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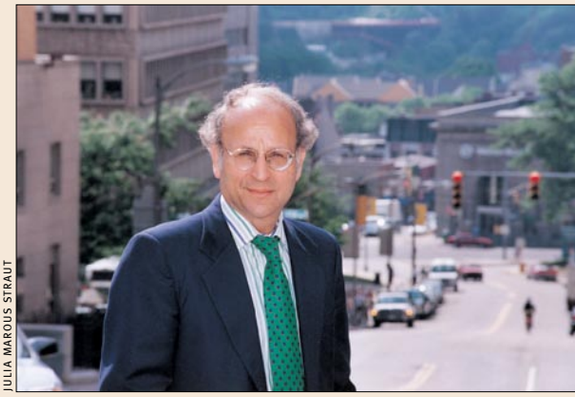
JULIA MAROUS STRAUT

I would rather discover a single causal connection than win the throne of Persia.
—Democritus

Imagine you have no idea how a stereo works, but you want to understand it. If you took a knob off the receiver and studied it, that might tell you something—about how volume changes, perhaps. It would not explain, however, why beautiful music comes out of the speakers.

It can be a bit like that when studying certain aspects of human biology, Peter Strick noted recently. Peter, a prominent neurobiologist, codirects the University of Pittsburgh and Carnegie Mellon University's Center for the Neural Basis of Cognition. He now also heads our new Institute for Systems Neuroscience. His point about the stereo is that biologists have been focused on studying synapses, cell organelles, genes, proteins, and the like—essentially, small component parts—without necessarily being able to put together how these elements fully interrelate and interact.

Which is not to say that studying individual elements hasn't been valuable. We've clearly learned a lot from analyzing parts. But if we want to understand, for example, behavior, we'll need to understand how neurons in a given neural pathway cooperate and how they are linked together to form circuits and networks. We're learning, not surprisingly, that these systems almost always play roles as important as the functions of individual parts.

Great discoveries often come hand in hand with new methodologies and technical approaches. In neuroscience, scientists have developed the ability to monitor populations of neurons and their interconnections at levels unheard of 15 years ago. Aaron Batista, a new recruit at the institute, is able to monitor the activities of a hundred neurons at once. He's hoping his work will one day help patients use their own thoughts to control prosthetic limbs.

And no cortical region acts in isolation. By using viruses and other tools, Peter's own lab has managed to trace neural interactions related to behavior to a few orders of connection. He has found that circuits and regions within our brain interact with other circuits and regions with a complexity that would make the entanglements in a Tolstoy narrative seem simplistic.

Another new recruit, Rob Turner, is exploring what happens when these complex interactions go awry—like the chain of dysfunctions that take place in Parkinson's disease. Rob is working with a new model of the disease that allows him to investigate why deep brain stimulation gives some patients relief.

As they delve into these and other secrets of the nervous system, Peter, Rob, Aaron, and their colleagues here and elsewhere are helping to write the next chapter of the history of neuroscience. Nothing fascinates us more than how our brains work—what's hardwired, what's learned, and why even the most powerful supercomputer must still be instructed by us. Virginia Woolf once wrote, "My own brain is to me the most unaccountable of machinery—always buzzing, humming, soaring roaring diving, and then buried in mud. And why? What's this passion for?"

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