

Evidence Points to Conscious 'Metacognition' in Some Nonhuman Animals

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Dolphins like Natua, pictured here, may share with humans the ability reflect upon their states of mind, says UB researcher David Smith.

(PhysOrg.com) -- J. David Smith, Ph.D., a comparative psychologist at the University at Buffalo who has conducted extensive studies in animal cognition, says there is growing evidence that animals share functional parallels with human conscious metacognition -- that is, they may share humans' ability to reflect upon, monitor or regulate their states of mind.

Smith makes this conclusion in an article published the September issue of the journal *Trends in Cognitive Science* (Volume 13, Issue 9). He reviews this new and rapidly developing area of comparative inquiry,

describing its milestones and its prospects for continued progress.

He says "comparative psychologists have studied the question of whether or not non-human animals have knowledge of their own cognitive states by testing a dolphin, pigeons, rats, monkeys and apes using perception, memory and food-concealment paradigms.

"The field offers growing evidence that some animals have functional parallels to humans' consciousness and to humans' cognitive self-awareness," he says. Among these species are dolphins and [macaque monkeys](#) (an Old World monkey species).

Smith recounts the original animal-metacognition experiment with Natua the dolphin. "When uncertain, the dolphin clearly hesitated and wavered between his two possible responses," he says, "but when certain, he swam toward his chosen response so fast that his bow wave would soak the researchers' electronic switches.

"In sharp contrast," he says, "pigeons in several studies have so far not expressed any capacity for metacognition. In addition, several converging studies now show that capuchin monkeys barely express a capacity for metacognition.

"This last result," Smith says, "raises important questions about the emergence of reflective or extended mind in the primate order.

"This research area opens a new window on reflective mind in animals, illuminating its phylogenetic emergence and allowing researchers to trace the antecedents of human consciousness."

Smith, a professor in the UB Department of Psychology and Center for Cognitive Sciences, is recognized for his research and publications in the field of [animal cognition](#).

He and his colleagues pioneered the study of metacognition in nonhuman animals, and they have contributed some of the principal results in this area, including many results that involve the participation of Old World and New World monkeys who have been trained to use joysticks to participate in computer tasks.

Their research is supported by the National Institute of Child Health and Development and the National Science Foundation.

Smith explains that metacognition is a sophisticated human capacity linked to hierarchical structure in the mind (because the metacognitive executive control processes oversee lower-level cognition), to self-awareness (because uncertainty and doubt feel so personal and subjective) and to declarative consciousness (because humans are conscious of their states of knowing and can declare them to others).

Therefore, Smith says, "it is a crucial goal of comparative psychology to establish firmly whether animals share humans' metacognitive capacity. If they do, it could bear on their consciousness and self-awareness, too."

In fact, he concludes, "Metacognition rivals language and tool use in its potential to establish important continuities or discontinuities between human and animal minds."

Source: University at Buffalo ([news](#) : [web](#))

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