ON THE VERGE
WHERE IDEAS AND COLLABORATION FLOURISH • 2015 EDITION

Temple University Center for Neural Decision Making is emerging as a global leader in decision neuroscience

IN THIS ISSUE:
Temple University Center for Neural Decision Making is emerging as a global leader in decision neuroscience
Decision Neuroscience, including the subfields neuroeconomics and neuromarketing, has provided new insights into the mechanisms that underlie a wide range of economic, marketing, and social phenomena—from risky choice and consumer behavior to trust, altruism, and cooperation. At the intersection of this rapidly growing area of research is the development of new perspectives on how neuroscience theories and methods inform decision making.

Over the past seven years, through the efforts of the Center for Neural Decision Making (CNDM), our faculty and students have been at the forefront of research in the broad area of decision neuroscience. Coming from diverse fields, such as neuroscience, psychology, economics, physics, engineering, and information systems, Temple faculty are working together to advance our knowledge of the mechanisms underlying decision making.

Bridging these areas through a university-wide interdisciplinary initiative has provided Temple University with a unique advantage in this rapidly-growing research area. One such recent opportunity came in the form of a $2.37 million grant from the National Science Foundation (NSF) for the purchase of a functional Magnetic Resonance Imaging (fMRI) scanner dedicated to research. Dr. Jason Chein, Associate Professor of Brain and Cognitive Sciences in the Psychology department, led the grant effort. The fMRI scanner will be housed in the soon-to-be-established Temple University Behavioral Research Imaging Center (TUBRIC), which will offer cross-modal and multi-methodological approaches to research.

As the ground work is being laid to establish this unique and dynamic research center, Temple University is poised to continue to advance the field of Decision Neuroscience. For example, some of the Center’s current projects are assisting academics and industry partners in more accurately defining consumers’ unconscious and conscious reactions to marketing phenomena, such as advertising, promotions, and risky decision-making.

We say that ideas and collaboration flourish when we are on the cutting edge of research. It is with this sentiment in mind that the Fox School, with the unique strengths of its faculty and deep interdisciplinary collaborations and industry connections, strives to be a world leader in the field of Decision Neuroscience. As a leader in this emerging field, our investigators continue to align with the broader research mission of Temple University—making a true impact on society and the world.

As we move forward in this exciting field, we look forward to sharing the groundbreaking research of our faculty, students, and interdisciplinary collaborations in this decision neuroscience-dedicated issue of *On the Verge*.
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Office of Research, Doctoral Programs, and Strategic Initiatives

The Office of Research, Doctoral Programs, and Strategic Initiatives strives to enhance the reputation of the Fox School of Business and School of Tourism and Hospitality Management at Temple University as global leaders in business research and community engagement to better serve our constituents—students, faculty, academy, industry, the people of Pennsylvania, and society in general.

Our Office provides administrative leadership and research support to Fox faculty and doctoral students through access to databases, management of grants and grant proposals, and showcasing of Fox School research to academic, practitioner, and media outlets.

The Office of Research, Doctoral Programs, and Strategic Initiatives also aims to further enhance the contributions and impact of Fox School faculty and doctoral students to society and the world around us by leading research, doctoral education, and engagement with industry and federal and state government.

Our mission is to:

• Facilitate the contributions and impact of Fox faculty and doctoral students by supporting research, doctoral education, and engagement with industry and government.

• Promote research partnerships within and beyond the Fox School and Temple University.

• Assist Fox faculty and doctoral students to competitively seek funding opportunities.

• Build a culture of collaboration with Fox faculty and doctoral students with industry and federal, state, and local government.

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Emerging as a global leader in decision neuroscience

The first research paper that used functional magnetic resonance imaging (fMRI) was published in the late 1990s. Soon thereafter, as a PhD student at the University of Southern California, Dr. Angelika Dimoka was using fMRI in her research.

“Back then, the research involved flexing a finger and then seeing what part of the brain was being activated,” she said. “It was like the Stone Age, but this was when the cornerstones of fMRI research were being laid.”

“Now, almost 20 years later, we are able to capture desires, emotions and rewards, all of these wonderful things, by using this amazing tool. It still fascinates me how much we know and how much is still out there to be learned.”

The fMRI is but one of the multiple techniques being utilized by Temple University’s Center for Neural Decision Making (CNDM), which Dimoka founded in 2008 and for which she currently serves as Director. At the disposal of Dimoka and her colleagues are eye-tracking, heart rate-monitoring, facial electromyography (EMG), breathing, and skin-conductance-measuring mechanisms, among others — all of which are being used in an effort to collect physiological and brain data in order to extrapolate insights into human behavior.

Like fMRI and the field in which it is most utilized, CNDM has come a long way since. In less than a decade, it has evolved into an internationally renowned research center. It’s the only interdisciplinary, decision neuroscience Center in the United States housed in a business school, CNDM has evolved into an internationally renowned research center.

The Center for Neural Decision Making has made a name for itself by exploring measures of marketing success, advertising effectiveness, sensory marketing, healthcare decision making, information processing, and the effects of aging on decision making, among others.

The CNDM received wide acclaim for its 2014 study into television advertising (p. 5). The team, which received a $286,000 research grant from the Advertising Research Foundation (ARF), is believed to be the first to identify the part of the brain that, when activated, could predict the success of TV advertisements. The implications of the team’s findings could forever change the function of marketers.

