

# Minding Mammals\*

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*Many traditional attempts to show that nonhuman animals are deserving of moral consideration have taken the form of an argument by analogy. However, arguments of this kind have had notable weaknesses and, in particular, have not been able to convince two kinds of skeptics. One of the most important weaknesses of these arguments is that they fail to provide theoretical justifications for why particular physiological similarities should be considered relevant. This paper examines recent empirical research on pain and, in particular, explores the implications of the dissociation between the sensory and the affective pain pathways. It is argued that these results show that the belief that nonhuman animals experience pain in a morally relevant way is reasonable, though not certain. It is further argued that the proposal to explore the relationship between consciousness and various forms of learning challenges the aforementioned skeptics to provide more physiological details for their claims that nonhuman mammals are probably not conscious.*

*Keywords: Animal; Nonhuman; Pain; Suffering; Affect; Anterior Cingulate Cortex; Argument by Analogy; Moral Subjects; Moral Patients*

## 1. Introduction

Though the naturalistic fallacy still looms large in ethics, the past 100 years have provided more and more evidence that substantial ethical theories will be dependent in part on facts revealed through empirical research. Recently, this has been most apparent in the numerous examinations of moral decision-making from fields such as psychology and neuroscience. As facts are revealed about how humans actually do moral reasoning, ethical theories—which all in a sense are dependent upon some

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stance about human nature—will need to either be compatible with the facts or to adjust to them.

Just as the evolving research is providing an increasingly informed picture of the moral agent, so too is it beginning to add substance to claims about proper moral subjects, and in particular to claims about the moral status or lack thereof of nonhuman animals. Many of the strongest arguments in favor of moral consideration for nonhuman animals rest on some notion of the universalizability principle, the idea that “relevantly similar moral situations should be treated similarly.” Utilitarian arguments provide the most obvious example of this kind of reasoning, but rights theorists and virtue ethicists generally can agree that acting differently towards moral subjects in relevantly similar situations is evidence of some kind of deficient reasoning.

Not surprisingly given the universalizability principle, many arguments over the similarity of human to nonhuman animals have taken the form of an argument by analogy. Features of humans’ and nonhumans’ responses to noxious stimuli at a cellular and a behavioral level are listed and suggested as evidence that the nonhuman is likely in a relevantly similar situation. Thus, if the principle of universalizability is correct, we have similar ethical obligations to the nonhuman as we do to a human, at least in situations where the analogy holds and where there are no additional features that would make the human more worthy of ethical consideration.<sup>1</sup>

However, as Allen, Fuchs, Shriver, and Wilson (2006) noted, arguments by analogy thus far have had notable weaknesses and have been unable to sway various kinds of skeptics. The first kind of skeptic is convinced that no empirical research will ever be able to reveal “what it is like” or if it is like anything to be a nonhuman animal. The second kind of skeptic does not take such a hard-lined approach to the problem, but thinks that there are important disanalogies between humans and nonhumans that suggest it is very unlikely that the nonhumans are capable of suffering. Allen et al. (2006) suggest that arguments by analogy will always be vulnerable to these objections as long as they have no theoretical justification for *why* the similarities should be considered important.

This paper is not intended to resolve conclusively these difficulties for the traditional argument by analogy. However, it is my belief that recent research on pain allows us to take an important step closer towards identifying which, if any, nonhuman animals are worthy of our moral obligations, at least if we buy some version of the universalizability principle. This research also emphasizes the need, which was already present though not perhaps as obvious, for the aforementioned skeptics to provide a more thorough case for doubting the claim that suffering occurs in particular nonhuman animals.<sup>2</sup>

## 2. Pain Research

Take an oversimplified argument for pain in nonhumans as an example of the problem. Suppose a philosopher pointed out that nociception occurs in both humans

and in a particular nonhuman species. Furthermore, she points out, the chemical mechanisms underlying the initial irritation in the two cases are remarkably similar, with histamines being released as a result of exposure to a foreign substance, causing a neural signal to travel up through the dorsal column and to the brain. She concludes that the animal feels pain consciously and, therefore, should be considered in ethical judgments.

