Observer

Vol. 31, No. 7 ◉ September 2018

Innovations in
Teaching
Psychological Science

*New Approaches for Training Students to Gather,
Evaluate, and Share Scientific Data*

PLUS

'Playing Games With Basic Research'
Scientists Turn to Machine Learning to Save Lives
Meet the 2018–19 APS Board

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Observer

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Published 10 times per year by the Association for Psychological Science, the *Observer* educates and informs the Association on matters affecting the research, academic, and applied disciplines of psychology; promotes the scientific values of APS Members; reports and comments on issues of national interest to the psychological scientist community; and provides a vehicle for the dissemination of information on APS.

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KEYNOTE SPEAKERS

Arrested Development or Adaptive? The Adolescent and Self Control

BJ Casey
Department of Psychology, Yale University, USA

Evolution of Emotions and Empathy in Primates

Frans B.M. de Waal
Department of Psychology, Emory University, USA, and Utrecht University, The Netherlands

The Brain in the Ecosystem: Cognition, Culture, and the Environment

Atsushi Iriki
Laboratory for Symbolic Cognitive Development RIKEN, Brain Science Institute, Japan

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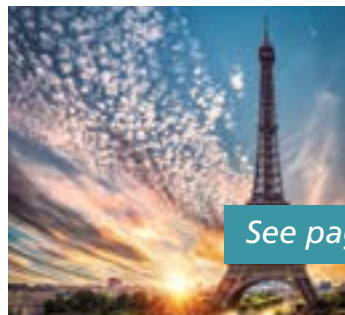
See page 36 for more program information

Seeing Psychological Science Everywhere

Barbara G. Tversky
APS President

Nearly 50 years ago, George Miller — yes, that Miller, the one from the Magical Number 7 +/- 2 — called for "giving psychology away" (Miller, 1969). Like many catchy phrases, this one has been echoed many times, sometimes without the cautionary title, "Psychology as a means of promoting human welfare."

Some years later, in his APS presidential columns (2007–2008), John T. Cacioppo brought data showing that psychological science was in fact being given away. Cacioppo presented a dense network of citation links within and across the sciences. A few sciences, psychology among them, were hub sciences. Like transportation hubs, a hub science is one that gets a lot of traffic; it is central to other sciences. In this case, it means that papers published in psychology journals are frequently cited by papers published in other disciplines. Some of the traffic might have come from interdisciplinary collaborations with psychologists, a practice encouraged by my immediate predecessor, Suparna Rajaram, and one that I can only cheer.

Big Data provides yet another way to assess the impact of our field. With trepidation, I turn to Google search yields. Because the numbers keep changing for reasons known only to Google's ineffable algorithm, they are a very crude estimate, to be taken as such. I've entered only fairly recent psychological terms, mostly from the late 20th and early 21st centuries. I also entered, for comparison, concepts from nearby disciplines. We'll start with two of those: *populism* yields 18.1 million Google results, and *gene splicing* gives 45.1 million. Although concepts such as *cognitive dissonance* and *stereotype threat* yield more than 7 million results each, they don't reach the level of *populism*. Between *populism* and *gene splicing* fall *fundamental attribution error* at 19.2 million, *confirmation bias* at 35.9 million, *implicit bias* at 39.6 million, and *marshmallow test* at 45 million. But look at these, topping *gene splicing*: *cognitive load* at 54.1 million; *grit* at 93.7 million; *cognitive behavioral therapy* at 99.4 million; and *growth mindset* at 105 million. Now another point of comparison, *genetic engineering*: It yields 154 million results, but *working memory* far surpasses that at 677 million. And *System 1 System 2* gives a whopping 5.56 billion.

Readers will have noticed that many of the concepts widely discussed by the public were central topics in recent widely read books that engagingly described years of accumulated research and its implications for the larger world. The public seems to understand both the interest and the relevance of psychological science and is thirsty to learn. At the same time, our field has an impressive pool of talent that not only can do excellent research but also can explain and apply it beautifully.