The goal of the CNDM, Dimoka said, is to parlay its recent publicity to further its reach. The Center has raised over $1 million in research funding from various federal and state agencies and research foundations, she said. Temple University recently secured a $2.37 million grant from the National Science Foundation for the purchase of an fMRI scanner (p. 11).

The availability of multiple methodologies has aided the Center’s evolution. There was a time, Dimoka said, when research studies hinged solely upon the responses of test subjects and survey respondents. Results rendered by fMRI cut through the subjectivity of such methodologies. At the CNDM, Dimoka, Venkatraman, and Reeck have access to tools that measure brain activations, fluctuations in a person’s skin conductance, and heart rate. They are also able to track a participant’s eye movements and changes in his or her breathing.

“Previously, I had to speculate about mechanisms for why and how people made decisions,” Venkatraman said. “Now, with access to the various tools and technologies at the Center, I can make better inferences about the underlying mechanisms using converging evidence across multiple methodologies.”

There’s more behind the Center’s efforts to push for critical and innovative research findings. The Center is not skipping any steps, Dimoka said, in its attempt to separate itself from others and build a competitive advantage as the leading center in decision neuroscience.

Enthusiastic doctoral students often approach Dimoka with grandiose research topics they wish to explore. The students believe, Dimoka said, that a profound research study will earn them quick acclaim within their discipline.

“I tell them to avoid paving a new path, but to instead turn over another stone on that path,” Dimoka said. “Most likely, there’s something new within a well-studied phenomenon in marketing or psychology where the student can create new insights or figure out what others could not.”

Nonetheless, the work for those associated with the Center for Neural Decision Making is far from over, and the CNDM has taken another step toward strengthening its reputation as a leader in decision neuroscience. Reeck, who joined the Fox School on a tenure-track appointment, will serve as CNDM’s Assistant Director.
Fox to introduce new PhD program in decision neuroscience

IN LESS THAN A YEAR, THE FOX SCHOOL OF BUSINESS WILL WELCOME THE FIRST COHORT OF A DOCTORAL DEGREE PROGRAM THAT WILL BE THE FIRST OF ITS KIND.

Temple University’s Board of Trustees voted unanimously in May 2015 to approve a new interdisciplinary PhD program in Decision Neuroscience. Recruiting for the program’s first cohort of PhD students will begin in Winter 2015, and the program will officially launch in Fall 2016.

“When the program begins, it will be the first interdisciplinary PhD program to bridge the psychology and business disciplines,” said Dr. Vinod Venkatraman, Assistant Professor of Marketing at the Fox School who has been in charge of conceptualizing the program.

“Our goal was to develop a doctoral degree program wherein students can achieve strong foundational knowledge in both business and psychology. The idea of interdisciplinary PhD programs is nothing new. Other colleges and universities embrace these, as well. But we will have the first program that aims to leverage the developments in the field of psychology and neuroscience and apply them to interesting real-world problems and business situations.”

Within the first two years of the program, students will take courses taught by professors from Temple’s Fox School of Business and the Psychology department at Temple’s College of Liberal Arts (CLA). It is incumbent upon the PhD student within that time to identify a faculty member as an advisor, Venkatraman said.

“In that way, the program is open-ended,” he said. “Second-year students might feel a stronger connection to the business approach than to decision neuroscience, and might elect to have a faculty member from Fox School of Business as their mentor. Alternatively, they may gravitate more toward psychological theories, in which case a faculty member from CLA could serve as their mentor.”

The PhD in Decision Neuroscience is the latest movement by Temple University to further its reputation as a leader in this discipline. The Fox School is home to Temple’s Center for Neural Decision Making, which provides students with top-tier facilities to further their research using multiple neurophysiological methodologies including eye-tracking, biometrics, electromyography (EMG), and functional magnetic resonance imaging (fMRI).

“This program is a powerful demonstration that Temple University is capable of crossing disciplinary lines,” said Dr. Jason Chein, Associate Professor of Psychology at Temple University’s College of Liberal Arts and Principal Investigator of Temple’s Neurocognition Lab. “So many new doctoral students have interests at the interface of behavioral economics and cognitive neuroscience or cognitive neuropsychology. With the establishment of this PhD program, those students will receive training across each of those disciplines.”

—Christopher A. Vito
Center for Neural Decision Making adds another Principal Investigator

Dr. Crystal Reeck came to the Fox School of Business at Temple University to be a research trailblazer.

“No matter how established your field is, I think all researchers would like to think of themselves as doing pioneering work,” Reeck said. “That’s certainly the case with the work I’ll be doing here at the Fox School and the Center for Neural Decision Making.

“In this field, there’s an opportunity for great creativity, especially when you integrate other disciplines and draw on the collective efforts of many researchers. I look forward to contributing to the great work that’s being done here.”

Reeck joined the Fox School of Business in July 2015 on a tenure-track faculty appointment from Columbia Business School, where she served as a postdoctoral research scholar and adjunct assistant professor in the Decision Making and Negotiations Cross-Disciplinary Area.

She will serve as Assistant Director of Temple University’s Center for Neural Decision Making (CNDM), which is housed at the Fox School, in addition to her appointment as an Assistant Professor of Marketing.

She joins Drs. Angelika Dimoka and Vinod Venkatraman, CNDM Director and Associate Director, respectively, as principal investigators of the neurobiological bases of human behavior, preference formation, and decision making.

