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Giving Creativity Free Reign

By Janelle Weaver

Danielle Bassett's love of research began in childhood. Homeschooled by her mother, she was encouraged to develop her own curriculum focused on research questions. "I had an insatiable appetite for discovery, which she encouraged with extensive freedom. I was hooked, and have remained so ever since," says Bassett, now the Skirkanich Assistant Professor of Innovation in the Departments of Bioengineering and Electrical and Systems Engineering.

Lured by the potential for discovery, Bassett embarked on a research career after graduating from Penn State University. She earned her Ph.D. in Physics at the University of Cambridge and was a postdoctoral fellow at the University of California, Santa Barbara, where she branched into the brain sciences.

Making a seminal contribution to the growing field of network neuroscience, Bassett and her collaborators discovered that people whose brain regions interacted flexibly in different combinations learned better than individuals with more rigid brain networks. "Viewing the brain in this way stands in contrast to the traditional emphasis on the role of single brain regions, and instead emphasizes the pattern of interactions between many brain regions as the fundamental driver of thought," she notes.

Inspiring Investment

For such displays of extraordinary insight and originality, Bassett received a prestigious MacArthur Fellowship in September. The so-called "Genius Grant" provides unrestricted awards to talented individuals who show exceptional creativity and promise for important future advances. "Receiving this award is one thing: inspiring," Bassett states. "I am inspired to give creativity free reign in my scientific inquiry, and to extend my efforts in translating my work for the betterment of humanity."

Having joined the Penn faculty only one year ago, Bassett is continuing her quest to understand complex networks by collaborating with researchers across four schools and eight departments. "One of the advantages of being a scientist at Penn is the compact campus brimming with fantastic expertise and ideas across the full gamut of disciplinary fields," she reports. "It is the most fantastic sandbox I could imagine!"

Boosting Brain Health

Currently, Bassett's group is developing mathematical tools to understand how brain networks reconfigure over time, shedding new light on human learning, language, motor behavior and psychiatric disease. By examining the disruption of normal connectivity patterns in individuals with schizophrenia or brain injuries, Bassett hopes to optimize treatments and rehabilitation strategies. "Many of my projects are focused on gaining knowledge directly relevant to mental health, leading to better diagnoses, more accurate prognoses and innovative treatments."

With the goal of improving mental health, Bassett is now puzzling over many questions: How can we tune learning environments in the classroom or workplace to enhance brain network flexibility? What treatments increase brain network flexibility? Is there such a thing as too much flexibility? "We have so many ideas that we are ready to implement, and the MacArthur Fellowship enables us to tackle those ideas immediately," Bassett says. "That said, it is difficult to imagine what questions I might be addressing five to ten years from now. The swift pace of scientific inquiry is one of the things I find most exciting and intoxicating about my job." ☀