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People in Economics

The AI Economist

Bob Simison profiles MIT behavioral economist **Sendhil Mullainathan**, who is leading his discipline into the age of algorithms

AI IS JUST TOO IMPORTANT to leave to computer scientists. So says MIT behavioral economist Sendhil Mullainathan, who has been applying artificial intelligence to economic research for more than a decade. Algorithms, he says, have the potential to dramatically improve human decision-making on things that matter, from conducting a job search to setting bail in court to understanding the signals in a cardiac test.

"Economics is uniquely suited to this moment," he said in an interview. "It's just not possible to build an algorithm without confronting the need to take the mushy, qualitative weirdness of life and put it up against the rigid formalism that is needed."

The 52-year-old India-born Mullainathan is "bridging economics from what we did in the last century to what we will be doing in the next century," said economist David Laibson, one of Mullainathan's professors in the 1990s at Harvard.

Mullainathan has led research into the psychology of memory, decision-making by judges, and the economics of scarcity. Jurists in New York City use algorithms based on his findings in setting bail. In 2002, at the age of 29, he won a $500,000 grant from the MacArthur Foundation, on whose board he served for 12 years until last June.

"His work is as much cited as anyone's" at a comparable career point, said Harvard economist Lawrence Katz, president of the American Economic Association. "I can't think of a more intellectually stimulating thing than a short conversation with Sendhil about whatever is on his mind."

Which could be almost anything. Friends and colleagues cite his extensive research into ice cream and espresso. He once led colleagues on a two-hour tour of Chicago's top ice cream sandwich shops. Mullainathan has also conducted his own research into nutrition and exercise.

"Sendhil dives so deeply into everything," said Bec Weeks, an Australian behavioral scientist at the University of Chicago who's been his research colleague and more recently life partner. "He always has a million good ideas. Understanding the ways that humans behave is the central puzzle his mind revolves around."

Mullainathan's research spans math, computer science, economics, and human behavior. He tells F&D how he's turned to algorithms in search of answers to philosophical questions.

Coming to America

That grows out of his life experiences. Mullainathan's path to the top of his profession began in a village with little electricity in the Indian state of Tamil Nadu, south of Chennai. His family owned land, making it one of the wealthier families in a poor town. His father, Mark, managed to get through college and work his way into a doctoral program in aeronautical engineering at Caltech. He left when Sendhil was 3. There were no phones in the village, so Sendhil's dad would send audiotapes with updates on what he was doing.

Four years later, the elder Mullainathan obtained visas to bring Sendhil and his mother, Sheila, to Los Angeles. That was the end of Mark's doctoral studies, as he went to work to support the family as an aerospace engineer at companies in Southern California, including McDonnell Douglas and Boeing.

When Sendhil was 10, President Ronald Reagan issued an order requiring a security clearance for such work, throwing Mark out of a job because he wasn't yet a US citizen. Although Mark and Sheila built a career as serial entrepreneurs owning and running video stores and selling computers, it was traumatic for young Sendhil.

"I learned that the world has no bottom, and I remember that distinct moment," Mullainathan said. "I became obsessed with the unemployment thing." In a way it led to his career in academia. "I remember hearing in high school that academics had this thing called tenure," he said. "You can't lose your job. I was, like, That's the job I want."

"I didn't do very well in high school," Mullainathan said, because "my mind's not very good with things like nouns and memorization." Math, on the other hand, was "all connected; it's reasoning."

After taking the PSAT college readiness test, Mullainathan got a flyer from the Clarkson School in Potsdam, New York, one of the oldest US early-college programs. He could finish high school there while taking advanced university courses in mathematics. He applied, got in, and informed his parents of his plan. While they were surprised, they agreed "because one thing they always did was to prioritize any education expenditure," he said. So, as a 16-year-old, off he went 3,000 miles away to a place where the temperatures often fall well below zero.

Later, moving on to Cornell, Mullainathan continued to focus on mathematics but added majors in computer science and economics. "What made economics different from math and fantastic was that it was an attempt to try and understand the complexities of the world," he said. He was fascinated with trying to explain economic anomalies, such as why Los Angeles developers would sell houses by lottery rather than simply raising prices.

Behavioral economics

For graduate school, Mullainathan got into the computer science doctoral program at MIT but deferred starting for a year. He wanted to give Harvard's PhD program in economics a try. He stuck with it over the next five years and completed his doctorate in 1998.

In a field where the benchmark for a publication's influence is 1,000 citations by other scholars, Mullainathan's Google Scholar profile lists more than a dozen works with several times that many. His body of work has been cited almost 100,000 times, or nearly as often as Nobel laureate Esther Duflo's. Mullainathan has held academic appointments at Harvard, the University of Chicago, and MIT.

Behavioral economics may seem an anomalous focus for someone obsessed with math and computer science. But during his doctoral studies, Mullainathan said, he came to the conclusion that as an economist he had to develop an understanding of human psychology.

"How as economists are we supposed to take all the oddities, the quirks, the foibles, the richness, and the inscrutability of human beings and ultimately put that into our understanding of economics?" he asked. "We have to recognize that human beings are just incredibly complicated in ways that are unfathomable."

Mullainathan has devoted his career to delving into the complexities of human behavior, sometimes with unexpected results. It was long accepted that corporations designed pay packages to reward CEOs for increasing the value of a business. But in 2001 Mullainathan and his frequent collaborator Marianne Bertrand, of the University of Chicago, showed that "CEO pay responds significantly to luck," such as moves in oil prices.