“The addition of Crystal is a significant one,” Venkatraman said. “Between Crystal, Angelika and me, our research interests are distinct, in regard to the multiple aspects of decision making. I study economic decision making and risk, Angelika is an information systems expert who studies cognitive processes, such as trust and distrust, and Crystal brings with her the expertise of emotion’s role in decision making.”

Combining both neuroscience and behavioral approaches, Reeck’s research examines how emotions influence decision making and how different strategies and ways of thinking help people manage that influence. Her research interests include consumer behavior, emotion regulation, and decision making.

“It’s no secret that it’s easier to make choices for other people because you’re not as emotionally invested in those outcomes,” Reeck said. “It’s when you’re the one who will experience the loss, gain, potential threat or worry that the decision becomes more complicated. My work tries to determine emotion’s role in the decision making process and how to minimize a person’s regret based upon those decisions to still make good decisions.”

Reeck said examples of emotion regulation include when an investor views profitable stock market returns, or when a gambler wins big at a casino.

“The question becomes, ‘How can that person rein in his or her excitement and joy to prevent putting everything back on the table, or back in the stock market?’”

Reeck is the 2014 recipient of the Innovation Award, from the Social and Affective Neuroscience Society, along with numerous competitive training and travel awards. Her work has been featured in media outlets such as Bloomberg Businessweek and funded by national granting agencies, including the National Science Foundation and the American Psychological Association.

She has published her research in peer-reviewed journals that span multiple fields, including Science, Journal of Cognitive Neuroscience, and Journal of Experimental Social Psychology. In September 2015, her paper, titled “The Social Regulation of Emotion: An Integrative, Cross-Disciplinary Model,” was accepted for publication in Trends in Cognitive Sciences.

Reeck holds a PhD in psychology and neuroscience from Duke University, and completed both her Master’s and Bachelor’s degrees at Stanford University.

“Between the Fox School and the Center for Neural Decision Making, the real research focus is on application,” Reeck said. “The extent to which academic researchers have their finger on the pulse of the industry, and their ability to inform practices outside the lab, are characteristics that stand out the most for me.

“That’s why I came to Temple and why I chose the Fox School.”

—Christopher A. Vito
Using neurophysiological measures to predict success of TV ads

The Fox School of Business continues to support its mission statement by engaging in state-of-the-art research that contributes to theory, managerial practice, society, and even daily living.

A team of researchers from the Fox School gained national media acclaim for demonstrating that activation in a particular area of the brain can significantly improve predictions about the effectiveness of TV advertising.

Drs. Angelika Dimoka, Paul A. Pavlou, and Vinod Venkatraman led the research study at Temple University’s Center for Neural Decision Making, which is housed at the Fox School. The research team received $286,000 through a research grant from the Advertising Research Foundation (ARF), a non-profit group that provided TV ads from major sponsor companies in the consumer-goods, financial, technology, travel, and pharmaceutical industries. The study sought to understand whether measures obtained in the lab when a small number of consumers watched these TV ads can predict the success of these ads in terms of increasing sales in the market.

Science Magazine, Forbes, National Public Radio, Austrian Public Radio, and Brainfluence, a leading global neuromarketing podcast, recently featured the findings of their research paper, which was published in the Journal for Marketing Research.

Fox School’s research team evaluated the responses of more than 300 participants to TV advertisements using eight distinct methods: traditional surveys; implicit measures; eye tracking; heart rate; skin conductance; breathing; and brain activity, as measured by functional magnetic resonance imaging (fMRI), and electroencephalography (EEG).

“This is the first study to relate individual-level measures in the lab to market-level behavior,” said Venkatraman, lead author and Assistant Professor of Marketing. “We showed that physiological and brain responses to a 30-second TV advertisement can provide reliable markers for evaluating its actual success in the market.”

“Based on our research and findings, from all seven neurophysiological methods, brain data collected using fMRI, were the most predictive,” added Dimoka, Director of the Center for Neural Decision Making, and an Associate Professor of Marketing. “Specifically, we are able to show that activation in the ventral striatum, the reward center of the brain, can predict a TV ad success. The higher the activation in the ventral striatum, the higher the success of the TV ad. Nobody has ever been able to make such a linkage.” The findings suggest that the key to a successful TV ad, Venkatraman noted, is the ability to increase the desirability of the product featured in the TV ad — a construct that is difficult to measure through the use of traditional, self-reported measures.

“A researcher might ask a test participant, more traditionally, ‘Do you like this TV ad? Are you likely to purchase the product?’” said Pavlou, Fox School’s Associate Dean of Research and Chief Research Officer. “While subjective measures like traditional questionnaires can still predict the success of TV advertising, the use of neurophysiological measures, especially fMRI, can almost double the power of our prediction.”

–Christopher A. Vito
Print ads trigger greater responses than digital ads, Fox researchers find

The Pew Research Center recently reported that daily newspaper readership in the United States among all age demographics has fallen significantly each year since the turn of the century. This is just one example of Americans’ gravitation toward the digital consumption of media.

But even in today’s redefined, digital age, print advertisements were found to have a key advantage as compared to digital media.

Researchers from Temple University’s Center for Neural Decision Making (CNDM) recently found that physical, print advertisements activated a part of the brain that’s closely associated with desire and value to a significantly greater extent than corresponding digital versions. The team of researchers at CNDM also found that test subjects spent more time with a physical ad than with its digital counterpart, and that they were better able to quickly and confidently remember the print ad as the original advertising source.

