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Kristin Andrews  
*York University*

Ljiljana Radenovic

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**Animal Cognition**  
**Kristin Andrews and Ljiljana Radenovic**  
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Debates in applied ethics about the proper treatment of animals (see ANIMAL RIGHTS; ANIMALS, MORAL STATUS OF) often refer to empirical data about animal cognition, emotion (see EMOTION), and behavior. In addition, there is increasing interest in the question of whether any nonhuman animal could be something like a moral agent (see MORAL AGENCY). These two questions are related but do not entirely overlap. If animals are moral agents we presumably need to grant them moral standing (see MORAL STATUS). If animals are not moral agents, there may be independent reasons for considering their interests. Empirical findings are relevant to both questions. This entry is designed to guide ethicists to the relevant data and claims of scientists and philosophers about capacities related to animal ethics.

**Moral standing**

In ethics, the usual question about animals has to do with whether nonhuman species are justified objects of sympathy and moral concern. In applied ethics, there are related questions about vegetarianism (see VEGETARIANISM AND VEGANISM), medical testing (see ANIMAL EXPERIMENTATION), testing of consumer products, hunting (see HUNTING), catch-and-release fishing, zoos, husbandry, living conditions, ecotourism, entertainment, and so forth. Some of these arguments rest on claims about the worth of the species (see SPECIES, THE VALUE OF) or focus on the instrumental value (see INSTRUMENTAL VALUE) of treating animals well. Other arguments are based on the cognitive capacities of individual animals, such as the capacity of an animal to experience pain and suffering (see SENTIENCE, MORAL RELEVANCE OF), or to think about the future. Questions about the proper treatment of research and zoo animals might also be addressed by considering the quality of social relationships among such animals. Other cognitive capacities, such as rationality and personhood (see PERSONHOOD, CRITERIA OF), are also sometimes thought necessary for moral agency.

**Moral agency**

Some philosophers have presumed that humans are the only creatures capable of moral sentiments and behavior, and that empirical data on animal behavior is irrelevant for ethics. Kant (1798) (see KANT, IMMANUEL) and modern Kantians like Korsgaard (2006) argue that animals lack autonomy (see AUTONOMY) and therefore cannot be moral agents. It is also argued that animals cannot be moral agents because they don't have moral emotions or moral senses (Hauser 2000; 2006). Similar point about uniqueness of human morality can also be found in Thomas Huxley's *Evolution and Ethics* (1864) where he proposes that morality is an exclusively human invention for the control of evil tendencies. On such views, nothing like morality could be found in nonhuman species.

On the other hand, some philosophers and scientists (e.g. Bekoff 2004, Bekoff & Pierce 2009, Flack and de Waal 2000, de Wall 2006, de Waal 2009, Gruen 2002,

Guzeldere and Nahmias 2002) believe that, given evolutionary theory, we should expect a cognitive and emotional continuity between humans and other animals such that other species also have something like a moral sense (see ALTRUISM AND BIOLOGY). On the continuity view, the psychological capacities required for morality are not either/or capacities, so we should expect to find such capacities or their precursors in many species. Some continuity theorists argue that since there is continuity between human and non-human minds, there also has to be continuity between those that have no moral agency and those that are full-blown moral agents. For example, Frans de Waal argues that there are two necessary conditions for morality, namely empathy (see EMPATHY) and reciprocity, and we see ancestral or primitive varieties of such capacities in many species (de Waal 2006). In dolphins, elephants, and apes, de Waal argues, we see more sophisticated versions of such capacities in terms of targeted helping, consolation, cooperation, and a sense of fairness.

Other continuity theorists argue that some animals have their own morality, rather than the precursors of human morality (Bekoff & Pierce 2009). Bekoff and Pierce take morality to be "a suite of other-regarding behaviors that cultivate and regulate complex interactions within social groups", and they think that different species have morality to a different degree, based on the complexity of their behavior, social organization, and cognitive flexibility (Bekoff & Pierce 2009, 82). Morality is species-relative on their view not because different behavioral capacities are involved, but because different species (and different groups within species) have different norms. They claim that regardless of the species, to have any degree of morality one must have empathy, altruism, cooperation and perhaps a sense of fairness.