The response to this argument is an old hat by now. Opponents of our straw philosopher will be quick to point out that nociception mediated by the same kinds of neurotransmitters takes place in organisms as simple as *Aplysia californica*, and surely we wouldn't want to attribute consciousness to them. Or if they don't want to risk offending *Aplysia* fans, they might point out, as Gary Varner (1998) does, that decapitated cockroaches can learn to hold their legs above an electrified solution after repeated shocks. In fact, we don't even need to start from a stance on the consciousness of simple or headless organisms, because we know that humans with severed spines have nociception taking place in peripheral parts of their bodies, and they can tell us that it doesn't hurt (Macphail, 1998).

At this point in the exchange, our philosopher can shed a little straw and pick up some flesh. She might point out, like David DeGrazia (1996), that humans share with most other vertebrates opiate receptors and are responsive to many of the same anesthetics. Or she may, like William Robinson (1997), describe in more detail the ascending and descending pathways at work in mammalian pain systems. Or, like Varner (1998), she could create a table that charts a number of physiological similarities and differences across phyla. All three of these authors have offered extensive arguments based on behavioral and evolutionary considerations, but I am here just focusing on the physiological data they use to support their claims.

Even with these more sophisticated accounts of physiological similarities, important theoretical considerations are not addressed. Take for example the classic model of pain (as described by Hardcastle, 1997) that suggests the intensity of the sensation of pain and the degree to which a subject minds the sensation can be experimentally dissociated. Since the *minding* of pain in humans is what most closely resembles our conception of suffering, all of the details given by the aforementioned authors would be consistent with an account of other animals' behaviors that claimed that the animals were not suffering<sup>3</sup> (as will become clear shortly). Thus, any argument by analogy that proceeds along these lines would benefit greatly by giving due consideration to current research about this dissociation.

Hints of the dissociation have been around for a while (e.g., Melzack & Wall's landmark 1965 paper mentions related phenomena), though its explicit recognition is a fairly recent phenomenon and supporting empirical work even more so. Scientists and philosophers had long been puzzled by reports of morphine patients who claimed that they still felt pain but no longer minded it as much. This, as Dennett (1978) pointed out, posed a significant challenge to our folk conception of pain, since our conception included both the ideas that "a pain is something we mind" and "we know when we are having a pain." These two claims taken together

are not consistent with the accounts of morphine patients. An illustration of this problem can be stated in the form of an argument:<sup>4</sup>

- FP1. Pain is an experience that individuals mind.  
 FP2. If someone thinks they are having a pain, they are having a pain.  
 So if  
 3. S thinks S is having a pain,  
 then  
 4. S is having a pain (from [FP2] and [3]), and therefore  
 5. S is having an experience that S minds (from [4] and [FP1]).

So given the two folk premises, it appears that (3)  $\rightarrow$  (5). But if we take the reports of morphine patients seriously, then we have real life cases of (3) &  $\sim$ (5). Thus, it appears, either the reports of the morphine patients are incorrect or something must be eluding our folk intuitions about pain.

Fortunately, scientists are beginning to discover the causes of the morphine phenomenon and at least a partial explanation of the difficulty noticed by Dennett and others. Scientists have suggested that there are two distinct pain pathways, the medial and the lateral, that account for different elements of the experience of pain. The lateral pathway is generally associated with sensory qualities of pain, such as its modality, location, and intensity. The medial pathway determines the degree of unpleasantness a subject attributes to the pain. If this account is correct, it suggests an obvious answer to the problem above, since the pain pathway being talked about in the phrase “we know when we are having a pain” when applied to the morphine patients is different from the pain pathway spoken about in “a pain is something that we mind.”