The study was part of a grant to CNDM from the Risk Analysis Research Center of the United States Postal Service Office of Inspector General (USPS OIG). The first study was completed in May 2015 and findings were presented at the Conference on Postal and Delivery Economics, in Athens, Greece, in June 2015.

“The role of the Office of Inspector General is to constantly explore enhancements to the value of mail and extend the United States Postal Services’ body of work,” said Amanda Stafford, an economist with USPS OIG. “We wanted to understand where mail can play a role in the consumer buying process, and the differences between the print advertisements that customers receive in the mail versus the advertisements they might receive via email.

“Temple’s team at the Center for Neural Decision Making had an agnostic approach to the advertisements, both digital and physical.”

The CNDM research team included: Dr. Angelika Dimoka, Director of the CNDM; Khoi Vo, CNDM Senior Research Associate; Dr. Vinod Venkatraman, Associate Director of the CNDM; and Dr. Paul A. Pavlou, Milton F. Stauffer Professor of Management Information Systems, Chief Research Officer, and Associate Dean of Research, Doctoral Programs, and Strategic Initiatives at the Fox School of Business.

During the study, participants were told to analyze 40 advertisements, 20 in print media and 20 in digital media. The participants never saw the same ad across both formats, Dimoka said. During the initial exposure to the print or digital ads at Temple’s CNDM, participants were subjected to eye tracking, skin conductance, and heart rate monitoring to accurately determine their physiological responses. One week later, the participants viewed a subset of the ads with additional new ones, while undergoing a functional magnetic resonance imaging (fMRI) scan.

During the fMRI session, participants were also asked if they had an intention to buy a product that was featured in the advertisement, and how much they would be willing to pay for it. Their decisions were incentive-compatible in the sense that participants had an option to buy one of the products in an auction that was implemented at the end of the study, based on their self-reported willingness to pay. When participants were making these decisions, the CNDM researchers found greater activation in the ventral striatum, or the reward center of the brain, for products that had been previously viewed in a physical format.

“This was a huge finding for us,” said Dimoka, an Associate Professor of Marketing at the Fox School. “The study participants hadn’t expressed any differences as to how much they were willing to pay for the product or service, and yet, there were differences in the degrees of activation within the reward center of the brain. Though it needs to be validated in future experiments, these findings indicate why knowledge about brain systems can provide valuable insights over simple self-report measures.

Added Vo: “We found that physical ads produced an emotional reaction, and both a subconscious desire and higher valuation for the product.”

Dimoka presented her team’s research findings at the USPS OIG Headquarters, in Rosslyn, Va., at a July 14, 2015 event, titled, “Understanding the Value of Mail through Neuroscience.”

There, she delivered a study overview, then participated in a panel discussion on “The Path Forward: Optimizing Advertising Through Neuromarketing Research.”

She has since learned that the USPS OIG is considering tapping into CNDM for follow-up studies ranging from consumer demographics, socioeconomic implications, and cross-media interactions.

“The OIG is very excited to see how we can take our findings further and capture changes in behavior and how they translate into the action of buying,” Dimoka said. “There is something quite unique going on in the ventral striatum of the brain. It’s such a unique area, and we look forward to exploring that area even further.”

Christopher A. Vito
Venkatraman exploring the effect of aging on consumer financial decisions

He asked both groups of participants to choose between hypothetical gambles and annuities in two separate tasks. For the annuity decisions, they were asked to decide how they would invest $100,000 of their retirement savings. Would they take out that money in one lump sum and put it in a savings account, or roll those funds into an annuity in exchange for a fixed income till they live? Venkatraman logged the participants’ responses using traditional surveys, eye-tracking, and functional magnetic resonance imaging (fMRI) techniques.

“To me, it was surprising how different the risk preferences were between the two groups in the gambling and annuity tasks,” Venkatraman said. “I’m trying to understand why that is, and the Center’s multiple methodologies have been helpful in this area.” This research stream is still in its infancy, and Venkatraman will present preliminary findings at a number of academic conferences in Fall 2015.

“It’s important for us at the Center to continue to establish ourselves in areas outside the laboratory, which lend themselves to real-world relevance,” said Venkatraman, the lead author of the stream of research, which he’s conducting with the assistance of PhD students from the Fox School. “The findings can have significant implications for public policy and the society as a whole. That’s what excites me the most about this study.”

—Christopher A. Vito
Fox researchers make landmark connection with anchoring studies

A pile of multicolored dice rested on Dr. Nathan Fong’s desk. As he explained the findings of his ongoing research studies, Fong picked up a single die, fiddled with it, and then tossed it to the desk’s surface.

“It’s remarkable,” the Fox School of Business professor said, “how a completely irrelevant number can generate such a lasting impression.”

Along with Fox PhD student SangSuk Yoon and Dr. Angelika Dimoka, Director of Temple University’s Center for Neural Decision Making and Associate Professor of Marketing, Fong has completed more than 10 research studies into the effects of anchoring, the human tendency to rely too heavily on, or be influenced too greatly by the first value considered during the process of forming numeric judgments.

They’ve found that a consumer’s willingness-to-pay for a product is entirely too unstable to be considered a fixed value. However, they’ve also discovered that the effects of anchoring are persistent over a lengthy period of time. Fong, Yoon, and Dimoka are believed to be the first researchers to make such a strong connection.

“With the same participants, we completed a follow-up study several months later, using the same willingness-to-pay task, the same product, and the same method of assigning random prices,” said Fong, an Assistant Professor of Marketing. “And the anchoring numbers the participants had been given months prior still correlated with their willingness to pay.

