

On this day of July 7, 2012, a prominent international group of neuroscientists gathered at The University of Cambridge to reassess the neurobiological substrates of conscious experience and related behaviors in human and non-human animals (henceforth simply called animals). While comparative research on this topic is naturally hampered by the inability of animals, and often humans, to clearly and readily communicate about their internal states, the following observations have been made:

- The field of Consciousness research is rapidly evolving. Abundant new techniques and strategies for human and non-human research have been developed. Consequently more data is becoming readily available, which calls for periodic reevaluation of previously held preconceptions in this field. With research on animals, homologous brain circuits correlated with conscious experience and perception can be selectively facilitated and disrupted to assess whether they are in fact necessary for those experiences. In humans, new non-invasive techniques are available to survey the correlates of consciousness. To the extent that homologies exist, those systems can be studied in much greater detail in animal models of experiential states.
- The neural substrates of emotions do not appear to be confined to cortical structures. In fact, subcortical neural networks aroused during affective states in humans are critically important for generating emotional behaviors in animals. Artificial arousal of these same brain regions generate corresponding feeling states in both humans and animals. Wherever in the brain one evokes instinctual emotional behaviors in animals, those internal states are rewarding and punishing. Deep brain stimulation of these systems in humans can also generate similar affective states. The systems are concentrated in subcortical regions where neural homologies abound. Young humans and animals without neocortices retain these brain-mind functions. Furthermore, neural circuits supporting behavioral/electrophysiological states of attentiveness, sleep and decision making appear to have arisen in evolution as early as invertebrates, being evident in insects, octopuses and jumping spiders. Many of their behaviors are consistent with experienced feeling states.
- Birds appear to offer, behaviorally, neurophysiologically and neuroanatomically a striking case of parallel evolution of consciousness. Evidence of near human-like levels of consciousness has been most dramatically been observed in Grey Parrots. Mammalian and avian emotional networks and cognitive microcircuitries appear to be far more homologous than previously thought. Certain species of birds have been found to exhibit similar neural sleep patterns as mammals, including REM sleep. Magpies have been shown to exhibit striking similarities to humans, great apes and dolphins and in studies of mirror self-recognition in the case of dolphins however, this ability manifests itself at an even earlier age than in humans and chimpanzees.
- In humans, the effect of certain hallucinogens appears to be associated with a disruption in cortical feedforward and feedback processing. Pharmacological interventions in non-human animals with compounds known to affect conscious behavior in humans can lead to similar perturbations in behavior in animals. In humans, there is evidence to suggest that awareness is correlated with cortical activity, which does not exclude possible contributions by subcortical or early cortical processing, as in visual awareness. Evidence that human and animal emotional

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feelings arise from homologous subcortical brain networks provide compelling evidence for evolutionarily shared primal affective qualia.

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The undersigned declare the following: "The absence of a neocortex does not appear to preclude an organism from having experienced affective states. Convergent evidence indicates that other animals have the neuroanatomical, neurochemical and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently the weight of evidence currently indicates that all mammals and birds, and probably other creatures, not just humans, possess neurological substrates that generate consciousness. Further, it seems likely that the nature of human consciousness cannot be scientifically understood, especially at critical neuroscientific levels, without animal models that allow the necessary detailed work on the underlying neural substrates that generate experiential processes."

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