

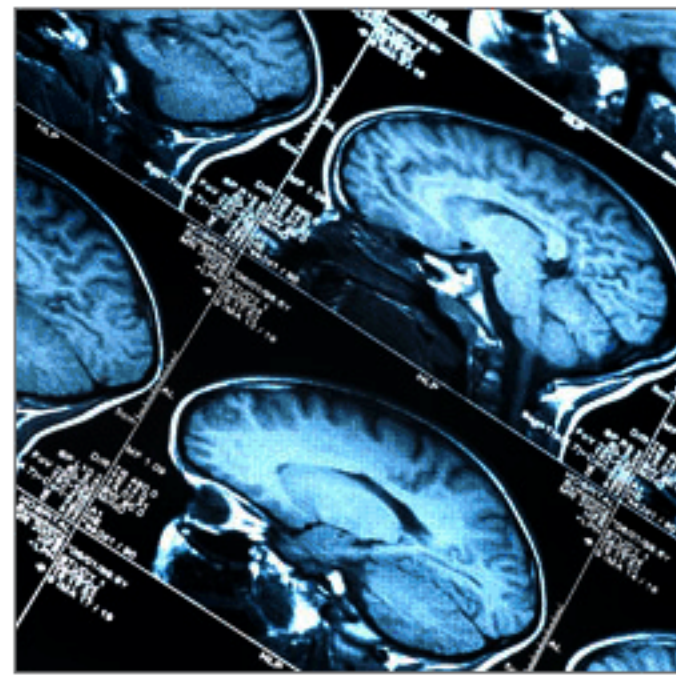
## Neuroscience and the Risk Manager

Coates, Shull, other experts weigh in on risk professionals' attention to their discipline

Thursday, May 02, 2013 , By Katherine Heires

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Over the past 20 years, advances in brain imaging technology and other methods of analyzing neural activity have yielded important insights into the complex workings and biology of the human brain. It is a discipline, neuroscience, that is closely related to neuroeconomics, which over the last decade has combined knowledge about the brain with biology, physiology, psychology, behavioral finance and economic theory to enhance understanding of decision-making in competitive market environments where risks are taken and rewards earned.



Neuroeconomics makes use of brain imaging to inform economic theory.

To Colin Camerer, Robert Kirby Professor of Behavioral Finance and Economics at the California Institute of Technology, neuroeconomics involves opening up the "black box" of the brain to inform economic theory and potentially to better understand and mitigate risky behavior such as rogue trading. Consultant Denise Shull, president and founder of ReThink Group, a New York firm that advises professional traders, defines it as the study of "what happens in your brain when you are faced with risk and other decisions made under uncertainty."

While making use of brain imaging, neuroeconomics also measures heart rate, blood pressure and facial expressions to assess physiological reactions. And it employs game-like tests and experiments to study decision-making, make inferences about the workings of the brain and build predictive models about human behavior.

These efforts, practitioners say, are designed to advance and enrich our thinking about economic theory, financial decision-making and public policy decisions.

The science has advanced in parallel to recent studies of bubbles and crises and how decision-making and risk-taking, on micro and macro levels, contribute to these events.

Andrew Lo, finance professor and director of the **Laboratory for Financial Engineering** at the Massachusetts Institute of Technology's Sloan School of Management, has focused on this area of study. Collaborating with Dmitry Repin of Boston University, Lo has conducted neuroscientific tests on professional traders, looking at how the intricate interplay of rational thinking, emotions and stress can affect risk-taking and investment returns. In a 2011 paper, "Fear, Greed and Financial Crises: A Cognitive Neurosciences Perspective," Lo said that "by exploring the neuroscientific basis of cognition and behavior, we may be able to identify more fundamental drivers of financial crises and improve our models and methods for dealing with them."

It is not just a financial markets pursuit: Officially embracing the promise of neuroscience, President Obama in April proposed a \$100 million expenditure for the first year of the Brain Research through Advancing Innovative Neurotechnologies project, with the objective of creating a brain map.

### Direct Observation

The greatest aid to neuroscience and its offshoot neuroeconomics has come with the availability of functional magnetic resonance imaging (fMRI) over the last two decades, allowing for more informed experimentation and bringing increased attention and recognition to these fields.

With fMRI, scientists are able to scan brains "in action" in a safe, non-invasive manner. They are able to obtain empirical data about what specific parts of the brain are active during a given activity. Although there is still some way to go in terms of image quality and precision, the technology has produced striking imagery and scientific findings.