### **Empirical data**

Psychological capacities related to moral standing and moral agency include a variety of abilities, including non-cognitive processes such as the ability to feel pain, advanced cognitive processes such as decision-making, and moral emotions such as forgiveness (see FORGIVENESS) and sympathy. While some non-cognitive capacities such as capacity to feel pain may be sufficient for moral standing, complex psychological capacities seem to be required for moral agency. There is empirical evidence regarding the existence of all these capacities among many different species.

### **Pain and suffering**

Jeremy Bentham (1789) claimed that the ability to suffer and feel pain is sufficient for moral standing, and the following century's Darwinian revolution convinced many that animals do feel pain. Thomas Huxley argued that Darwin's doctrine of continuity provided strong evidence that animals are conscious and feel pain as do humans (Huxley 1874). Huxley and Bentham based their claims that animals feel pain on behavioral evidence, such as observations that animals favor limbs that are not broken and nurse tissue damage. In a contemporary philosophical discussion of the potential for research on nonhuman pain behavior, both behavioral and neurological studies are examined for their relevance to the claim that animals experience pain (Allen et al. 2005). Behavioral studies show that rats seek to avoid injury, even if it requires moving to a less comfortable environment (LaBuda and Fuchs 2000a), and there is data that animals reduce this injury avoidance behavior when given morphine (LaBuda and Fuchs 2000b).

Neurological evidence is also drawn on to defend the claim that animals feel pain. Nociceptors, specialized neurons that sense noxious stimuli, are found in a wide variety of animal species, from apes to sea slugs. However, there remain questions whether nociception is necessarily associated with the *experience* of pain. While much of the focus of this research has been on mammalian pain, some researchers have found behavioral and neurological evidence for pain in other taxa, including fish (Sneddon 2003; Nordgreen et al. 2009). Still, critics argue that fish lack the physiology necessary for pain experience. There is a growing philosophical literature on such issues (Allen et al. 2005; Allen 2004).

In addition, there is some evidence that animals experience psychological pain as stress. Glucocorticoids such as cortisol are correlated with stress in humans, and some have suggested that high levels of stress hormones in other species indicates the existence of stress. Stressors such as dominance and status ranking have been studied in a number of different species (Sapolsky 2005; Abbott et al. 2003). For example, among baboons glucocorticoid levels remain elevated in females for about a month after the death of a close relative, and high levels of stress hormones are found in nursing mothers when a potentially infanticidal immigrant male arrives. High levels of stress hormones are also found in females when the female ranking system is undergoing instability, and in males when the male ranking system is unstable (Cheney & Seyfarth 2007).

### **Friendship**

The special bond between individuals known as friendship (see FRIENDSHIP) has a number of associations with morality. It serves as a marker of an individual living a good life, but at the same time the existence of this special relationship offers a challenge for moral theories that do not permit special duties. The anthropologist Joan Silk defines friendship in primates as "relationships *among nonkin* that are characterized by frequent participation in affiliative interactions (often, but not necessarily, including grooming); involvement in coalitionary aggression, particularly in defense of the partner; high rates of association; mutual responsibility for maintaining proximity; high degrees of reciprocity in directional, nonaggressive activities such as grooming and food sharing; continuity across time and context; high degrees of tolerance (co-feeding), loyalty, and compatibility; and low degrees of stress when together (Silk 2002, 434). Friendship in non-human animals is a matter of some debate. In many species there are special relationships between nonkin individuals; Jane Goodall first told us about such male alliances in chimpanzees aimed at toppling the alpha (Goodall 1986), but we also see male alliances in dolphins as a mating strategy (Connor et al. 1999). Other non-kin relationships between males and females have been described as friendships when they do not involve sexual activity. Male and female baboons, for example, form friendships that can last a year, and friends forage together, sit together, and groom one another at high rates. Males also help raise their female friends' offspring, and protect the young against the possibility of infanticide (Cheney and Seyfarth 2007; Palombit et al. 1997).