“Our test manipulated the participants’ preferences, and it stuck. Anchoring studies suggest, at least in theory, that a marketer’s attempt to measure a consumer’s true preference is impossible. Preferences are like a moving target, and they can change based upon context. However, based upon our findings, a marketer may have the ability to impart long-lasting effects on a consumer’s preference.”

To test the effects of anchoring, the research team asked participants to consider a random number, called an anchor — like the last two digits of his or her Social Security number, or a number drawn from a set of cards — and then view it as a monetary figure. Then, the participants were asked whether they would be willing to pay that price for a particular product. (The product used in this particular study was a cordless computer mouse.)

Participants were subsequently asked to provide a monetary value that represents the most they would be willing to spend on that same product. The experiment is designed so that participants have an incentive to report their actual valuation as best they can, because they had an opportunity to really buy the product. These valuations have a strong correlation with the previously considered anchors, even though the participants know that the anchors are arbitrary numbers.

“Traditionally, in economics, people were considered to have concrete and well-defined preferences,” Yoon said. “Our study showed that consumers do not have those preferences, and that — in fact — their preferences changed. Our follow-up study proved that anchoring can have a lingering effect on consumer’s decision-making processes, as well.”

Fong, Yoon, and Dimoka coauthored their first study into anchoring, in 2013. By this time, more than a decade had passed since a landmark anchoring study had been completed by two professors from Massachusetts Institute of Technology (MIT) and a third from Carnegie Mellon University. That research team’s study, which demonstrated the strong influences of arbitrary anchors, has been cited nearly 1,000 times by fellow academics, Fong said, but few follow-up studies existed before he, Yoon, and Dimoka began to explore anchoring further.

Fong said he first learned of anchoring at MIT, where he met the initial study’s authors while completing his PhD. Initially, Fong said he, Yoon, and Dimoka only wanted to perform a replication study.

“When you’re dealing with human behavior, the weather that day or something in the water might have influenced the results. Flukes happen,” said Fong. “The problem facing social sciences right now is that big findings, so to speak, aren’t always subject to replication studies. And as we found, anchoring turned out to be a robust and underexplored effect.”

Added Yoon: “The malleability of consumer preference is a big question for marketers today. But these studies show that consumers don’t have concrete, well-defined preferences as once believed.”

—Christopher A. Vito
Fox professors excited for the return of ISDN to Philadelphia

The Interdisciplinary Symposium on Decision Neuroscience (ISDN), which started at Temple University’s Fox School of Business in 2010, and has grown each year since, is poised to return to Philadelphia in June 2016.

The fifth-annual ISDN conference was held at the Massachusetts Institute of Technology (MIT) in May 2015. ISDN is considered the premier international gathering of academics, researchers, and scholars in the field of decision neuroscience. Drs. Angelika Dimoka and Vinod Venkatraman, from Temple’s Center for Neural Decision Making (CNDM), were part of the organizing committee for the conference, which was co-sponsored by Temple University, along with Harvard Business School, MIT, the University of Michigan, and Stanford University.

In Spring 2016, the symposium will return to the Fox School, which hosted the first three ISDN conferences. Stanford University hosted the event in Palo Alto, Calif., in 2014, and MIT hosted the 2015 symposium in Cambridge, Mass.

“Bringing the ISDN conference back to Temple University gives added exposure to the research accomplishments of the Fox School of Business, on both the national and international levels,” said Dimoka, Director of Temple’s CNDM.

According to Dr. Carolyn Yoon, one of the symposium’s organizing committee members, ISDN has grown in both registered attendance and prestige each year since its inaugural conference in 2010.

“Neuroscience, by nature, needs to be interdisciplinary and draw from a large community,” said Yoon, an associate professor of marketing at the University of Michigan’s Stephen M. Ross School of Business. “In the time that ISDN has been in existence, the studies and research that have been presented at the conference have proven that neuroscience has amounted to something more than just a fad.”

“The talks were of such a high quality in the first year of the conference, in 2010, and, as you might expect, it’s only gotten progressively better with each passing conference,” said Dr. Uma Karmarkar, assistant professor in the marketing unit at the Harvard Business School, and a member of ISDN’s organizing committee in 2014 and 2015. “The ISDN holds an important place, as most of the work of all of its participants and attendees is complementary, despite often arising from different fields of study.”

At MIT, the more than 100 attendees heard from researchers in a variety of subject areas, from face-tracking, wearables, and consumer neuroscience, to the psychophysiology of financial decision-making. Dimoka chaired a session on applied decision neuroscience, while Venkatraman chaired a session on impulsivity and cognitive control on the symposium’s final day.

“This is more than just the leading conference in the field of decision neuroscience,” Dimoka said. “This event provides an opportunity to present our findings, learn from one another, and appreciate the research we’re doing in this niche field. Decision neuroscience is an application for multiple disciplines: business, psychology, economics, neuroscience, engineering, psychiatry, and more.

The Interdisciplinary Symposium on Decision Neuroscience brings us together to further our common theme, which is using neuroscience theories and tools to understand how people make decisions.”

—Christopher A. Vito
Researchers from Temple University have been awarded a grant from the National Science Foundation (NSF) for the purchase of a functional magnetic resonance imaging (fMRI) scanner.

The $2.37 million grant will further facilitate the researchers’ efforts in studies of decision neuroscience.

