

Autonoetic Animals

Endel Tulving first distinguished episodic memory from other memory systems by appealing to its distinctive representational content and function. He characterized episodic memories as memories of events or situations that occurred at a specific place and time in an organism's past: memories that encode *what* happened, *where*, and *when*. However, partly in the hope of providing a richer characterization of the phenomenon as it is revealed to us in subjective experience, Tulving later emphasized that episodic memory is just one aspect of a richer capacity he called *autonoetic awareness*. This involves experiencing oneself in non-actual situations, whether they be situations that one experienced in the past, or 'simulations' of situations that one might experience in the future.

As Tulving characterized it, the capacity for autonoetic awareness seems to involve a sophisticated form of self-awareness that few, if any, non-human animals are likely to possess. Moreover, the fact that autonoetic awareness is characterized phenomenologically makes it difficult to test whether non-human animals have such a capacity; we can't after all, just *ask* them. This has led to a widespread suspicion that non-human animals lack episodic memory in the rich sense of autonoetic awareness.

In order to sidestep the conceptual and methodological hurdles involved in arguing that non-human animals possesses autonoetic awareness, comparative psychologists have instead investigated whether animals have 'episodic-like' memory, where this simply involves a capacity for encoding and retrieving information about *what, where and when* a prior event occurred. Beginning with seminal work by Nicola Clayton on the food caching abilities of scrub jays, this research program has provided evidence of episodic-like memory in a variety of non-human animals.

In this paper, I argue that comparative psychologists no longer need to be coy about the strength of the conclusions they draw from their research into episodic-like memory. Combined with contemporary neuroscience, the behavioral evidence provides excellent reason to believe that the episodic memory of non-human animals is accompanied by some degree of autonoetic awareness. I begin by clarifying the nature of autonoetic awareness. Specifically, I argue that such awareness, properly understood, does not presuppose sophisticated capacities for self-awareness. Rather, it merely requires a form of minimal selfhood constituted by an *egocentric perspective*. Drawing from my own recent work, I argue that an organism's egocentric perspective is partly realized by neural mechanisms that encode sensory information into a unified egocentric spatial framework, and that these mechanisms are highly conserved across a wide range of species.

I then supplement this account by drawing from recent research in neurophysiology and cognitive neuroscience into the neural mechanisms of navigation and episodic memory. Collectively, this research supports a model of the mechanisms of auto-noetic awareness in humans that implicates a circuit spanning the hippocampus and various cortical areas. On this model, the hippocampus serves to flexibly bind together cortically-encoded multisensory information derived from previous experiences into spatially structured 'scenes' that are encoded relative to the organism's egocentric perspective. In conjunction with prefrontal circuits, the hippocampus can orchestrate these scenes into complex temporal sequences under a degree of volitional and motivational control. As a result, the subject is able to flexibly 'project' herself into counterfactual situations on the basis of past experience. Crucially, these mechanisms seem to be widely conserved across a range of non-human species. Moreover the best explanation of the success of non-human animals on episodic-like memory tasks is that these mechanisms are involved. Since these mechanisms are the neural realizers of auto-noetic awareness, there is strong reason to think that non-human animals are capable of such awareness.