### **Rationality**

Questions about an individual's moral standing and moral agency may be related to questions about that individual's rationality. However, views about the cognitive capacities required for rationality vary. In the animal cognition literature, much of the

research on rationality has focused on nonhuman apes, who have been shown to have competence in capacities as varied as analogical reasoning (Oden 2001; Gillan et al. 1981), transitive reasoning (Gillan 1981; Boysen et al. 1993) numerocity (Shumaker 2001), the use of numerals (Biro & Matsuzawa 2001), categorical perception (Thompson & Oden 2000), tool-use (Goodall 1969), artificial symbolic communication (Premack 1990), human language comprehension (Savage-Rumbaugh et al. 1993), and causal reasoning (Bräuer et al. 2006). Many of these capacities are found in other species and taxa as well. For example, while tool-use has been found in all species of great ape, it is also demonstrated in avian species such as rooks (Bird & Emery 2009) and bottlenose dolphins (Krutzen et al. 2005). In addition, artificial communication systems have been developed for use with African Grey parrots (Pepperberg 1999), bottlenose dolphins (Herman et al. 1984) and sea lions (Schusterman & Krieger 1994). Among philosophers, Dretske (1988, 2006), Dennett (1995, 1983), Millikan (2004, 2006) and Proust (1999, 2006) have argued that animals have some form of rationality. On the other hand, philosophers including Bermúdez (2003, 2006) and Davidson (1982) argue that animals cannot be rational because they lack language. For a discussion of the philosophical arguments regarding animal rationality, see the volume *Rational Animals* (Hurley & Nudds 2006).

### **Personhood**

While personhood may be related to rationality, some elements of personhood may be investigated independently. For example, an understanding of self is a plausible requirement for personhood. Gordon Gallup has argued that a chimpanzee's ability to recognize himself in a mirror indicates an understanding of self (Gallup 1970), and subsequent research suggests that a number of species recognizes their reflection, including gorillas (Shumaker & Swartz 2002), orangutans (Swartz et al. 1999), bottlenose dolphins (Marino et al. 1994; Reiss & Marino 2001), Asian elephants (Plotnik et al. 2006) and pigs (Broom et al. 2009). However, there is some question whether mirror self-recognition does indicate that the recognizer has a sense of self, and conversely failure to pass such tasks may not be sufficient to show that the individual lacks a sense of self, given concerns about ecological validity (e.g. the species may not be visually oriented). For a discussion of self-awareness, see the volume *Self-awareness in Animals and Humans* (Parker et al. 1994).

### **Theory of mind**

A theory of mind is the capacity to attribute beliefs and desires to others. The ability to understand others' motivations and reasons for action is implicated in some non-consequentialist ethical theories, and there remains a question whether any animals have this ability. Behavioral research with chimpanzees has shown some evidence for understanding others' perceptual states, but no experiment has been able to directly assess the chimpanzee's understanding of others' beliefs (Call & Tomasello 2007). Some have argued that the kinds of experiments performed should not be expected to answer the question, and thus there is no evidence that chimpanzees lack a theory of mind either (Andrews 2005; Lurz 2009). Andrews, for example, argues that the predictive tasks that have been used to test for theory of mind are flawed because we should not expect belief attribution to be used in predicting behavior; at least in humans, belief attribution is more

closely associated with the practice of explaining behavior (Andrews 2005). While the earliest examination of theory of mind was in chimpanzees (Premack and Woodruff 1978), more recent research examines other species, and looks for the ability to attribute mental states other than belief, including perceptual and informational states. For example, researchers have claimed that the ability to attribute some mental states can be found in various species including dolphins (Tschudin 2006), scrub jays (Emery & Clayton 2004), rhesus monkeys (Flombaum & Santos 2005), and dogs (Horowitz 2009).

### **Helping and cooperation**

Helping and cooperation are seen in many species. Generalized reciprocity - the helping of an unknown individual after having been helped oneself - has been observed in rats when they help an unfamiliar rat obtain food (Rutte and Taborsky 2007), and in chimpanzees (Warneken et al. 2007). While there are studies that suggest that chimpanzees are unwilling to help other chimpanzees gain food even when it requires very little effort (Silk et al. 2005), there is a growing body of evidence that chimpanzees do help in some contexts (Yamamoto et al. 2009). De Waal argues that there is evidence of targeted helping in the great apes, elephants, and dolphins (de Waal 2006). Some monkeys also display helping behavior (Markowitz 1982). Bekoff and Pierce argue that cooperation is seen in a wide variety of animals, including rooks, hyenas, and wolves. And there is evidence that some animals help animals of different species (Bekoff and Pierce 2009). For example, Bernd Heinrich found that ravens lead wolves to elk carcasses that the ravens cannot process and eat on their own; the ravens eat after the wolves tear the carcasses (Heinrich 1999).