What is the evidence for this dissociation? One relevant fact is that when the anterior cingulate cortex (ACC), which plays a prominent role in the medial pathway, is ablated in patients, similar effects are reported as those of the morphine patients, with subjects claiming they still feel pain but that it no longer bothers them (Foltz & White, 1962; Glybels & Sweet, 1989). This fact is supported by the discovery that the medial pathway has far more opiate receptors than the lateral pathway (Jones et al., 1992), which would account for why morphine dramatically inhibits the *mind*ing of pain but not the *sen*sation. In fact, there appears to be a double dissociation, as Ploner, Freund, and Schnitzler (1999) describe pain affect without pain sensation in a subject with damage to the S1 and S2 cortices of the lateral pathway. Ploner and colleagues write that the subject “described a ‘clearly unpleasant’ intensity-dependent feeling emerging from an ill-localized and extended area ‘somewhere between fingertips and shoulder,’” but “was completely unable to further describe quality, localization and intensity of the perceived stimulus” (p. 213).

Further, even more conclusive evidence has been discovered recently by the studies of Pierre Rainville and his colleagues. In two experiments by Rainville, Carrier, Hofbauer, Bushnell, and Duncan (1999), subjects had their hands immersed in a water bath with a moderately painful temperature of 47°C. In the first experiment, the subjects were given hypnotic suggestions that enhanced the pain unpleasantness

of the water, and the subjects reported that the unpleasantness increased but the intensity of the pain sensation remained the same. In the second experiment, the subjects were given a hypnotic suggestion that the pain sensation increased, and in that case they reported that *both* the unpleasantness and the sensation increased. These results, combined with the claims of patients administered morphine, indicate that the mechanisms responsible for localization of pain are different from those that produce the sensation of unpleasantness.

Several positron emission tomography (PET) studies have confirmed the notion that at least two distinguishable pathways are involved in the processing of the sensory aspects and the affective or motivational aspects of pain. Repeating the hypnosis experiment while performing a PET scan on the subjects, Rainville, Duncan, Price, Carrier, and Bushnell (1997) showed that activity in the ACC varied proportionally to the amount of unpleasantness experienced by subjects. In contrast, activation of the S1 area of the somatosensory cortex varied proportionally to changes in pain sensation reported by subjects (Hofbauer, Rainville, Duncan, & Bushnell, 2001). Similar studies have confirmed these results (Tolle, 1999).

Interestingly, excitation in the same areas of the ACC has been observed in a range of circumstances as diverse as social exclusion (Eisenberger, Lieberman, & Williams, 2003), human mothers hearing the distress cries of infants (Lorberbaum et al., 1999), and increased aversive sensation due to expectation of pain (Sawamoto et al., 2000). Thus, a wide range of behavior described as negative affective states in humans appear to selectively activate regions of the ACC.

Perry Fuchs and his research team at the University of Texas at Arlington have also developed a way of testing the role of the ACC in nonhuman mammals (LaGraize, Labuda, Rutledge, Jackson, & Fuchs, 2004). Rats generally prefer to spend most of their time in darkness rather than light, other things being equal. In Fuchs' experiments, hyperalgesia (increased response to aversive stimuli) was produced in the left paws of rats by ligating the L5 spinal nerve associated with that paw. The rats were kept in chambers that were divided into one light and one dark section. The experiment was set up so that when rats were in the dark side of the chamber, painful shocks were delivered to their hyperalgesic paws; but when the rats were in the light side of the chamber, equal strength shocks were delivered to their contralateral paws (which were not hyperalgesic). Not surprisingly, rats with hyperalgesic paws began spending a much larger proportion of their time in the light side of the chamber. However, when electrolytic lesioning was performed on the ACC of rats, the percentage of time spent by the rats in the light side of the chamber decreased dramatically, down to approximately the same percentage they spent in the light chamber before ligation. Withdrawal reflexes of the paw upon shocking continued normally even after the ACC lesioning, thus producing something of a functional equivalent to the reports of "feeling pain but not minding it" by humans with ACC lesions.

