

What? Where? When? Some animals may know

by Bend_Weekly_News_Sources

A long string of experiments over decades have repeatedly found that animals aren't as dumb as humans traditionally thought they were and far from it. But are they actually conscious?

Studies have given only vague glimpses of an answer. But some scientists have said an organism must be conscious if it has a "cephalic memory." This is basically the memory of the "what, where and when" of events in life. New research has found that some animals may have just this sort of memory. The meadow vole *Microtus pennsylvanicus*, a small rodent that tends to hide in tunnels under the grass. It is one of the most common small mammals in North America. (Image courtesy U.S. Nat'l Park Service)

Rodents known as meadow voles can "recall the what, where and when" of a past event, researchers wrote in the title of a new study published in the journal *Animal Cognition*. Although past studies had suggested such abilities in animals, they involved putting the creatures through tests that involved some training, the authors said. That opened the results to criticism that the training could have affected their behavior in some way that made the animals merely act as though they knew "what, where and when." The new study involved no pre-training. It exploited the fact that female voles, along with some other animals, enter a period of peak sexual receptivity just after giving birth. The somewhat surprising tendency may be explained by the creatures' short lifespan, which compels them to pack a lot of reproduction into little time, said biologist Michael H. Ferkin of the University of Memphis, Tenn., the study's lead author. Male voles seem to be aware of the females' pattern of receptivity. In one experiment, Ferkin and colleagues briefly put male voles in a cage that contained two chambers. One chamber contained a female that was a day away from giving birth. The other contained a female that was sexually mature, but not due to be in a state of heightened receptivity anytime soon. A day later, the males were placed in the same apparatus, which was now empty and clean. The males initially "chose and spent significantly more time investigating the chamber that originally housed the pregnant female," who would by now have entered peak receptivity, the researchers wrote. This suggested, they continued, that the males both recalled and used key information from the earlier event: what was in the cage, where and when. Under slightly altered conditions, male voles showed no preference for either side of the cage, they wrote. For instance, when only half an hour had passed since the initial exposure to the females, there was no preference. Nor were there any cases in which a day had passed, but where the initial encounter was different "with a peak-receptivity female replacing the pregnant female. The peak-receptivity female would no longer be in that state a day later." The results of these and additional experiments suggest that male voles may have the capability to recall the "what, where and when" of a single past event. Ferkin and colleagues wrote in the paper, published in the journal's July 26 advance online issue. This knowledge may allow males to remember the location of females who would currently be in heightened states of sexual receptivity. The work "appears to be a very thorough and carefully done piece of research that makes a solid contribution," wrote psychologist Bill Roberts of the University of Western Ontario in London, Ontario, in an e-mail. "The controls used are impressive." Roberts had argued in a 2002 paper that research up to then suggested animals have no sense of time. Ferkin's study does make at least one "major assumption," Roberts added: that the males somehow know that the late-pregnant females will be receptive 24 hours later. Another possible problem, Ferkin and colleagues

themselves wrote, is that the rodents may just know how to make decisions based on how vivid or faint a memory is "without understanding that this depends on how much time has passed. In other words, they might lack a real concept of time. University of Toronto memory researcher Endel Tulving cited another, "eminent" quibble with the study. Voles have a very keen sense of smell, he noted. Perhaps "unknown to the humans" even in cleaned, disinfected cages, the rodents could sniff something that cues their actions. But overall, the findings add to a body of work suggesting animals have a capacity for "mental time travel," Roberts wrote. For instance, past work suggested some apes can anticipate a future need for tools, and scrub jays remember what kind of food they stored, where and when.

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