Kristin Andrews. *The Animal Mind: An Introduction to the Philosophy of Animal Cognition*. Routledge 2015. 232 pp. $150.00 USD (Hardcover ISBN 9780415809573); $39.95 USD (Paperback ISBN 9780415809603).

In her Acknowledgements, Kristin Andrews remarks that *The Animal Mind* is essentially a textbook whose subject matter is derived from classes she has taught over the past decade. But that description is pleasantly misleading and modest, as Andrews does not merely present the major theories and latest research into animal cognition. She also evaluates the quality of that research and the arguments advanced by notable philosophers, psychologists, ethologists and biologists. For readers unfamiliar with the terminology frequently used by specialists in those fields, Andrews includes a clear glossary. Likewise, the entire book is written in an engaging style, avoiding the mind-numbing tendencies that introductory textbooks can produce.

Investigations into the nature of animal cognition are immediately confronted with the problem of how our human minds can reliably understand other animal minds that may have evolved quite differently. Therefore, theories about animal minds are inevitably developed on the basis of widely accepted theories about how the human mind works.

Andrews readily acknowledges the risks of relying on the human mind as a general analogue for interpreting animal minds. However, as she also suggests, the charge of anthropomorphism has often been misdirected or exaggerated by philosophers who have failed to recognize the evolved nature of the human mind. Given that the human mind has inevitably inherited cognitive capacities that have evolved from those already used by other surviving species, it would be an egregious mistake to ignore or discount the genuine analogues between the minds of humans and those of other closely related species. Therefore, this tendency of 'anthropectomy' should be avoided as much as the opposing one of anthropomorphism. To that end, Andrews adopts a judicious method of calibration by which the most well-established theories of human cognition can be used to initially guide research into animal cognition generally, with the results also serving to refine our understanding of how the human mind works, as much as the minds of other animals.

This approach also enables Andrews to show where 'folk psychology' about animal minds may often provide accounts that are quite similar to various competing scientific hypotheses. For example, while associative learning theories claim to explain animal behaviour without recourse to such concepts as beliefs or desires, this need not imply that those 'folk' concepts must be falsely ascribed to the animal in question. Insofar as both accounts are able to make reasonably accurate predictions of the same types of behavior, it would be hasty to dismiss the concepts of 'folk psychology' as inherently flawed. Andrews' pluralistic approach is largely in agreement with the functionalist perspective that allows for different levels of explanation to account for animal cognition. However, by virtue of her calibration method Andrews is able to take a more agnostic position in finding plausible explanations from a much wider range of sources. At the same time, relying on the 'inference to the best explanation' as the ultimate standard of plausibility also enables Andrews to highlight the problems with certain well-established research programs, such as those based on the associative learning hypothesis.

As theories of associative learning are based on the mechanisms of classical and operant conditioning, they attempt to provide a much more parsimonious account of animal cognition. If signs of apparent foresight or planning can be more easily explained as conditioned responses to

environmental stimuli, then attributing any 'cognition' at the level of beliefs and desires would seem to be unwarranted. However, as animals have been observed to immediately initiate successful responses to solving problems not previously encountered, such cases have often been cited as evidence of genuine 'insight' i.e., implying the capacity to envisage the best solution without having to learn by prior stimulus conditioning, or actual trial and error. The most commonly cited evidence is that of Köhler's experiments with chimpanzees. Presented with a bunch of bananas hanging above them but out of reach, some chimpanzees quickly solved the problem, by taking crates that had been scattered around the floor and stacking them to build a ladder.

Andrews' discussion of this case is particularly interesting in that she is reluctant to accept it as providing decisive grounds for the explanatory limitations of associative learning theories. Instead, she refers to other research which suggests that associative reasoning processes may well be much more complex than the standard theories have claimed. In particular, evidence that some animals can transfer an effective response learnt from past situations into a novel situation indicates that in some cases at least, actions that appear to require some creative capacity to conceive the best solution to a problem may in fact be achieved by reconfiguring a previously useful response. In Köhler's experiments, although the chimpanzees had no prior experience from which they could have quickly recognized the combined instrumental value of the crates, perhaps those wooden crates may have been perceived as sufficiently similar to other familiar items such as stones or tree branches, which chimpanzees have long used as tools in the wild. Having climbed to the top of the stacked crates some chimpanzees then used a stick or pole to knock down the bananas.

Nevertheless, even if such cases can be explained more parsimoniously by transferable associative processes, such responses still imply the capacity to *recognize* that a potential response is *likely to be effectively transferable* to the new situation before attempting it. And as such a process can be even more parsimoniously explained by the animal initiating a prior act of mental rehearsal, i.e. a cognitive trial and error, then it would not suffice to characterize it as a "fancy mechanism" of associative learning, as Andrews suggests it may in fact be. In any case, she concludes this same discussion by warning against attempts to account for the complexity of animal behaviour in terms of simple cognitive mechanisms, as such accounts tend to only 'gesture toward the existence of an explanation, rather than provide one' (39).

Behavioral flexibility is often regarded as a more reliable sign of a cognitive capacity for self-control, which in turn is reasonably assumed to imply some degree of self-consciousness. Even insects display behavioural flexibility, as Andrews notes in referring to the much studied honey-bee waggle dance (57). Individual bees do not always follow the waggling bee's instructions on where to locate the new food source, but may instead opt to fly back to a source known from their own past experience. For this reason, it is odd that Andrews should instead categorize the behaviour of ants as inflexible because it is governed by simple heuristics (13). Precisely because they are heuristics, they are used to *guide* rather than determine each ant's behavior (see E. O. Wilson's *In Search of Nature*, Island Press, 1996, 68).

Notwithstanding her good advice to be wary of simplistic explanations, Andrews also offers the refreshing advice to avoid the opposite tendency to over intellectualize the nature of cognition. But for this very reason, her own preceding discussion of the 'Chrysippus problem' is negligent in over intellectualizing the process of causal reasoning in animal cognition. Andrews mistakenly assumes that 'since a disjunction is logically equivalent to a conditional with negation', then this should suffice to show whether or not a dog uses causal reasoning in deciding which of three paths

to take in pursuing a rabbit. Andrews notes that 'the first step in the causal reasoning is quite strange: no smell on A causes no smell on B which causes no smell on C'. But this is a propositional representation of causal reasoning that need not be the *only* way to approximate the dog's understanding of cause and effect. To her credit, Andrews also cites Rescorla's alternative Bayesian account, but fails to note that such probabilistic judgments are of course based on *causal reasoning*.

The capacity for causal reasoning, combined with a high degree of self-consciousness, suggests the intriguing possibility that humans may not be the only animals capable of moral cognition. As Andrews notes, it has been argued that chimpanzees, other great apes, cetaceans and elephants should be accorded the legal status of 'persons' on the grounds that they are self-aware and autonomous beings. In addition, many animals have been found to exhibit co-operation, empathy and a sense of fairness, which arguably constitute the most basic elements of morality. Even if these combined capacities are necessary but not sufficient to as yet qualify any animals as moral agents with powers and responsibilities equivalent to those of adult humans, they may well be sufficient to qualify them as moral 'patients' i.e., worthy of moral consideration. And as many animals display distinct personality traits, this leads Andrews to suggest the still more intriguing possibility that some animals may be capable of actively cultivating their own traits in a manner akin to Aristotelian virtue ethics. While such an ambitious hypothesis would require an entire book to explore in depth, *The Animal Mind* itself provides a rich source of research material and wide-ranging philosophical knowledge to inspire many further investigations into animal cognition.

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