A similar phenomenon was demonstrated in a study of monkeys. Dong, Hayashi, Roberts, Fusco, and Chudler (1996) ran monkeys through two different tasks. In one task, the monkeys had to hold a button down while intense heat was applied

to a section of their skin in order to obtain a food reward. The monkeys could escape the thermal pain by releasing the button, but by doing so they would lose their food reward. Using this task, the researchers found a threshold at which the monkeys were not willing to endure the pain in order to obtain the reward. In a separate task, the monkeys were rewarded for pressing a button when the temperature changed from noxious to non-noxious levels. After damaging a part of the posterior parietal cortex that provides input to the insular cortex, another important structure in the medial pathway (see Price, 2002 for more details), the researchers found that the monkeys no longer utilized the escape responses but were able to discriminate noxious and non-noxious temperatures. Again, this research fits very well with the interpretation that the monkeys could still feel the pain but no longer found it unpleasant.

Where does this leave us with other nonhuman animals? All mammals have an ACC, and research thus far has suggested that it plays a similar role in other mammals as it does in humans (Johansen & Fields, 2004). Thus, at least one important theoretical step has been taken to strengthen the argument by analogy for the moral significance of nonhuman animals. Past critics have suggested that the mere processing of information and reflexive withdrawal behavior are not enough to prove the existence of the conscious experience of pain; research has confirmed their suggestion is right but has also indicated that other mammals possess both those parts of the pain pathway that can be dissociated from the conscious “minding” of pain and those parts of the brain that appear to be integral to the “minding.” Of course, it is inevitable that future research will further differentiate the roles of different parts of the pain system, so the possibility remains that there are fundamental differences between humans and other mammals.<sup>5</sup>

However, another theoretical consideration that may be useful in determining what species consciously experience pain is the role that pain plays in learning. As Allen (2004) notes, it is important to be cautious about such claims, since detached spinal cords have been shown to learn responses to avoid noxious stimuli and such learning even displays relatively complex features such as latent inhibition and blocking learning to avoid specific stimuli when more salient stimuli are present (Grau, 2002). However, as Allen suggests, consciousness may still play a role in more complex forms of learning, e.g., certain kinds of operant learning. This would be consistent with phenomenological observations, where *minding* a sensation often causes us to desire to avoid it in the future.

Returning to Fuch’s research on rats, this explanation fits well with the fact that rats with intact ACCs learned to avoid the dark side of the chamber, whereas rats with ablated ACCs did not. It is also supported by research by Johansen and Fields (2004) which demonstrated that the injection of excitatory amino acids into the ACC produced an aversion to a particular location in the absence of a peripheral noxious stimulus in rats, and that the injection of an amino acid antagonist into the ACC blocked learning to avoid the location even in the presence of a peripheral noxious stimuli. The authors concluded “ACC neuronal activity is necessary and sufficient for noxious stimuli to produce an aversive teaching signal” (p. 398). Thus, there appears

to be an important relationship between the affective pain pathway and learning, which may in turn be suggestive of an evolutionary role that the conscious experience of pain could play.

These considerations could be important when we turn our attention to non-mammalian species. Pain research in avian, reptilian, amphibian, and fish species is far more limited than in mammals, but we can be sure that they do not have ACCs since they lack neocortices. However, since all of these species clearly avoid noxious stimuli, it would be premature to conclude that they must lack a functional equivalent to the medial pain pathway in mammals. Presumably, future research on mammals will give researchers more of an idea of what such a functional analog could look like in more evolutionarily distant species.

### **3. Skeptical Arguments**

What do these results show in light of the two strands of skeptical arguments referred to at the beginning of the paper? The first basis of skepticism was the claim that no third-person account could ever prove that “it is like something” to be a particular nonhuman animal. This argument, for what I hope will be fairly clear reasons, does not seem to be very relevant to ethical debates or to the interpretation of the research referred to in this paper.

I think that arguments from the first-person perspective are persuasive insofar as they attempt to show that we cannot be *certain* of consciousness in nonhuman animals. However, absolute certainty is a very tenuous concept and one that is not particularly useful in everyday life. For example, Descartes’s dreamer argument suggested that since we have many times been deceived into believing that we were awake when in fact we were dreaming, we cannot now be certain that we are not dreaming. However, as many interpreters have noticed, this does not imply that it is unreasonable for us to believe that we are now awake (Broughton, 2002).