Dr. Jason Chein, an Associate Professor of Brain and Cognitive Sciences in the Psychology department at Temple’s College of Liberal Arts (CLA), is the grant’s principal investigator. The fMRI scanner will be housed in the yet-to-be-established Temple University Behavioral Research Imaging Center (TUBRIC), which will offer cross-modal and multi-methodological approaches to research, Chein said.

“Ours is one of the first grants for MRI instrumentation that the NSF has awarded in more than three years, which is quite humbling,” Chein said. “A big part of why we received this grant is due largely to the talented group of researchers at Temple who possess an expertise in neuroimaging and who are asking truly unique questions while utilizing an interdisciplinary approach to find the answers.

“With this prestigious grant, we are able to purchase a piece of equipment with a very powerful gradient field that allows us to see the brain with unparalleled spatial and temporal precision. This will open the door to pursue the kinds of research questions we’ve been waiting to answer.”

The grant will support a large number of investigators, across multiple colleges, including three from the Fox School of Business: Dr. Angelika Dimoka, Director of Temple’s Center for Neural Decision Making (CNDM); Dr. Vinod Venkatraman, Associate Director of CNDM; and Dr. Crystal Recek, Assistant Director of CNDM.

“Receiving this grant is an important step in the right direction, toward the encouragement of interdisciplinary research at Temple University, while also strengthening our commitment to the study of decision neuroscience,” Dimoka said. “The Center for Neural Decision Making at Temple University looks forward to continuing in our roles as active research contributors in this area.”

NSF’s awarding of the grant and the future establishment of TUBRIC are two prominent examples of the interdisciplinary research work that is taking place at Temple. Chein said he hopes both will spur future projects between faculty working in less-traditional interdisciplinary lines of academic study.

“With the support of this funding, we are able to purchase an fMRI scanner with a very powerful gradient field that allows us to see the brain with unparalleled spatial and temporal precision. This will open the door to pursue the kinds of research questions we’ve been waiting to answer.”

The grant will support a large number of investigators, across multiple colleges, including three from the Fox School of Business: Dr. Angelika Dimoka, Director of Temple’s Center for Neural Decision Making (CNDM); Dr. Vinod Venkatraman, Associate Director of CNDM; and Dr. Crystal Recek, Assistant Director of CNDM.

“One such collaborative project, Chein said, is a research effort he and Venkatraman have launched. Their current work delves into a decision-making phenomenon called the description experience gap, reflecting the fact that individuals act differently, and make different choices, when making decisions based on explicit information versus personal experience. Their current study targets adolescents, ‘who research has shown are more prone to increased risk taking,’” Chein said.

In the study, participants are given two choices: a certain, but small opportunity to win tokens vs. a risky proposition that could garner a larger amount of tokens.

“We’ve used behavior and eye-tracking measures to see how adolescents make choices. While this is pilot work, comparing adolescents to adults, the data we have indicates that adolescents are different with respect to how they make their decisions and what information they focus their eyes on,” Chein said. “So far, it looks like the adolescents are most-interested in the value of rewards than the probability of each outcome. The establishment of TUBRIC will enable us to explore whether differences between adolescents and adults might be explained by the maturation of specific brain systems.”

—Christopher A. Vito
Google chief economist speaks at Fox during NSF-funded big data workshop

The irony of using a big data factory like Google to discover the risks of its own methodology was not lost on researchers and experts attending the Privacy in an Era of Big Data workshop, funded by the National Science Foundation (NSF) and hosted by the Fox School of Business and Temple University’s Big Data Institute.

Big data is loosely defined as the collection and analysis of large data sets of complex information. As the scope of collected data increases, there is a significant need for advanced analytic techniques and the development of new methods of investigation. Temple’s Big Data Institute was established to harness the full potential of big data and enable further research on the subject with an interdisciplinary approach by bringing together seven related research centers across the university in conjunction with the Fox Chase Cancer Center.

Co-founder of the Institute, Dr. Paul A. Pavlou, Chief Research Officer and Associate Dean of Research, Doctoral Programs, and Strategic Initiatives, along with Dr. Sunil Wattal, Director of the Center on Web and Social Media Analytics and Associate Professor of Management Information Systems, were awarded a grant from the NSF to further their investigation into unexplored links between big data and privacy.

“This is a topic that’s on everyone’s minds, and we’re here to get some useful insight on it,” Wattal said.

The workshop, held April 22–23, 2015, was part of a week of events meant to encourage big data research from industry, government, and academia on the future of big data. The goal of the workshop, Pavlou said, was “to create a forward-looking research agenda into the future of big data and privacy.”

A priority for attendees was to examine the balance between big data and privacy rights, an essential task for the responsible use of big data to both improve national security and further develop consumer marketing.
Dr. Thomas Page, Technical Director for Core Infrastructure & Cloud Repositories at the National Security Agency (NSA), represented the NSA’s perspective on big data, with a plenary keynote presentation.

“There’s a moral responsibility in this space. We’re doing this on behalf of the American people,” Page said.

Page called for a new focus when discussing big data. “Big Smart Data,” he said, avoids unnecessary or intrusive information from reaching analysts, and allows new public policy to be enacted that balances personal privacy and national security concerns.

Page’s keynote address raised concerns of a “zero sum game,” wherein consumers trade privacy for national security. Christina Peters, Chief Privacy Officer at IBM, noted that she believes the two are not equivalent. Citing instances of security breaches at Target and Home Depot, she indicated how a history of misuse or neglect has risked consumer information.