Several books in the past few years have served to popularize neuroscience and neuroeconomics, including "The Hour Between Dog and Wolf: Risk Taking, Gut Feelings and the Biology of Boom and Bust," by John Coates; and "Market Mind Games: A Radical Psychology of Investing, Trading and Risk," by Denise Shull.



Denise Shull is founder of ReThink Group, a firm that advises professional traders.

In addition, research by Peter Bossaerts, professor of economics, management and finance at the California Institute of Technology, has employed neuroscientific methods in focusing on risk perception, risk learning and human decision-making when uncertainty exists.

Each of these experts has his or her own perspective on the applicability of neuroeconomic studies to the risk management profession.

Coates, a senior research fellow in neuroscience and finance at the University of Cambridge and a former derivatives trader at Goldman Sachs and Deutsche Bank, recalls how risk was surveyed on Wall Street in the early to mid-1990s. "The head of the trading desk would ask what your position was and how you felt about it," and in doing so would make behavioral judgments as to whether or not a trader could handle a particular position. Over

time, Coates says, this approach was replaced by statistical metrics and risk managers' conducting stress tests and making snapshot assessments of risk levels.

"We went from a method of personal observation to a more objective, firm-wide, statistical-analytical approach," Coates says. The latter, he adds, has proved incapable of catching "subterranean shifts" -- those points sometimes referred to as "the hour between dog and wolf" -- when people turn either far more risk-seeking or far more risk-averse. Coates says the more statistically-based methods that do not take biology or neuroscience into account fail to catch behavioral shifts in traders and other workers. He is hopeful that this will change.

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"On an individual level, a trader can train and learn to build resilience, so one's performance is not impaired under stress," says Coates. "And then, when you do go into a period of sustained success, you can learn not to succumb to irrational exuberance."

### Vary the Routine

Specifically for risk managers, Coates suggests gaining a better understanding of the biology behind euphoria, fatigue and the stress responses among employees in high-stress jobs. "Without an understanding of the biology behind stress and uncertainty, managers can do wrong things," Coates says. "The usual response when you become fatigued at work is to think you need a vacation, but what you really need to do is change activities." He believes task flexibility would improve risk managers' productivity.

He also maintains that many financial firms operate in a way that exacerbates biological instability in employees, rather than "leaning against" the trend. When traders are on a winning streak and "winner effect" sets in, banks should not up their risk limits -- which tends to reinforce the risk-taking. Instead, Coates says, they should keep risk limits steady and perhaps give the traders time off, so their biology can reset.

"We often see this at Wimbledon," Coates says, referring to the tennis championship, "where a no-name player is beating Roger Federer for a time. But when they come back from a rain delay, the no-name player is invincible no more."

Of course, basic incentives can be misaligned. "By amplifying the compensation, they were amplifying the risk-taking," Coates says, suggesting that banks lessen the frequency of payouts, perhaps extending them over a five-year period, as Deutsche Bank has done with its senior bankers.

Denise Shull believes that if risk managers accept that there is emotion in all decision-making, they should start to treat emotional data as valid and useful and start analyzing it alongside market data. "You can identify a relatively small number of emotions you want to be systematically tracking, to understand, for example, where traders are on a scale of neutral, confident and over confident," Shull says.

She thinks that many firms would benefit from simply analyzing emotional data for FOFR -- a factor that she believes played a major role in some of the recent, headline-making risk-taking blunders -- on a scale of 1 to 5. "Firms should consider making it a part of their risk management culture," Shull says. Ideally, it would be a top-down directive from the board.

### Modeling and Profiling

"Firms and boards need to realize when they are making decisions that are not based on reasonable assessments and when they are trying to avoid the fear of regret in some way," Shull explains. "Once they realize it, it will help to lower risk levels." She sees putting all risk management models in an accurate, psychological context, with an assist from neuroscience findings, as the only way to stop recurring boom-and-bust cycles.

Scott Huettel, a professor of psychology and neuroscience at Duke University and director of the Duke Center for Interdisciplinary Decision Science, takes a slightly different view of neuroscience's potential to help risk managers. He has focused his studies on how people make decisions in social settings, offices and while part of communities -- whether on Facebook or elsewhere -- and how these groups exhibit certain biases. He believes that neuroscience can help identify these circumstances in a more precise way.

"The wealth management industry spends \$1 billion a year on market segmentation, and while they don't treat everyone the same, they do think there is some predictability to how some people or segments of people approach decisions, and they take advantage of those subtle differences," Huettel says. Over time, neuroscience is going to help risk managers better identify types of people based on their risk preferences, and this will provide a better sense of how individuals or types of individuals perform.

"We'll know the particular types of risk strategies used by some people, groups of people, and we will be able to break up and better understand the population in that way," Huettel says.

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