We have given psychology away. Indeed, psychological science seems to be everywhere — in policy, in other fields of science, in art, in engineering, in many parts of daily life. Much of this has, as Miller exhorted, been used to promote human welfare, though that is far harder to assess than even constantly varying Google search yields. Numerous findings and ideas from psychological science have been put to work to improve many facets of life: child-rearing; education; workplace hiring, promotions, and atmosphere; health and well-being, both mental and physical; and economic and social policy. APS has taken on Miller's mission in its journals, explicitly in *Psychological Science in the Public Interest*. Those publications play a large role in disseminating ideas worth applying as well as documenting where they have been done so successfully. Other fields, notably behavioral economics, have taken on a similar mission. *Nudge*, arguably a psychological concept, yields 23.8 million Google results, and more importantly has become an explicit method in the social and economic policies of many organizations, including governments.

Yet there are the inevitable dark clouds hovering. Big Data reminds us of arenas in which knowledge created by psychological science is not always used for the public good. Notorious among them are fake news and the related use of psychological data to target individuals. Other findings from,

➡

for example, neuroscience, may grab fewer headlines, but also raise complex issues of policy and ethics. The intricacies of such questions are far beyond these columns, and fortunately psychological scientists have stepped up to address them. APS annual conventions regularly include panels to discuss these topics.

Still another way of looking at the impact of psychological science is through its influences on the practices of other disciplines. So many fields are now collecting human data and adopting our methods. Education, certainly. Medicine, more and more. In many areas of computer science, human–computer interaction and augmented and virtual reality among them, it's hard to publish without running comparisons on people. Artificial intelligence is inevitably compared with natural intelligence, and increasingly with intelligence in other species. Political scientists are beginning to assess the effects of policy on behavior. Behavioral economists have been doing that for years. Physicists, chemists, biologists, and mathematicians want to know the teaching methods that best serve their students. Researchers in engineering and business schools study the ways teams interact and innovate in order to improve both. Architects and urban planners want to know how their designs affect behavior, and environmental scientists need to know how human behavior affects the environment. Art educators have been investigating the magical wordless conversation between the eye and the hand and the page in the creation of art.

The spread of psychological science to so many domains is thrilling. To bring it home, I have invited a few outsiders to contribute columns to the *Observer.* Each of them is doing remarkable work in another discipline, yet that work has been deeply influenced by psychological science. I have asked them to reflect on those influences. In future columns, you will hear from someone who is designing new institutions of higher education by adopting evidence-based practices from psychology; an architecture critic and author who analyzes architecture and urban design with a cognitive lens; a physician who is also a researcher whose own practice has been influenced by research in judgment and decision-making and whose research has contributed to that field; an actor-director-teacher whose work has been affected by social neuroscience; and a human–computer interaction researcher whose designs are influenced by psychological science and who assesses their effects on people. I am looking forward to their reflections. I know I will enjoy them and learn from them, and I hope you will too. ◐

