



The Sense of Memory: Integration and representation of sensory processes

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Tuesday

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Session 3 **Categorization learning at the interface between perception and cognition**

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Object categorization and perceptual separability: A two-way street

The ability to group objects into categories, despite their perceptual dissimilarity, is extremely helpful for organizing the environment and adaptively responding to its demands. People and other primates can solve categorization tasks by switching selective attention to object dimensions and testing the value of different rules involving those dimensions, through a rule-based learning system implemented in prefrontal cortex, hippocampus, and basal ganglia. A pre-requisite for using this mechanism is the ability to extract and selectively attend to object dimensions that are potentially task-relevant. In the cognitive psychology literature, dimensions that are represented independently and can be selectively attended are usually called “separable” dimensions. Recent research suggests that learning to categorize objects along a new dimension changes the perceptual representation of such dimension, making it more separable and discriminable. In this talk, I will review research aimed at understanding the interplay between learning to extract novel separable dimensions during category learning, and discovering new categorization rules using recently learned dimensions. I will describe recent advances in cognitive modeling and computational neuroscience that allow us to study separability in a more precise manner, and the use of these new tools to understand how categorization training modifies the representation of object dimensions. I will finish by describing evidence suggesting that extended practice with separable dimensions is not required for rule-based category learning in humans. Rather, we seem able to learn representations “on the fly” that allow rule application.

