly in the following passage from Braddon-Mitchell and Jackson.

There is no natural way of dividing a map at its truth-assessable representational joints. Each part of a map contributes to the representational content of the whole map, in the sense that had that part of the map been different, the representational content of the whole would have been different. Change the bit of the map of the United States between New York and Boston, and you change systematically what the map says. This is part of what makes it true that the map is structured. However, there is no preferred way of dividing the map into basic representational units. There are many jigsaw puzzles you might make out of the map, but no single one would have a claim to have pieces that were all and only the most basic units.13

We might gloss this as follows. Pictorial representations do not have a canonical structure. Their structure can be analyzed in many different ways (corresponding to the jigsaw puzzles that one can construct from it), but none of these can properly be described as giving the structure of the state of affairs.

Yet, in order to understand the inferential role of a thought one does need to understand the canonical structure of that thought (what is often termed its logical form). This canonical structure is perspicuous, although not always perfectly perspicuous, when thoughts are expressed in public language sentences. It is because of this that higher-order thought is language-dependent. Only public language sentences can make the canonical structure of a target thought available to thinkers in a way that allows them to grasp the inferential role of the target thought. The conclusion of the argument, then, is that thinking about thinking is only available to language-using creatures.

4. WHAT THE ARGUMENT DOES NOT SHOW: Sentience and Higher-Order Thoughts

Some philosophers have proposed higher-order thought theories of consciousness.\textsuperscript{14} According to these theories a mental state is conscious if and only if it is the object of a higher-order thought. Given that sentience just is the capacity to have conscious experiences, higher-order thought theories of consciousness restrict sentience to creatures capable of thinking higher-order thoughts. Any such conclusion is potentially very important for animal ethics, given the weight that is standardly put on animal suffering in thinking about our obligations to non-human animals.

It should be stressed, however, that this conclusion does not in any sense follow from the argument from intentional ascent to semantic ascent. The argument presupposes a theory of consciousness. It does not set out to provide one and it is perfectly compatible with the view that non-human animals can not only have conscious experiences (and so be sentient) but also have conscious beliefs and desires. The object of a conscious belief is a state of affairs in the world (or, in the case of a false belief a merely possible state of affairs) and the argument from intentional ascent to semantic ascent applies only to thoughts that have other thoughts as their objects. As such it offers no direct support to arguments that animals cannot be sentient because they are not capable of having higher-order thoughts.\textsuperscript{15}

5. INTENTIONAL ASCEND AND UNDERSTANDING OTHER MINDS

Is it possible for non-linguistic creatures to participate in practices of attributing psychological states to their conspecifics or indeed to any other creatures? In the light of the preceding discussion it is not hard to see why a very broad class of psychological attributions should be


\textsuperscript{15} It may provide indirect support, however, on some ways of developing higher-order theories of consciousness. Authors such as P. Carruthers have argued that the type of higher-order thoughts required for consciousness are only available to creatures possessing a “theory of mind” and as we will see in more detail in the next section, the argument from intentional ascent to semantic ascent does rule out theories of mind at the non-linguistic level [P. Carruthers, “Natural Theories of Consciousness,” \textit{European Journal of Philosophy} 6 (1998), pp. 203–222].
unavailable to non-linguistic creatures. To attribute a belief, for example, to another creature is essentially to view that creature as standing in a particular relation to a thought—the relation of believing the thought to be true. Clearly, therefore, the attribution of a belief requires thinking about a thought. It is a canonical form of intentional ascent that requires being able to “hold a thought in mind.”

This has potential implications for animal ethics, on any view that links moral significance to the capacity to engage in certain types of reflection about the mental states of conspecifics—or to the capacity to engage in types of behavior (perhaps caring behavior) that presupposes and involves such reflection. It is important to recognize, however, that the argument from intentional ascent to semantic ascent does not leave non-linguistic creatures completely “mind-blind.” There are types of mental state that can be comprehended and attributed by non-linguistic creatures.

To explain this further, we need to distinguish two ways of thinking about desire. One can desire a particular thing, or one can desire that a particular state of affairs be the case. This is the distinction between goal-desires and situation-desires. At the level of verbalizable thought, the distinction can be marked in terms of two different ways of completing the sentence “X desires –.” A sentence ascribing a goal-desire is completed by the name of an object or by the name of a kind of stuff (e.g., “food”). But when a sentence ascribes a situation-desire, it is completed by a “that –” clause in which the blank is filled by a complete sentence specifying the state of affairs in question.

Goal-desires are more basic than situation-desires. The contrast is effectively between desire construed as a propositional attitude (in situation-desires, which are attributed via that-clauses picking out the thought that is the object of desire) and the more fundamental goal-desires that are directed not at thoughts but rather at objects or features. There is no reason why non-linguistic creatures should not be able to attribute goal-desires to other agents. The argument from intentional ascent cannot get a grip, since goal-desires are relations between a subject and an object/feature, rather than between a subject and a proposition.

The ability to attribute goal-desires goes hand in hand with a basic understanding of intentional, that is to say goal-directed, behavior.