Reference

Miller, G. A. (1969). Psychology as a means of promoting human welfare. *American Psychologist*, *24*, 1063–1075.
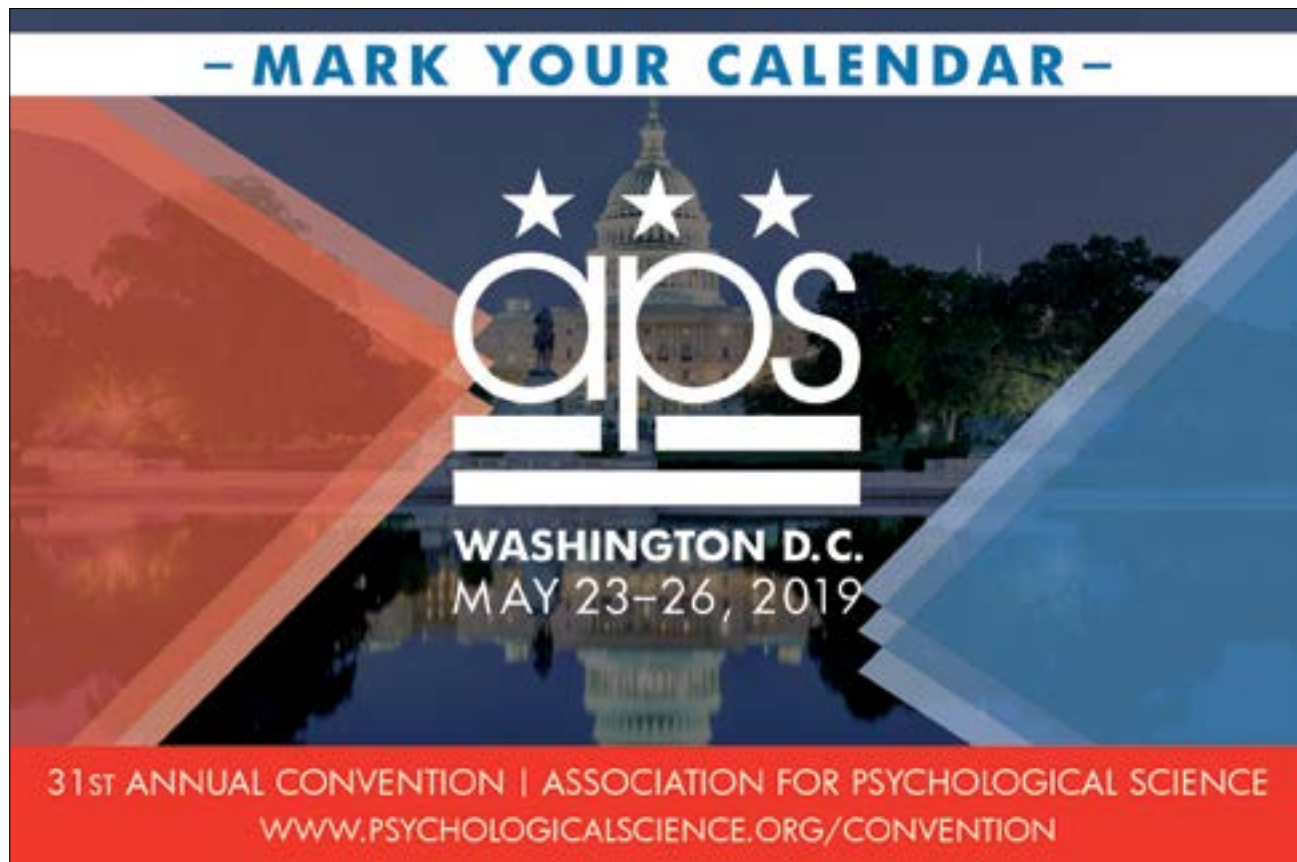
Newcombe, King Will Be New APS Journal Editors

APS William James Fellow **Nora S. Newcombe** will become the new editor of *Psychological Science in the Public Interest* on January 1, 2019. She is the Laura H. Carnell Professor of Psychology at Temple University. She researches education and learning, specifically STEM learning and education, spatial learning, and cognitive maps.

Nora S. Newcombe

Newcombe has been awarded the Distinguished Scientific Contributions to Child Development Award from the Society for Research in Child Development and the Women in Cognitive Science Mentorship Award. She also has received the George A. Miller Award for an Outstanding Recent Article on General Psychology, the G. Stanley Hall Award for Distinguished Contribution to Developmental Psychology, and the Award for Distinguished Service to Psychological Science. She has served as editor of the *Journal of Experimental Psychology: General*, *Cognitive Psychology*, and *Cognitive Research: Principles and Implications* and as associate editor of *Psychological Bulletin*, along with her service on numerous editorial boards and grant-review panels.

Also on January 1, 2019, APS Fellow **Laura A. King** will become the new editor of *Perspectives on Psychological Science*. King is Curators' Distinguished Professor of Psychological Sciences at the University of Missouri. She researches personality psychology, well-being, motivation, meaning in life, individual differences in intuitive information pro-

Laura A. King

cessing, and narrative approaches to personality and identity, among other topics.

King has received the Carol and Ed Diener Award for Outstanding Mid-Career Contributions to Personality Psychology from the Society for Personality and Social Psychology and the Templeton Positive Psychology Prize.

King is the author of two psychology textbooks and numerous scholarly articles and book chapters. She has served as associate editor for a number of journals in personality and social psychology and has served as editor of the *Journal of Personality and Social Psychology*.