Similarly, thoughts on the protection of consumer information were echoed by the conference’s keynote speaker. Hal Varian, Chief Economist at Google, discussed the trust contract held between consumers and big data collectors. He argued that big data factories have the most to lose. “Search engines have a lot more to lose than a human. When computers screw up they screw up big,” Varian said.

When Google visitors type in “how do I know,” the top results rendered by the search engine relate to pregnancy, sexual orientation, and transmittable diseases. This demonstrates Google’s role in not only sharing a vast amount of information, but also its responsibility as an online confidante, Varian argued.

“Search engines are the biggest privacy enhancers in the world. People won’t ask these questions to their lawyer, doctor, parents, or priest, said Varian, who also served as the featured keynote speaker at the Frederic Fox Lecture Series April 23, 2015, another event during the Big Data week at Fox. “This is the first time you can get this type of answer from a non-human.”

Varian explained that the intended use of big data is to educate consumers on the difference between privacy and security. Since privacy is the restricted use of personal information, a responsibility of big data should be to protect the security of the data and manage the risks associated with personal data analytics.

A closing comment from the first day of the workshop was the idea that “big data is the new bacon,” as presented by Lael Bellamy, Chief Privacy Officer at The Weather Channel. Her support of improved data collection and consumer intelligence reinforced the notion that although big data is trending, it’s been around for a long time.

“It’s possible everyone can benefit from the Big Data revolution,” said Carnegie Mellon University professor Dr. Rahul Telang.

The workshop’s aim was to serve as a bridge for interdisciplinary collaboration among academic, industry, and government with emphasis on academic rigor and real-world relevance. In establishing a cross-disciplinary approach into understanding and mitigating the trade-off between big data and privacy, the Big Data Institute at the Fox School is poised to play a leading role in the research on big data, to inform academia, industry, and society in general.

~Lora Strum
Fox researcher finds first impressions may have lasting impact

Initial impressions based upon a person’s facial features can significantly impact how we evaluate that person’s behavior, according to research by a professor from Temple University’s Fox School of Business.

Dr. Brian Holtz, Assistant Professor of Human Resource Management, conducted three studies, all of which suggested that people were more likely to accept the actions of an individual whom they initially perceived to be trustworthy.

New York Magazine and the United Kingdom’s Daily Mail recently featured Holtz’s research, which was initially published in the journal Personnel Psychology.

Holtz’s studies draw on prior psychological research demonstrating that certain facial features stimulate impressions of trustworthiness (high inner eyebrows and prominent cheekbones), while others (low inner eyebrows and shallow cheekbones) have the opposite effect.

In his first two studies, Holtz introduced participants to the biography of a fictitious CEO, which included a professional headshot, and then asked participants to gauge the CEO’s trustworthiness. Later, the participants read a description of a meeting in which the CEO announced a temporary pay reduction and were asked to evaluate how the CEO handled the situation. The subjects, Holtz said, were unaware that he had manipulated the CEO’s image to reflect either a trustworthy or untrustworthy face.

He found that participants who viewed the trustworthy face, tended to give the CEO the benefit of the doubt and judge the CEO’s actions to be fair. In contrast, participants who viewed an untrustworthy face evaluated the same actions to be significantly less fair.

“In essence, these results illustrate a confirmation bias, such that our initial expectations of others are often confirmed,” Holtz said. “If we expect a person to be trustworthy, for example, then we are more inclined to perceive their behavior in a favorable light.”

Participants of his third study—undergraduate students from Temple University—were asked to write a business-related memo that they were led to believe would be evaluated by a Fox School MBA student. Before writing the memo, participants viewed the LinkedIn profile of an MBA student purportedly assigned to evaluate their memo. In reality the LinkedIn profiles were fabricated to present either a trustworthy or untrustworthy face. In addition to earning research credit, participants were told they could earn a cash bonus of up to $6 depending on the quality of their memo.

Two days after the initial session, participants received a written evaluation of their memo, and were informed that they would receive a $3 cash bonus—“an ambiguous, down-the-middle ranking,” Holtz said. Then, the participants completed a questionnaire designed to assess their view of the MBA student’s evaluation of their work.

“Again, the results suggested that initial impressions of trustworthiness shaped how fairly the participants thought they were treated by the MBA student, even though all participants received the exact same outcomes,” Holtz said.

“Ultimately,” he continued, “the key takeaway point from this research is that we form initial impressions very quickly and, for better or worse, our initial impressions can have cascading effects on how we perceive subsequent interactions with others.”

—Christopher A. Vito
Fox researcher’s revolutionary study correlates scents with purchasing tendencies

Could a spicy cinnamon scent persuade you to buy a Lexus? A professor from the Fox School of Business thinks so.

Dr. Maureen Morrin, Professor of Marketing at the Fox School, and a collaborative research team found a definitive connection between warm scents, consumer preference for luxury (more expensive) items, and an increase in overall spending.

“If there is a warm scent in the room, people perceive the room to be smaller, and more full of other people,” Morrin said, citing the research findings of she and her team. “As a result, they feel a little less socially powerful. In order to restore their feeling of power, they prefer premium or luxury brands.”

Morrin and her research colleagues, Dr. Adriana Madzharov of the Stevens Institute of Technology, and Dr. Lauren Block of Baruch College, published the findings of their scent-power correlation research in the Journal of Marketing in January 2015. Their research also received mention in Science Daily. The study is believed to be the first of its kind to examine how temperature-related associations with smell affect our spatial perceptions and sense of self-importance.

