

## Neuroscience and Animal Sentience

Eleanor Boyle

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### Abstract

Scientific research is increasingly demonstrating that many animal species have the capacity for sentience and thereby experience emotion, pleasure and pain. Studies from a range of disciplines including neuroscience, ethology and psychology have offered anatomical, behavioural and evolutionary evidence supporting the argument for animal sentience. Comparative neuroanatomy has demonstrated that many species possess the nervous system structure and physiology for emotion. Behavioral studies have shown that all vertebrates and even some invertebrates respond to potentially emotional or painful situations suggesting at least phenomenal awareness and aversion. Evolutionary and psychological research has emphasized the adaptive value of emotion, of pleasure and of pain for motivation and for survival.

Research is varied and interdisciplinary, examining many species. Some studies have employed experimental brain lesioning or stimulation and others have conducted systematic observation of animal behaviour under diverse conditions. Though emotion is difficult to measure, even in humans, methods have assessed animals' preferences and motivation to seek particular stimuli or situations and measured correlates of emotion such as behavioural and physiological signs of frustration or distress in certain contexts. The myriad of findings include: even some invertebrates produce pain-killing opioid chemicals; lame or stressed animals will self-administer analgesics or psychoactive pharmaceuticals; and primates display empathy as do mice which respond as though they too feel the pain of cagemates given noxious stimuli.

Along with findings on animal emotion, a growing body of research has demonstrated cognitive capabilities and the potential for conscious awareness in various species. Analytical tasks such as tool use have been reported in chimpanzees, crows and insects. The list of species able to recognize themselves in mirrors is growing and includes some elephants, dolphins and magpies. Facial recognition of individual conspecifics has been documented in sheep and pigs. Even octopi and bees can learn novel tasks. Though complex thought may not be essential to emotional experience, animals' cognitive abilities illustrate neural complexity and competence. The role of consciousness in sentience is similarly open to argument, but studies have suggested awareness in a range of vertebrates.

Science provides much evidence in support of the argument for animal sentience. In the process it raises questions about the ways that humans use animals. Research on sentience and related concepts supports recent views on brain evolution disputing long-held notions of a unilinear hierarchy of life forms, suggesting instead that sentience and intelligence have arisen independently in multiple lineages of animals. Scientific evidence increasingly supports the notion that humans and other animals are on a spectrum of capabilities and that humans have opportunities and even imperatives to recognize animals' potential for emotion, for pleasure and for pain.

### Keywords

Animal welfare, brain, cognition, consciousness, crow, dolphin, elephant, emotion, empathy, evolution, farm animal, magpie, mammal, mouse, neuroanatomy, neuroscience, pleasure, pain, sheep, tool use, vertebrate