BISTOPS Holds Inaugural Seminar on Teaching Psychological Science

Psychological scientists gathered July 9 through 13 in Paris, France to foster future research on teaching and learning psychology at the inaugural Biennial International Seminar on the Teaching of Psychological Science. Established educational psychologists and those with a newfound interest in the field alike came together to discuss existing research and exciting avenues for international collaboration to promote the evidence-based teaching of psychological science worldwide. The seminar, organized by APS Fellow **Douglas A. Bernstein** (University of South Florida), was hosted by the Fondation Maison des Sciences de l'Homme–Maison Suger in cooperation with APS and other international organizations. Speakers included APS Fellow **David Daniel** (James Madison University) and member **Sue Frantz** (Highline College).

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WASHINGTON D.C.
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SUBMISSION DEADLINES

Symposium	Poster
November 15, 2018	January 31, 2019

Rapid Review: Symposium submitters will be notified by December 31, 2018.
Poster Submitters will be notified on a rolling basis.

STUDENT AWARDS

Student poster submitters are eligible for the following awards via the
APS Convention submission system.

Applications due January 31, 2019

RISE Research Award

Recognizes outstanding psychological science research focused on socially and/or
economically underrepresented groups and/or outstanding research by students of
diverse ethnic, racial, and geographic backgrounds.

Student Research Award

Recognizes outstanding completed research from all areas of psychological science.

www.psychologicalscience.org/studentawards

APS Fellow Carsten de Dreu Receives Spinoza Prize

APS Fellow **Carsten K. W. de Dreu**, a professor of social and organizational psychology at Leiden University, has been awarded the Spinoza Prize, the highest scientific award given in the Netherlands. The prize recognizes researchers working in the Netherlands for making outstanding contributions to their fields on an international level. The award is accompanied by a prize of €2.5 million ($2.9 million) to support future research.

> **I can just follow my scientific heart and test out a number of wild hypotheses that I'd otherwise never get funded. A Spinoza Prize opens up a world of opportunities.**

"It is a tremendous honor," de Dreu said in a press release. "The good thing about a Spinoza Prize is that it isn't based on a research proposal, so you have carte blanche to use it however you want … I can just follow my scientific heart and test out a number of wild hypotheses that I'd otherwise never get funded. A Spinoza Prize opens up a world of opportunities."

De Dreu played an instrumental part in the founding of APS's International Convention of Psychological Science, and he currently serves as Chair of the Program Committee for the 2019 APS Annual Convention. In his empirical work, he applies neurobiological and social psychological perspectives to the study of collaboration, conflict regulation, and group decision-making. A main focus of this work is understanding how groups resolve the tension between members' self-interest and the common good. He has published more than 250 scientific articles, including paradigm-shifting research on the role of the hormone oxytocin as a powerful motivator for in-group/out-group aggression.

Previously, de Dreu has investigated how work overload can hinder the exchange of information within judicial panels and influence court judgments, and he is currently working to identify how to improve communication within medical teams in the operating room to boost patient outcomes.

Carsten K. W. de Dreu

In addition to his work at Leiden University, de Dreu is a fellow of the Royal Netherlands Academy of Sciences, former president of the International Association for Conflict Management, and professor of behavioral economics at the Center for Experimental Economics and Political Decision Making at the University of Amsterdam. In April 2018, he was awarded a European Research Council Advanced Grant of €2.5 million ($2.9 million) to study the influence of so-called macroprocesses such as climate change and economic crises on the stability of societies.

An award ceremony for Spinoza Prize winners will take place on Wednesday, September 12 in the Koninklijke Schouwburg theater in Den Haag, Netherlands. The Netherlands Organization for Scientific Research has awarded 85 Spinoza Prizes since it was established in 1995.

Researchers Investigate Problems With MTurk Data

Some psychological researchers and other social scientists are warning about a possible problem with survey data being collected through the widely-used online tool Amazon Mechanical Turk (MTurk).

The researchers recently detected a noticeable number of survey responses from repeating GPS coordinates, indicating the presence of possible bots with spoof accounts. More details on the issue can be found online (at bit.ly/2BfeGHD and unc.live/2nHpzs4), along with a proposed standardized procedure (bit.ly/2KVR8Hk) to test whether responses from repeating GPS coordinates provide evidentiary value.