16 See Bermúdez, Thinking without Words, pp. 48–49.
Although of course there will be many different degrees of complexity in goal-directed behavior, depending on the richness of the desires and beliefs by which it is driven, a creature capable of attributing goal-desires will be able to make the basic distinction between purposeful behaviors, on the one hand, and random movements and instinctive reactions on the other. A purposive action is an action for which a motivating goal-desire can be identified.

Goal-desires cannot be the only mental states that can be identified and attributed by non-linguistic creatures. It is hard to see, for example, how a goal-desire can be attributed to a creature without some evidence of the information that the creature possesses about its environment. At the bare minimum this information will be perceptual. To know what goal-desire might be motivating a creature at a given moment a creature needs to know, first, what end it is pursuing and, second, how it might reasonably expect that end to be realized by its current behavior. Both of these require knowing to which features of its environment the creature is perceptually sensitive. If, therefore, a non-linguistic creature is to be able to attribute goal-desires to a fellow creature it must be able to formulate hypotheses about what that creature is perceiving.

Here too we can distinguish two ways of thinking about seeing by following F. Dretske, making a distinction between simple seeing and epistemic seeing. According to Dretske, what we see in simple seeing (or what he calls non-epistemic seeing) “is a function solely of what there is to see and what, given our visual apparatus and the conditions in which we employ it, we are capable of visually differentiating.” In contrast, epistemic seeing involves standing in a relation to a proposition (a thought). Epistemic seeing involves seeing that something is the case.

The argument from intentional ascent shows that non-linguistic creatures are not capable of understanding epistemic seeing, since this involves thinking about the perceiver’s relation to a thought. But this is perfectly compatible with non-linguistic creatures being capable of thinking about the direct perceptual relations in which other creatures stand to objects. This allows non-linguistic creatures to engage in a primitive form of psychological explanation. A creature that knows what a conspecific or predator desires and has some sense of its perceptual sensitivity to the environmental layout (as well as an
understanding of its motor capabilities) can expect to be able to predict its behavior with some success.

This restrictive interpretation of the “mind-reading” abilities of some non-linguistic creatures is compatible with much recent research into the extent to which non-human primates can properly be described as possessing a “theory of mind.” There are well-documented examples of primate behavior that some prominent students of animal behavior have thought can only be interpreted as examples of interpersonal deception. But the consensus opinion among primatologists is that a more parsimonious interpretation of these behaviors is to be preferred. Many examples of what has come to be termed tactical deception can be understood as the manipulation, not of another’s propositional attitudes, but simply of their visual perspective. Here is an example of a tactical deception in a troupe of baboons in Ethiopia that lends itself to such an interpretation:

An adult female spent 20 min gradually shifting in a seated position over a distance of about 2 m to a place behind a rock about 50 cm high where she began to groom the subadult male follower of the group—an interaction not tolerated by the adult male. As I was observing from a cliff slightly above [the animals] I could judge that the adult male leader could, from his resting position, see the tail, back and crown of the female’s head, but not her front, arms and face: the subadult male sat in a bent position while being groomed, and was also invisible to the leader. The leader could thus see that she was present, but probably not that she groomed.

The behavior of the female baboon, assuming that it is indeed to count as an instance of tactical deception, does not seem to require representing the beliefs of the alpha male. What she is doing is profiting from an understanding of the alpha male’s visual “take” on the situation to escape detection. The female baboon needs only to appreciate the alpha male’s line of sight and the fact that he would be prevented from seeing the subadult male by the intervening rock. This seems firmly at the level of simple seeing rather than epistemic seeing.

---


20 Report by Hans Kummer quoted in Byrne, The Thinking Ape, p. 106.
This example (and the discussion of animal "mind-reading" more generally) shows that the argument from intentional ascent to semantic ascent is compatible with taking non-linguistic animals to have fairly sophisticated cognitive abilities. The argument requires theorists to think critically about some contemporary research in animal cognition. It places limits on the conceptual abilities that can be attributed to non-linguistic creatures, but in so doing opens up new ways of interpreting the behaviors revealed by observation and experiment.

6. REASONING, RATIONALITY, AND LOGICAL THINKING

Explaining animal behavior in psychological terms forces us to consider questions of rationality and reasoning. Psychological explanations work because they identify beliefs and desires in the light of which the action being explained makes sense from the agent’s perspective. To say that an action makes sense in the light of an agent’s beliefs and desires is to say that it is the rational thing to do (or, at least, a rational thing to do) given those beliefs and desires. And that in turn means that, in at least some cases, a creature might reason her way from those beliefs and desires to acting in the relevant way. Reasoning and rationality are correlative notions. How should we make sense of those notions at the non-linguistic level?

Here is one way in which we cannot make sense of them. The argument from intentional ascent stands squarely in the way of treating animals as thinking logically. We can illustrate this with the most basic form of logical thinking—the form of thinking codified in the propositional calculus and involving the basic logical connectives, such as disjunction (“or”), conjunction (“and”), and the material conditional (“if... then ...”). Consider a conditional thought of the sort that might be expressed in the sentence “if A then B.” To entertain such a thought is to understand that two thoughts are related in a certain way—namely, that the second thought cannot be false if the first thought is true. But this means that understanding truth-functional compound thoughts is a form of intentional ascent. One cannot think about the truth-values of thoughts without thinking about thoughts and this, by the earlier argument, requires semantic ascent.