Bertrand and Mullainathan later sent fictitious resumes in response to help wanted ads in Chicago and Boston, randomly assigning names they thought sounded White or Black. They found that those with White-sounding names got 50 percent more callbacks, they report in a 2004 paper, "Are Emily and Greg More Employable than Lakisha and Jamal?"

Mullainathan and Princeton psychologist Eldar Shafir spent almost a decade conducting experiments on the psychology and economics of scarcity, whether of time, money, food, or other resources. It resulted in their influential 2013 book *Scarcity: The New Science of Having Less and How It Defines Our Lives*.

To this day, the authors give talks on the book, Shafir said. The researchers found that scarcity dramatically affects the functioning of the brain, causing people to obsess about whatever is in short supply. This soaks up cognitive bandwidth so that the mind doesn't operate at full capacity, and people get trapped in a scarcity cycle, the authors found.

The completion of the book 13 years ago cleared the decks for Mullainathan to choose his next research focus.

Focus on AI

"I woke up on a Tuesday morning with nothing to do," he said. His response was to seek out a research direction that was well off the beaten path.

"I try and pick things that are very, very far from where people are," he said. "I have a principle that if you're close to where people are, it's just not that efficient, because there are a lot of smart people in this profession."

That approach makes Mullainathan unique, said Stanford economist Jann Spiess, a research collaborator and former student. "Every few years, he takes a step back and reevaluates what he is doing," Spiess said. It's part, he said, of what makes Mullainathan "one

of the smartest, most innovative people in economics."

In 2012, there was little excitement about AI outside of computer science, Mullainathan said. "It was on no one's list," he said. "I wanted to work on something that could meaningfully bend the curve."

Mullainathan began applying machine learning—a type of AI that deploys algorithms designed to learn from data—to study human decision-making. In 2017, he and four colleagues published a paper examining whether machine learning could improve bail-or-jail decisions by judges. They used an algorithm to analyze the risk that defendants would flee or commit another crime, applying it to a database of more than 700,000 people arrested between 2008 and 2013 in New York City.

They found that judges routinely made the wrong call, often releasing defendants on bail that the algorithm put in the high-risk category. "Judges are subject to the gambler's fallacy," said the University of Chicago's Jens Ludwig, one of the researchers. That is, like a gambler at roulette who predicts after four reds that the next result will be black, jurists who see four high-risk defendants in a row tend to release the fifth one on bail, regardless of the objective risk profile.

The researchers estimated that using a risk-assessing algorithm could help reduce crime by 25 percent, with no change in the number of people held in jail, or reduce jail populations by 42 percent with no increase in crime. The researchers built an AI tool that New York City judges use today to aid in their decision-making, Ludwig said.

"This is a behavioral economics revolution," Ludwig said. "Sendhil has the potential to transform our understanding of human decision-making and create tools for improving it. He is that kind of visionary."

In a 2024 paper, Ludwig and Mullainathan use AI to show that defendant mugshots can reliably predict judges' jail-or-bail rulings. Based on data from North Carolina, the researchers found that people who appear well groomed in their booking photos or who have wider or rounder faces are more likely to be released on bail than to be held until their trial.

"Mullainathan has devoted his career to delving into the complexities of human behavior, sometimes with unexpected results."

While the finding may seem intuitive, it was "a connection that no one noticed," including public defenders and judges themselves, Mullainathan said.

Algorithms sometimes spot "implausible connections" that people don't, Mullainathan said. "It's a scale at which the human mind can't operate, and a tediousness that the human mind can't manage," he said.

He cited an experiment using AI to compare electrocardiograms of people who died of sudden cardiac arrest with ECGs that looked similar to those of people who didn't. The algorithm detected minuscule differences in the tests that doctors missed. This could help identify people more likely to die of sudden cardiac arrest who might be candidates for a pacemaker, Mullainathan said.

Bicycles for the mind

After six years at the University of Chicago, Mullainathan returned to MIT in 2024 as a professor in the departments of economics and electrical engineering and computer science. He is leading an initiative called "The Bike Shop @ MIT," using algorithms to build "bicycles for the mind."

The image comes from a graphic published in the March 1973 issue of *Scientific American* comparing the efficiency of animals in motion. "Man on a bicycle" was by far the most efficient. The finding, Mullainathan writes, offered "a vision of what computers *should be*: bicycles for the mind."

Mullainathan and colleagues are conducting an experiment involving math students in India. "Teaching is a big leap of mind reading," said MIT's Ashesh Rambachan, a collaborator on the project. "Teachers don't understand what students don't understand. An algorithm might help them with that."

Rambachan, Mullainathan, and research collaborators in India are compiling thousands of examples of students' work on mathematics homework. They plan to use AI to identify where students go wrong so that they can create an algorithm mapping the "cartography of confusion." The goal is to help teachers help students find their way, Mullainathan said. It could, he said, "change how we think about the student mind."

"Economics," Mullainathan said, "needs to confront the patchwork nature of our models of the economy and of why people behave and make the decisions they do. Algorithms are the new factory floor of science. They have the capacity to help us stitch the models together. I think they will help us transform philosophical questions into definitive science in the next 20 years." F&D

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