Within our brains, more than 100 billion neurons release their rapid-fire signals, punctuated by pauses of just milliseconds. Increasingly, scientists can log the resulting patterns of activity using neuroimaging. Yet decoding the data—to discern how our brains work and what goes awry when disease takes hold—remains a heavy lift.

DuBois Bowman, PhD, chair of Biostatistics, has embraced such intellectual challenges since his undergraduate days. “We’re at a paradigm shift,” says Bowman, who joined the Mailman School in January. “Merely collecting big data will not be enough to enhance public health.”

Scientists need robust tools to sift through vast reams of data and detect often barely perceptible changes—whether in clinical imaging, population-scale electronic health records, or pharmaceutical assays. In 2005, Biostatistics published Bowman’s algorithm to reveal how our brains enlist two nonadjacent areas on a common task. He and colleagues subsequently gleaned new insights into schizophrenia and addiction; the brain, they found, rewires itself to regain lost function. As founding director of Emory University’s Center for Biomedical Imaging Statistics from 2007 through 2013, Bowman garnered $1.9 million in grants from the National Institutes of Health to squeeze even more meaning from neuroimaging data.

With the right formula, says Bowman, the payoff for public health can be huge. As a principal investigator for a $900,000, multicenter study of Parkinson’s disease, he is now working to compile data from 1,600 patients to reveal changes in brain function and other clinical precursors to the disease, years before the hallmark symptoms manifest. “This approach can have a tremendous impact on our understanding,” he says, “and also on clinical practice.”

Bowman discovered the field of biostatistics as an undergraduate at Morehouse College, analyzing the effect of psychological stress on hypertension in African-American males. “It was a magical moment,” he says. “for me to find an area where I could use my quantitative abilities to impact health.”

As an African-American, Bowman has often had to blaze his own trail. “When I started out, I could count on one hand the number of underrepresented minority faculty in biostatistics,” he says. He’s since created a diversity workshop for the International Biometric Society, for which he serves as president, and is an active mentor. “We have to be concerned if our perspective is too narrow,” says Bowman. “No two people look at problems the same way.”

Meanwhile, the appeal of collaborations to harness big data is only growing. Medical device, pharmaceutical, and tech companies all seek to leverage the quantitative revolution, setting the stage for innovative partnerships. Says Bowman: “We’re just scratching the surface.”

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THINK BIG