Logical thinking depends upon language, therefore, because it presupposes the capacity for intentional ascent, which in turn
depends upon semantic ascent. This poses an obvious challenge for how we think about reasoning in animals. The challenge is to identify forms of reasoning at the non-linguistic level and then explain them without assuming that the animal (or prelinguistic infant) is deploying elementary logical concepts. I will illustrate how this challenge can be met for a very basic form of reasoning. This is straightforward conditional reasoning of the type formalized as modus ponens—reasoning that is standardly thought to exploit the validity of the inference from “if A then B” and “A” to “B.” The detection of patterns of behavior is closely bound up with the possibility of conditional reasoning. A creature that knows that if the gazelles see the lion they will run away and that recognizes (perhaps on the basis of its understanding of the gazelles’ visual perspective) that the lion will shortly be detected by the gazelles, is in a position to predict that the gazelles will soon take flight.

In *Thinking without Words*, I propose looking for the sources of conditional reasoning in a primitive form of causal reasoning. Whereas conditional reasoning (in the sense codified in the propositional calculus) exploits truth-functional relations between complete thoughts, causal reasoning exploits causal conditions holding between states of affairs. Since causal relationships do not hold between complete thoughts, an understanding of causality presupposes no intentional ascent, and hence does not require language.

One might expect on both experimental, observational, and evolutionary grounds that some capacity for causal cognition is very widespread among animals and available at a very early stage in human development. The ability to detect certain types of causal regularity and to distinguish genuine causal relations from accidental conjunctions has obvious survival value. Causal dependence relations are directly observable, highly salient and pragmatically significant in a way that no other dependence relations are.

How might causality be understood by non-linguistic animals? It seems plausible that the core of the understanding of causation at the non-linguistic level is sensitivity to regularities in the distal environment. A basic sensitivity to environmental regularities must be part of the innate endowment of any creature capable of learning about the environment, and one might expect any creature to be peculiarly sensitive to regularities between its own actions and ensuing changes in its immediate environment (which is why instrumental condition-

ing works as well as it does). Of course, as regularity theories of causation have been forced to acknowledge, there are many regularities that are not causal, and it is in the capacity to distinguish genuinely causal regularities from accidental regularities that one might expect differences between different species of non-linguistic creature and, for that matter, different stages of development within any given species. The regularities to which non-linguistic creatures are sensitive (unlike those usually stressed in regularity analyses of causation) need not be exceptionless. No creature that only acted on exceptionless regularities would fare well in evading predators and obtaining food.

Proto-causal understanding tracks relationships, which can be either deterministic or probabilistic, between states of affairs. This makes possible a (primitive) grasp of causation at the non-linguistic level. It also explains why primitive versions of certain fundamental inference forms are available at the non-linguistic level. We can term this “proto-conditional reasoning.” Instead of treating animals as exploiting full-fledged conditionals (i.e., truth-functional compounds of thoughts) we can think of them as tracking causal relations between states of affairs. I call these proto-conditionals. Conditional reasoning in animals can be understood in terms of a proto-conditional together with an understanding, which may take the form of a perception or a memory, that the antecedent holds. The consequent will straightforwardly be detached.

We see, therefore, that the initial argument for the language-dependence of logical thinking does not rule out the possibility of non-linguistic reasoning. We cannot, of course, understand non-linguistic reasoning as involving logical concepts (or any form of intentional ascent). But we can identify at the non-linguistic level forms of inference that are analogues of canonical logical inference forms and that can be deployed in practical reasoning without any mastery of logical concepts or capacity for higher-order thinking.

7. Conclusion

The study of animal cognition offers a rich field for theorists of animal ethics. There are significant continuities between the cognitive life of some non-linguistic animals and the cognitive life of human animals. Some species of animal are genuine thinkers in much the same way that humans count as genuine thinkers. That is, they
behave in ways that reflect their desires and their beliefs about the environment. Others are genuine thinkers in a weaker sense—the sense characterized by what I have called the “minimalist conception of non-linguistic thought.” Even at the minimalist level we are dealing with forms of behavior that cannot be explained purely in terms of conditioning or innate releasing mechanisms. Ethicists who think that the moral significance of animals is a function of their level of cognitive sophistication will need to take account of the subtle gradations between different types of thinking without words. They will also need to take on board the limits to non-linguistic thought imposed by the argument from intentional ascent. There are serious consequences to making the moral significance of animals depend upon the capacity for higher-order thought (thinking about thinking—or metarepresentation). Nonetheless, the types of cognitive activity that are ruled out by the argument from intentional ascent are more limited than might immediately appear. As I brought out with reference to non-linguistic “mind-reading” and non-linguistic reasoning, non-linguistic animals can get a long way without thinking about thinking!

*Philosophy-Neuroscience - Psychology program*

*Washington University*

*St. Louis, MO, 63130, USA*

*E-mail: bermudez@wustl.edu*