Animal Sentience and Emotions: The Argument for Universal Acceptance of Sentience

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Introduction

Though the fact of animal sentience is implicit in biomedical experimentation,1 researchers have traditionally downplayed and ignored certain aspects of it, and in nonvertebrate species they have denied it altogether. While it is established that vertebrate animals feel pain and respond to pain drugs in much the same ways that humans do,2 emotions such as joy, happiness, suffering, empathy, and fear have often been ignored, despite the fact that many psychological and behavioral experiments are predicated on the assumption that animals feel these emotions and will consistently react based on these feelings. Despite the current state of research that weighs in favor of animal sentience, denial of the emotional states of animals is pervasive within the biomedical research community.

Animal sentience refers to “the ability of animals to feel and experience emotions such as joy, pleasure, pain and fear.”3 Charles Darwin was the first scientist to make a serious study of animal emotions, and he pioneered comparisons between human facial expressions of emotions and the expressions of other animals. This comparative approach fell by the wayside with the advent and subsequent dominance of behaviorism in scientific thought, led by B.F. Skinner and others. Skinner considered emotions “fictional causes to which we attribute behavior,” and under the influence of this school of thought, the study of animal consciousness essentially became a “disembodied mind” devoid of emotional experience. It was considered “unscientific” to characterize animal emotion, and to some extent human emotion, as attributable to anything other than “learning and memory.”4 Thus, in observations of animal behavior, descriptive labels that did not attribute any intentionality were acceptable. Noted primatologist Frans de Waal describes how, when he observed the way chimpanzees would reconcile with a kiss after a fight, he was pressured to use the phrase “postconflict reunions with mouth-to-mouth contact” rather than the terms “reconciliation” and “kiss.” He goes on to state that for three decades in primatology research, simpler explanations had to be systematically countered before the term “reconciliation” was accepted in situations in which primates quite obviously “monitored and repaired social relationships.”5 De Waal notes that this dependence on descriptive labels, i.e., that animals can be aggressive but not angry or affiliative but not loving, runs counter to the principles of cognitive parsimony. This principle argues against the assumption that humans

3Proctor, H. S., Carder, G., & Cornish, A. R.
5de Waal, F. B. M.
have developed unique emotional responses within the context of evolution and has consequently led to a rigidity on this topic among some scientific researchers.

A common objection to the study of animal sentience is that researchers can never truly know what an animal is feeling and, thus, all research into animal emotion is speculation. While it is not possible to know what an individual animal is truly feeling, neither is it possible to know this about another human being, yet merely on the basis of our shared ability to communicate, researchers attribute emotion to humans and recognize the connection between emotions and expressions of feelings. However, humans can be unreliable narrators of their own experience and may not accurately describe what they are feeling. Investigations into neurobiology support the idea that similar structures in the mammalian brain may perform similar functions when it comes to emotional expressions and that even very different structures may have analogous functions—for example, as in Klein and Barron’s analysis of analogous insect brain structures that postulates subjective experience in insects.6

Another issue facing the recognition of animal sentience and emotions within the community of biomedical researchers is the demand that animal sentience be proved beyond any shadow of a doubt, an unrealistic standard that is not adhered to in any other scientific field. Even concepts of evolution, though widely accepted, cannot be proved beyond a reasonable doubt.7 Helen Proctor and her colleagues also note this paradox of animal sentience, stating, “Whilst other areas of science often make do with imperfect data, animal sentience is required to buck the trend and provide unequivocal proof.”8 In their systematic review of scientific literature from 1990 to 2012, Proctor et al. found 2,562 publications that attributed sentience to animals and referenced an animal’s emotional state. The overwhelming majority of these publications referenced a negative rather than positive emotional state, i.e., depression or anxiety. Interestingly, the majority of these experiments had been performed for human benefit, namely in pharmaceutical studies, indicating that animal emotional states can be and are studied when they are perceived to benefit human medical progress.9

This cognitive disconnection is pervasive throughout biomedical research and can be demonstrated by the differences in how experimenters talk about their own companion animals versus the animals they conduct experiments on. Thus, joy and sadness can be attributed to one’s own personal companion animal—for example, as in the case of a dog who is left behind and sits longingly at the door—but animals in the laboratory, even of the same species, are not perceived to experience the same longing. Bekoff calls this the formation of a “distinct category of animal … perceived by researchers as ontologically different.”10 PETA Senior Science Adviser Dr. Frances Cheng describes this as a process of desensitization that begins with young biomedical researchers, in which cartoons of “happy” rats are marketed to them on T-shirts and mugs, rat skeletons holding lab books are auctioned off in fundraisers, and the bodies of dead animals are used for amusement.11 This serves to reinforce the notion that evidence of animal emotion, based

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8Proctor, H. S., Carder, G., & Cornish, A. R.
9Proctor, H. S., Carder, G., & Cornish, A. R.
10Bekoff, M.
on both direct observation and scientific evidence, can continue to be ignored because certain categories of animals don’t matter as much as others. This can also be observed in veterinary school training, where students are taught that animals with certain labels, i.e., “food” animals or “lab” animals, don’t deserve the same consideration as “pets.”