### **Moral emotions**

Some researchers interpret animal behavior as expressing a variety of different moral emotions. Forgiveness, for example, is arguably seen in chimpanzee societies; after a fight chimpanzees often reconcile by kissing and embracing after a fight (de Waal & van Roosmalen 1979). Some argue that they show a sense of fairness (e.g. Bekoff 2004, but for the opposite claim see Jensen et al. 2007, 2008, Visalberghi and Anderson 2008). There are reports that many species (especially apes and elephants) seem to engage in delayed acts of retaliation. This suggests that they are able to feel retributive emotions (de Waal 2006). There are also studies suggesting that chimpanzees engage in what de Waal and Luttrell (1988) call a "revenge system" by responding to negative acts with other negative acts, and acts which de Waal describes as punishment (see PUNISHMENT).

There have been several reports of mourning dead group members across species, suggesting the possibility of grief or similar emotions. Chimpanzees are known to respond to the death of a respected group-member. On one account, a group of chimpanzees fell into silence while watching human caregivers bury their matriarch (Berlin 2009). Elephants are known to return to the bodies of their group members in what appears to be an act of mourning (Poole 1997).

Furthermore, there is empirical evidence that many species experience empathy - the capacity to feel what others are feeling. There are at least two basic types of empathy: empathy as an emotional reaction to the distress or joy of other members of the group, and empathy as the cognitive capacity to understand how other members of the

group feel (for detailed categorization of types of empathy see Davis 1994). McDougall (1908/1923) noted that empathy as emotional reaction to other members of the group exists in many social animals. For example, the ability to respond to alarm calls suggests an emotional link between individuals in social species since the emotion that causes the alarm cry effects the behavior of others in the group; this variety of emotional contagion is well documented in a number of taxa, including ground squirrels (e.g. Sherman 1977), birds (e.g. Powell 1974), and monkeys (e.g. Cheney and Seyfarth 1985).

Empirical reports also suggest that individuals of many species are distressed by the distress of a conspecific and will act to terminate the other's distress even if it results in harm to self. Albino rats (Church 1959, Rise and Gainer 1962, Rice 1964), pigeons (Watanabe and Ono 1986), rhesus monkeys (Masserman et al. 1964, Mirsky et al 1958, Wechkin et al. 1964), rhesus macaques (de Waal 1996), and chimpanzees (Parr 2001, Parr and Hopkins 2000) are all said to exhibit such behavior. Macaques have the same heart rate response regardless of whether they are experiencing distress or perceiving expressions of distress in others (Miller et al. 1966).

In addition, empathy as emotional reaction can be seen in facial mimicry, whereby the expression of one individual causes the same reaction on behalf of an observer. Yawns seem to be just as contagious among monkeys and apes as among humans (Anderson et al. 2004; Paukner & Anderson 2006). In orangutans, the open mouth face said to be homologous to human laughter was also found to be contagious (Ross et al 2008).

Furthermore, in addition to the reactive empathy widespread in the animal kingdom, it has been argued that some mammals show signs of something like cognitive empathy. Cognitive empathy seems to require sophisticated cognitive capacities such as perspective taking or theory of mind. Some species that may have such abilities include the great apes, elephants, dolphins, wolves, hyenas, and rats (de Waal 2006; Bekoff & Pierce 2009). De Waal argues that the tendency of chimpanzees and bonobos to console individuals in the face of some difficulty such as losing a fight suggests cognitive empathy (de Waal 2001, 2994). Bekoff argues that social carnivores such as wolves and hyenas, who live in complex social societies with sophisticated social norms governing food sharing, care of offspring, and division of labor, indicates the presence of cognitive empathy (Bekoff 2004; Bekoff & Pierce 2009).

### **Conclusion**

There are certainly other mental capacities relevant to animal morality, moral standing, and moral agency. For more information on such abilities we direct you to the Stanford Encyclopedia of Philosophy entry on Animal Cognition, and Sara Shettleworth's book *Cognition, Evolution, and Behavior*.

### **Cross-references**

Altruism and Biology; Animal Experimentation; Animal Rights; Animals, Moral Status of; Autonomy; Emotion; Empathy; Moral Status; Moral Agency; Kant, Immanuel; Instrumental Value; Hunting; Friendship; Forgiveness; Personhood, Criteria of; Punishment; Sentience, Moral Relevance of; Species, the Value of; Vegetarianism and Veganism

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