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Decision-Making: Roles of Memory and Uncertainty Uncovered

Memory isn't really about the past. It's a compass for the future, according to neuroscientist Daphna Shohamy. She studies how our experiences inform the choices we make and what effects we expect our actions to have.

"We all carry around these internal sources of information," said Dr. Shohamy. "I want to know when and how we use them to make a decision."

Dr. Shohamy's early work focused on dopamine, a brain chemical that helps us learn and make better decisions when we repeat the same action over and over. People with Parkinson's, who lose dopamine-making neurons, struggle with this reinforcement learning, she found.

Then she turned to everyday decisions not based on this kind of repetitive learning, such as deciding what to have for dinner. Her lab's brain scans of volunteers in the midst of making choices revealed the brain's memory center, the hippocampus, in action. The researchers investigated the role of uncertainty, showing that people slow down when making hard choices because the brain is accumulating evidence from different sources, including its memories. Dr. Shohamy's lab has advanced our knowledge about topics such as what makes the teenage brain unique (altered connections to the hippocampus), how we respond to art and how anorexia can throw off decisions made around food.

Research in the Shohamy lab could have far-reaching implications in addressing problematic and harmful behaviors, as well as have practical applications in the workplace. Dr. Shohamy is particularly interested in school and education, the heart of where we try to apply what we know about how people learn.

"At the end of the day, I think of the brain as a learning machine," said Dr. Shohamy.

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