ANN GRAYBIEL PS '71

MIT Neuroscience Professor Asks Why Bad Habits Are So Hard to Break

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MIT Professor Ann Graybiel PS '71 won the National Medal of Science.
Photo: Donna Coveney/MIT

Ann Graybiel, PS '71, wants to know why good habits are so hard to make and bad habits so hard to break. After completing her bachelor's degree at Harvard University, she began studying neuroanatomy at MIT in the Department of Psychology and Brain Science. MIT was one of the few places in the country where researchers were asking behavioral questions and expecting to find cellular answers.

"At that time, it was really daunting to approach the big questions that any of us would ask—How can we see? How can we have language? —because the techniques were so weak," says Graybiel, MIT's Walter A. Rosenblith Professor of Neuroscience. "Several people at MIT had the temerity to do that. Now, almost everybody does."

The particular nerve cells Graybiel studies are in the brain's basal ganglia. Because both Parkinson's and Huntington's diseases are caused by malfunctions of the basal ganglia, previous researchers believed that these regions controlled only physical motion and gesture. Graybiel's research has advanced the radical idea that basic elements of learning and habit formation—and even the sense of accomplishment people feel when they figure out a puzzle—are rooted in the basal ganglia. Her research has led her to explore the nature of drug addiction, and her insights could also help explain illnesses such as obsessive-compulsive disorder and Tourette's syndrome, as well as Parkinson's and Huntington's.

The field of systems neuroscience is still being invented, Graybiel says:

"What's really been fun [is that] once we began to find out about these brain regions, we have continually had to learn and develop new methods. It's been challenging." As for her current research, "we want to understand what happens in the brain when we make habits and when we break them," Graybiel says. "We're looking at genes so we can pinpoint molecules in those mechanisms. And we look at the electrical activity of neurons. We think that these modes of brain-function mechanism hold the key to a lot of therapeutic possibility."

Graybiel lives in Lincoln, MA, with her husband, Jim Lackner '66, a professor of physiology at Brandeis University; they enjoy sports and music. Graybiel, who joined the MIT faculty in 1973, became an investigator at the McGovern Institute in 2001. She was awarded the National Medal of Science, the nation's highest science award, in 2002.

By Catherine Nichols