Likewise, though the aforementioned experiments provide very little reason to think the claim that nonhuman animals are conscious is certain, they do provide evidence supportive of the claim that the attribution of conscious states to mammals is reasonable. And reasonableness is all that is needed for the moral argument. If it were reasonable to believe that my neighbor’s children were trapped inside a burning building, it would surely be morally reprehensible to point to the lack of certainty as an excuse for inaction, since the potential costs of inaction are so high (assuming that our actions could make a difference). Likewise, a similar precautionary principle is enough to override a certainty requirement in debates over the moral status of nonhumans since the costs are extremely high (at least on sentientist grounds) if it turns out that nonhumans are conscious yet we continue current practices such as intense factory farming.

The other form of skepticism provides a much stronger criticism of the argument by analogy, since it questions not just the certainty of the consciousness of nonhuman animals but also the reasonableness of this belief. Returning to the

earlier example, if it is not even reasonable to believe that my neighbor's house is on fire, then my apparent obligation to take action is much diminished. Likewise, if skeptical arguments are successful in showing that the belief in conscious states in nonhumans is unreasonable, then at least from the perspective of universalizability we have no obvious ethical obligations towards these animals (assuming that consciousness is a necessary condition for pains to be relevantly similar).

These arguments, perhaps most commonly associated with Peter Carruthers (2000; see also Macpahil, 1998), generally claim that some kind of higher-order cognitive capacities are necessary for consciousness and point to evidence that suggests that nonhuman animals do not possess these capacities. Even a theorist such as Michael Tye (1997), who believes that animals as simple as bumble bees are conscious, still believes that higher-order awareness is necessary for "suffering."

However, regarding the question of consciousness, I think there are important reasons for preferring the approaches mentioned earlier to those suggested by Carruthers. Allen's suggestion to investigate whether conscious experiences of pain are linked to certain kinds of learning points to a number of lines of investigation that can be confirmed or disconfirmed empirically. On the other hand, the scientific details of what is meant by the claim that consciousness consists of "being disposed to be targeted by a higher-order thought" (which is Carruthers' position) are left rather vague. It is not clear what research could be used to support or reject this theory.

Until at least a sketch of what the research would look like is provided, it is hard to see how theories such as Carruthers' can overcome the argumentative burden imposed by the precautionary principle. Given the current practices of society, this is not to say that the political burden of proof is on the skeptics. Since accepting that nonhuman animals feel pain in a morally relevant sense suggests a moral obligation for particular lifestyle changes, it is clear that from a practical (rather than ethical) perspective the onus is on animal welfare advocates to provide motivational force for their arguments that current practices need to be changed. Even if the ethical arguments were conclusive, this would not be an easy task.

#### **4. Conclusion**

Research on the lateral and medial pain pathways has provided some additional evidence to support the claim that it is reasonable to believe that mammals feel pain similar to that categorized as suffering in humans. In addition, this research has opened up possibilities for future empirical investigation that may reveal important results for the investigation of a functional role for consciousness, and has provided an outline of criteria to look for in non-mammalian species. Though the research will probably not be enough to convince some skeptics, it is suggestive of features that will be necessary for skeptical theories to acquire in order to provide help in the future scientific investigation of consciousness.



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## Notes

- [1] See Varner (1998) for an account of how humans' "ground projects" entitle them to special moral consideration. Varner (in press) also provides a detailed analysis of research related to auto-noetic consciousness (conscious awareness of one's past, present, and future) and how possession of such consciousness would be grounds for extra moral consideration above and beyond that of the merely sentient. See also Rachels (1997) and Singer (1993) for additional evaluation of the role of "biographical" consciousness in moral evaluation.
- [2] The justification for my move from pain to suffering will become more apparent later in the paper.
- [3] In fact, in a criticism of Peter Singer, Holton and Langton (1999) suggest that the difference between pain and suffering provides a reason for questioning how much we are to make of the fact that humans feel empathy towards other species.
- [4] I owe the basic form of the argument to Bill Robinson, though I'm not reproducing his version exactly.
- [5] Rainville (2002) has suggested further differentiations beyond the sensory/affective distinction.

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