University of Minnesota graduate student **Hui Bai** is working with others to assess the scale of the issue by inviting researchers to complete an online questionnaire (bit.ly/2Bpq6Zt).

NIH Delays Clinical Trials Policy Enforcement. Now What?

Over the last several months, psychological scientists proposing human subjects research in grant applications submitted to the National Institutes of Health (NIH) have had to keep track of a complicated series of policy changes and updates. In a new development, NIH has released a notice that should be read by all members of the behavioral science community.

In 2017, NIH announced policy changes that led to many types of basic behavioral science research studies funded by NIH to be classified as clinical trials. These policy changes increase the burden on psychological scientists without resulting in clear benefits to the scientific rigor of NIH-funded research; they also occurred without consultation with basic behavioral science researchers.

When NIH dug in on this policy despite opposition from the behavioral science community, APS alerted Congress to the problem. The issue resonated with appropriators, and as part of the 2018 budget for NIH, Congress instructed the science agency to halt enforcement of its clinical trial policies affecting basic behavioral research and to solicit input from the affected researchers. APS, along with the rest of the scientific community, has been awaiting NIH's response to Congress's directive.

This issue has been playing out for more than year. APS played a leading role in asking Congress to help. See more on this and other APS advocacy and public policy efforts at www.psychologicalscience.org/policy.

On July 20, 2018, the response arrived in the form of NIH notice NOT-OD-18-212, titled "Delayed Enforcement and Short-Term Flexibilities for Some Requirements Affecting Prospective Basic Science Studies Involving Human Participants." In this notice, NIH announced that it is delaying enforcement of the new clinical trials policies. But early reviews say that while the notice is technically in compliance with the Congressional directive, it has created more confusion in the process.

"Based on the 2018 appropriations bill and community feedback, NIH is delaying enforcement of registration and reporting policies for prospective basic science studies involving human participants … through September 24, 2019," the notice reads. "NIH will provide leniency for applications submitted to the incorrect funding opportunity announcement."
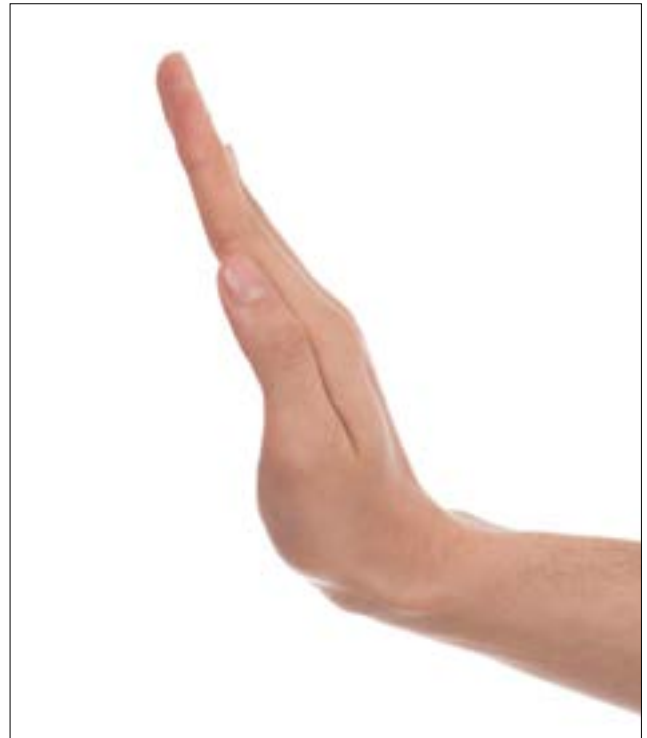
NIH also indicates it will issue a Request for Information to seek additional input from the research community in the days ahead. In the interim, APS encourages you to share your opinions about NIH's notice and the clinical trials policy changes in general. APS is also interested in your experiences in applying for NIH grants, and whether you have encountered any difficulties in applying for grants due to NIH policy changes. Feedback and comments can be sent to APS via email to aps@psychologicalscience.org.

Meanwhile, scientists interested in submitting applications to NIH funding opportunity announcements should read NOT-OD-18-212 closely and consult with the relevant program officer for the opportunity prior to beginning work on grant applications.