**Evidence of Animal Sentience**

1. **Vertebrates**

**Mammals**

This section does not include primates and dogs, although there is a wealth of evidence indicating their sentience. Rather, rodents and large animals who are commonly used in experiments are highlighted in this section.

Tens of millions of rodents are used in biomedical experiments every year; indeed, rats and mice are the animals most commonly used in experiments. They are confined and genetically altered, their family relationships are manipulated at will, they are sometimes housed singly in stressful isolation, and any number of painful and distressing experiments are performed on them. There is truly no limit to what can be done to these animals, no matter how painful or senseless. But like other mammals—including dogs and primates—rats and mice experience feelings of pleasure, fear, pain, and suffering.12

Play is an important activity that humans derive pleasure from, and it’s been shown that animals who engage in play experience similar pleasure. Play has been documented in a wide range of animals, including most mammals studied and some orders of avian species, reptiles, and invertebrates.13 Neurobiological data collected from animals at play provide evidence that play is enjoyable to them, and rabbits, dogs, elk, buffalo, elephants, and primates have all been shown to engage in it.14 Rats are no exception. Not only do they enjoy play,15 they also anticipate it and have been shown to have increased dopamine activity in their brains when they know a play event is imminent.16 Rats enjoy pleasurable activities like tickling and possess an array of facial expressions that convey both positive and negative emotions.17 Rats who were tickled showed more optimism in their decision making.18 Rats feel remorse for their actions19 and exhibit

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14Bekoff, M.
15Siviy, S. M., & Panksepp, J.
empathy and altruistic behavior by forgoing a treat to help a fellow rat. Mice also exhibit empathy for other mice who are in pain.

Sheep, goats, cattle, and pigs are used in experiments that investigate a range of conditions including fractures, respiratory ailments, spinal cord trauma, and burns. There is a body of evidence attesting to their ability to experience both positive and negative emotions. Sheep can recognize both familiar and unfamiliar faces from two-dimensional images, which is a cognitive skill identified in humans and other primates, and isolated and stressed sheep can be comforted by a picture of a familiar face. Sheep can anticipate rewards, react with disappointment when they do not receive the reward, and experience an array of emotions including fear, anger, boredom, disgust, and happiness.

Goats also display an array of emotions. They can show optimism after being rescued from a situation of neglect, remember their kids’ calls and recognize them up to at least 17 months after weaning (the time frame of the study), and excel at learning and remembering novel tasks. They communicate with humans using eye contact, a strategy they share with dogs and horses.

Pigs understand time, are capable of spatial learning and memory, can understand the perspective of another, are able to categorize front and back views of human heads using open-ended categorization, and engage in complex forms of play. They also demonstrate emotional

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contagion, a process long documented in humans whereby individuals reflect and empathize with a companion’s emotions, both negative and positive.\textsuperscript{33}

Cows grieve when separated from their calves, show frustration, and exhibit a sense of accomplishment when achieving a task, beyond just receiving a reward. Like pigs, cows engage in complex forms of play, exhibit emotional contagion and social buffering, and demonstrate stable and unique personality traits among individuals.\textsuperscript{34}

**Birds**

Birds are used in a variety of experiments, including infectious disease, toxicology, cancer, neurology, vaccine development, and embryology experiments. Chickens and turkeys are used in experiments for the agricultural industry as well. Some birds are taken from the wild or held in colonies and captive bred, yet birds consistently demonstrate sentience and the expression of emotions such as joy and grief.

Birds have rich and complex emotional lives and possess advanced cognitive abilities. For example, chickens show declarative representation, object permanence, self-control when making decisions, and advanced social learning abilities.\textsuperscript{35} Chickens also show evidence of emotional empathy and physiological and behavioral stress when their chicks are distressed by an aversive stimulus (an air puff). However, they also show cognitive flexibility and are able to attenuate their reaction based on the level of distress, i.e., they are more upset when the chick shows greater levels of distress.\textsuperscript{36} Furthermore, hens will function as social buffers to chicks, ameliorating their distress.\textsuperscript{37} Chickens can also anticipate positive and negative events and show behavior consistent with pleasure, relaxation, and stress, depending on the event.\textsuperscript{38}

Starlings and white-throated sparrows exhibit emotional responses when they hear the songs of conspecifics,\textsuperscript{39} budgerigars demonstrate contagious yawning\textsuperscript{40} (a marker of empathy), and crows and western scrub jays hold funerals and mourn their dead.\textsuperscript{41,42} Ravens remember reciprocal actions both short- and long-term\textsuperscript{43} and engage in synchronized play, an indicator of emotional

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\textsuperscript{39}Sivy, S. M.


contagion that is a key element in empathy and social cognition. Of 27 orders studied in birds, play has been reported in 13. Crows and psittacines demonstrate analogical reasoning, which scientists believe forms the foundational thought process in humans for scientific discovery, and crows develop and use tools to accomplish tasks.