For her most-recent study, Morrin and her colleagues exposed test subjects to two identical retail environments, and then subtly manipulated the scent in each atmosphere to be either warm (think spicy cinnamon), or cool (think minty menthol). They found that consumers exposed to the warm scents felt less socially powerful, finding the room crowded and overwhelming. To assuage their insecurities, they not only purchased more goods, but showed a preference for luxury items assumed to increase one’s social status, Morrin said. Conversely, those participants in cool-scented environments showed no inclination toward or against the luxury items, and bought less overall.

“Cool scents tend to work in an opposite direction than warm scents in terms of their impact on how powerful you feel within a given environment,” Morrin said.

Morrin, whose research interests include sensory processing and consumer decision-making, has always been interested in pioneering studies regarding the correlation between scent and consumer behavior. The idea of warm and cool scents emerges from learned associations between foods and scents that can influence our conscious perceptions. When one smells menthol, the association is immediately with mint, which to our taste buds is cool, Morrin said, while vanilla and cinnamon evoke opposite reactions.

Morrin’s study revealed that not only can scent prime our emotions, it actually alters our idea of ourselves in space. Morrin’s test subjects reported increased crowding in rooms with warmer scents when the population remained constant. Conversely, the shoppers in cool-scented rooms reported increased spatial perception and a reduced number of people in the room.

Should retailers take advantage of these findings, Morrin said the market for luxury goods can be targeted acutely.

“Retailers of luxury goods might consider how their store’s atmospherics impact shoppers’ spatial perceptions,” she said. “Aspects of the retail environment that elicit power-compensatory consumer responses might lead to a greater preference for and purchasing of luxury brands.”

Morrin said she hopes to continue her investigation, and is currently working with several doctoral students from the Fox School to investigate other ties between scent and consumer behavior. The next step, she said, could be determining how ambient scents, especially those outside of our conscious awareness, could influence our purchase choices.

—Lora Strum
Fox’s Ram Mudambi hosts NSF-sponsored iBEGIN Conference

Fox School of Business Professor Dr. Ram Mudambi and his team of researchers have received a prestigious grant from the National Science Foundation (NSF) to host the First International Business, Economic Geography and Innovation (iBEGIN) Conference at the Fox School. It was preceded by similar workshops in 2013 and 2014.

The two-day conference, held Nov. 13–14 at Fox’s Alter Hall, was sponsored by the NSF, with support from Temple’s Center for International Business Education and Research (CIBER) and the Fox School Institute for Global Management Studies. It was aimed, Mudambi said, toward using research from his team’s iBEGIN initiatives as the foundation for a long-lasting research community focused on the intersection of the three fields of international business, economic geography, and technology/innovation studies.

“In a very deep sense, all society is based upon human connections. We’re social animals,” said Mudambi, the Frank M. Speakman Professor of Strategic Management and Perelman Senior Research Fellow at Fox. “This conference applied that theory to the sphere, and business and economics. We developed the concept that the human experience is built on human socialization, and used it to understand how connections across space create value.”

The conference featured three keynote speakers, who addressed attendees Nov. 14 in an open-to-the-public setting. The keynotes included:

- Dr. John Cantwell, Rutgers University, Distinguished Professor of Management and Global Business, and editor-in-chief of the Journal of International Business Studies
- Dr. Harald Bathelt, University of Toronto, Canada Research Chair Professor in Innovation and Governance, and editor of Journal of Economic Geography
- Dr. Mark Lorenzen, Copenhagen Business School, Professor of Innovation and Organizational Economics, and Director of the Danish Research Unit of Industrial Dynamics (DRUID)

“These three keynote speakers have been great supporters of our iBEGIN work, and I could not have been more delighted to host them,” Mudambi said. “John is the editor of the top international business journal, Harald is the editor of the top economic geography journal, and Mark is the director of DRUID, one of the world’s largest research networks in innovation studies. To have them under one roof at one conference was a truly unique opportunity.”

The iBEGIN Conference was promoted as part of GlobalPhilly 2015, a two-month international exposition, featuring events geared toward the promotion of international arts, commerce, education, heritage, and more in Philadelphia. Mudambi said papers were submitted to the conference from all over the world, including from: Denmark, France, Italy, Korea, Spain, Sweden, Japan, the United Kingdom, the United States government, the United States Federal Reserve, and more.

Mudambi’s ongoing iBEGIN initiative is a collaborative effort with professionals in centers around the world, including: Denmark’s Copenhagen Business School, Italy’s Politecnico di Milano and University of Venice Ca Foscari, the Indian School of Business, Henley Business School at the University of Reading (UK), and many others.

The next research project on the horizon for Mudambi and his globally dispersed research team involves battery power, a progression of yet another long-running iBEGIN segment on renewable energy and sustainability. The team has documented the important role that emerging economies like China and India are playing in the innovative landscape of the wind turbine industry, but batteries are the key to unlocking the potential of these renewable energy technologies.

“Batteries are the steam engine of our age,” Mudambi said. “We have ways to produce energy, but we have no way to harness it and store it. Today, if we had to run our planet on stored battery power, we could run perhaps one percent of our power applications. Imagine if you could run the whole planet on batteries. It’s a problem that, once solved, will revolutionize society.”

—Christopher A. Vito
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