Read NIH's notice on basic behavioral science research at bit.ly/2PhBWaE.

Read more about the clinical trials changes and their implications in *Science* at bit.ly/2K04Atq. ◐

The 2018–2019 APS Board

The APS Board of Directors for the 2018–2019 academic year welcomes several distinguished psychological scientists. **Barbara G. Tversky**, Teachers College, Columbia University and Stanford University, takes on her role as President, while **Lisa Feldman Barrett**, Northeastern University, becomes President-Elect. **Suparna Rajaram** of Stony Brook University, the State University of New York, is Immediate Past President. The board also will include two new Members-at-Large for the coming year: **Maryanne Garry**, University of Waikato, New Zealand, and **Vonnie C. McLoyd**, University of Michigan. The new board members will take their places beside Members-at-Large **Deanna Barch** of Washington University in St. Louis; **Stacey Sinclair** of Princeton University; **Simine Vazire** of the University of California, Davis; and **Howard M. Weiss**, Georgia Institute of Technology. Board Secretary **Gün R. Semin**, ISPA Instituto Universitário, Portugal, and Utrecht University, the Netherlands, continues in his role, while Treasurer **Roberta L. Klatzky** of Carnegie Mellon University will be stepping down after 19 years of service. Ending their terms on the board are Past President **Susan Goldin-Meadow** of the University of Chicago; **Dorthe Berntsen** of Aarhus University, Denmark; and **Cindy Yee-Bradbury** of the University of California, Los Angeles.

Barbara G. Tversky
Teachers College, Columbia University and Stanford University

President 2018–2019

Barbara G. Tversky, professor of psychology and education at Columbia Teachers College and professor of psychology emerita at Stanford University, is known for her groundbreaking examination of spatial thinking and language, event perception and cognition, extended mind, and gesture. Tversky's research has explored areas as diverse as art, architecture, design, comics, visualizations, and maps. Her work has expanded understanding of the ways visual communications, including gestures and diagrams, use place and marks in space to express meaning more directly than language. Such communication fosters broader concepts including storytelling, description, and explanation. During her distinguished career, Tversky has collaborated with linguists, neuroscientists, computer scientists, designers, engineers, biologists, geographers, chemists, and artists. She recounts some of this journey in a book that she is currently finishing titled *Mind in Motion: How Action Shapes Thought* (Basic Books, 2019).

Tversky is a Fellow of the American Academy of Arts & Sciences, the Cognitive Science Society, and the Society of Experimental Psychologists. She received the Phi Beta Kappa Excellence in Teaching Award and has served on the governing boards of the Psychonomic Society, the Cognitive Science Society, and the International Union of Psychological Science. She has served on the editorial boards of *Cognitive Psychology*, the *Journal of Experimental Psychology: General*, and the *Journal of Experimental Psychology: Learning, Memory, and Cognition* and is currently an Associate Editor of *Cognitive Processing* and on the advisory board of *Spatial Cognition & Computation*.

Lisa Feldman Barrett
Northeastern University

President-Elect 2018–2019

As a standard bearer in the field of emotion research, Lisa Feldman Barrett has altered the understanding of our inner lives to reveal that emotional experiences and their expressions are varied within ourselves and between cultures. A University Distinguished Professor of Psychology at Northeastern University, she has discovered that emotions do not "live" in certain brain structures (e.g., that fear is housed in the amygdala) and explores the neuroscientific basis of emotions.

Barrett, who served as an at-large member of the APS Board from 2011 to 2014, has research appointments at Harvard Medical School and Massachusetts General Hospital in psychiatry and radiology. She has published more than 200 academic papers in such outlets as *Science*, *Nature Neuroscience*, and *Psychological Science*. She has given a popular TED talk, has testified before Congress on the role of emotional literacy in public health, and has appeared on *The Today Show* to discuss her research. Her book, *How Emotions Are Made: The Secret Life of the Brain*, has been described as "brilliant," "mind-blowing," and "a delight to read" by experts in the field. The book details how emotion is constructed mentally and physiologically in the moment and across the course of our lives.