Fish
There are many species of fish who are used in biomedical experiments, including goldfish, zebrafish, and trout. They are subjected to experiments in toxicity, neurology, embryonic development, disease control, and cancer, and they are increasingly being proposed as a replacement for mammals in experiments.

The preponderance of evidence in current literature indicates that fish not only feel pain but also experience a range of positive and negative emotions and demonstrate significant cognitive abilities. In her book Do Fish Feel Pain? Victoria Braithwaite presents evidence that fish possess key traits associated with consciousness, including the ability to form and use mental representations; consider a current mental state and associate it with a memory; alter their view of an aversive situation, depending on the context; and consider the consequences of their actions. Though their brains are structured differently than those of mammals, they possess the neural structures and limbic system suggestive of the ability to process pain as an emotional experience. Vila Pouca and Brown echo this, stating, “Learning, memory and the emotional drivers are, therefore, important components of pain and all of them are present in fish.” Fish also show distinct personality traits that seem to shape their spatial learning abilities. While database searches did not turn up any studies on positive emotions in fish, research has shown that fish retain memories based on both positive and negative experiences.

2. Invertebrates

53Vila Pouca, C., & Brown, C.
Some scientists may argue that animals who lack a neocortex cannot process subjective experiences, i.e., the awareness of pain, happiness, etc. This has proved to be a stumbling block in acknowledging sentience in animals other than mammals. However, recent investigations indicate that there is a basis for believing that there is subjective experience in the absence of a neocortex, and analogous neurological structures can perform this function in animals.

In July 2012, a prominent group of scientists, including cognitive neuroscientists, neuropharmacologists, neurophysiologists, neuroanatomists, and computational neuroscientists, met at the University of Cambridge to assess the state of research on animal consciousness. Stephen Hawking was also present at this meeting. They produced The Cambridge Declaration on Consciousness, which, in critical part, states the following:

The absence of a neocortex does not appear to preclude an organism from experiencing affective states. Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Nonhuman animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates.

Thus, based on available evidence and scientific consensus, invertebrates must also be included in the consideration of sentience.

**Cephalopods**

Octopuses indicate when they are suffering from pain or distress, demonstrate complex cognitive abilities, and are able to connect perceptual experiences and memory and retain memories long-term. They also show a variety of emotions through changes in coloration and skin patterns (though the meaning of many of these patterns is still speculative) and demonstrate play behavior. They can learn to open jars to obtain crabs and develop and use tools. There are anecdotal accounts of octopuses engineering escapes from aquariums, squirting experimenters with water, and communicating with divers through touch and gestures. They appear to

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recognize and distinguish between individual humans and modify their behavior based on whether they “like” the particular individuals.⁶² Cuttlefish, close relatives to octopuses, appear to experience REM sleep similar to humans⁶³ and have demonstrated the ability to count.⁶⁴

Decapods
While there has been little investigation into the emotional states of decapods, including crabs and lobsters, there is evidence that they experience and are conscious of pain. Crabs exhibited the following criteria for a sentient awareness of pain: avoidance learning, trade-offs between avoidance of the pain and other requirements, response to opioid analgesics, and high cognitive abilities.⁶⁵ In one experiment, hermit crabs with a high-quality shell withstood higher levels of pain (electric shocks) in order to retain the shell. Low-quality shells were vacated. This motivational tradeoff indicates a conscious awareness of pain and an ability to weigh the consequences of experiencing continued pain versus losing a coveted resource.⁶⁶

Conclusion
Given the evidence demonstrating the sentience of animals—they have the capacity to feel joy, pain, fear, suffering, and happiness—and that those emotions are meaningful within the context of their lives, the ethical and moral issues that preclude the use of humans in painful and invasive experiments also hold true for animals. Even if full scientific certainty is lacking for certain species or evidence has not yet been collected on them, this does not justify using them in painful and distressing experiments. The precautionary principle, originally formulated as a directive in environmental policy, states that “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”⁶⁷ Birch argues that this principle should be extended to animal welfare and suggests that when there is a risk of serious, negative effects on animal welfare, “lack of full scientific certainty” should not be used as a reason for failing to prevent them. Indeed, Birch extends this argument even further, stating that if there is evidence of sentience within just one species of a particular order of animals, such as Octopoda, which encompasses 300 species, then protection should be extended to the entire order. Birch also notes that those who argue against sentience in animals must face a burden of proof to show this, not the other way around.⁶⁸

There are significant challenges to accepting this notion within the scientific community. Young researchers are indoctrinated into a professional culture that often suffocates empathy and


⁶⁷Birch, J.
condones ignoring the evidence in favor of animal sentience. But the cost of not accepting this
evidence is astronomical and can be counted in the lives of millions of animals—thinking,
feeling beings—who suffer at the hands of experimenters who see fit to acknowledge their
feelings and awareness only when it’s convenient.