Barrett has been honored with multiple awards for her groundbreaking research on the nature of emotion, including the National Institutes of Health Director's Pioneer Award. She also is a recipient of the 2018 APS Mentor Award. She is a Fellow of the American Academy of Arts & Sciences, the Society of Experimental Psychologists, the Royal Society of Canada, the American Association for the Advancement of Science, the Society for Personality and Social Psychology, and the Mind and Life Institute. ➡

Maryanne Garry
University of Waikato, New Zealand

APS Board Member 2018–2021

Maryanne Garry is a professor at the University of Waikato in New Zealand and works at the Institute for Security and Crime Science, both in psychological science. She researches human behavior with a focus on memory, including distortion, false memories, and the overlap of memory and law. Garry investigates the ways in which memories — including our childhood memories and traumatic memories — can change over time or right in the moment. Much of this work has influenced allied professions, such as psychotherapeutic practice and the law. Garry was president of the Society for Applied Research in Memory and Cognition from 2008 to 2012, and continues to serve on the governing board.

Vonnie C. McLoyd
University of Michigan

APS Board Member 2018–2021

Vonnie C. McLoyd is a developmental psychologist and professor of psychology at the University of Michigan. McLoyd conducts research on family relations and youth development. Her work focuses on the interactions among parental behavior, socioeconomic factors, and youth socioeconomic adjustment. Using economic theories and family-stress models, McLoyd has investigated the influence of economic conditions (e.g., poverty, parental job loss), compromising experiences with peers and neighborhoods (e.g., neighborhood violence, peer victimization, racial discrimination), and parental psychological well-being on youth development. Her research also has examined adolescent employment as well as how race, social class, and adolescent experiences can affect an individual's transition into adulthood. This line of inquiry demonstrates the processes by which family relations can serve as a protective or risk factor for socioeconomic threats to childhood adjustment. McLoyd is a pioneering researcher on the psychological processes that contribute to these developmental factors in African American children and families. Her work provides essential information for creating prevention and intervention programs for African American families and communities.

McLoyd was the recipient of a 1996 MacArthur Fellowship and has served on the editorial boards of several distinguished journals, including *Child Development,* the *Journal of Black Psychology*, and the *Journal of Research on Adolescence.* ❍

MINDS ON THE ROAD

AN APS BLOG ON THE SCIENCE OF WHAT'S DRIVING BEHAVIOR

www.psychologicalscience.org/motr

AT RANDOM

"Psychology is no longer the study of mental functions as a 'black box' that cannot be seen or measured. We now study psychological processes, such as attention, emotion, social relationships, and mental disorders as being closely connected to biological systems, all of which can be measured and manipulated. Our methods also span across levels, from genetic and neurological bases to broader societal and cultural dimensions."

-Psychological scientist **Nancy Gonzalez**, the new Dean of Natural Sciences at Arizona State University

APS Award Address

'Playing Games With Basic Research'

Richard Mayer on Designing Evidence-Based Educational Games

Today, doing homework means sitting down to fill out a worksheet, flipping through flash cards, or writing an essay. But what if all students had to do was plug in a controller and train their brains by playing games?

It may be an enticing idea, says APS James McKeen Cattell Fellow Richard E. Mayer, but just because kids enjoy games more than conventional lesson plans doesn't mean educational video games are the way to go; as the sign in his University of California, Santa Barbara, lab says, "Liking Is Not Learning."

"The problem we have is there are many strong claims for the educational value of computer games, but they're based on weak evidence," said Mayer, a Distinguished Professor of Psychology at the University of California, Santa Barbara, during his award address at the 2018 APS Annual Convention in San Francisco.

It all comes down to the issue of transfer, a classic concept that's been at the foundation of both education and psychological science since the very start, he continued.

For more than 45 years, Mayer's research has been motivated by a simple question: "How can we help people learn so they can apply what they have learned to new situations?"

In the case of video games, it's not enough for Tetris just to teach players how to be the best at stacking the game's colorful blocks at an increasingly demanding pace — those cognitive skills need to carry over into other contexts as well.

Mayer's "use-inspired basic research" begins with the idea that we construct knowledge and learning through three basic processes. First, students need to be able to pay selective attention to relevant material and understand what parts of a multimedia presentation are important. Next, that information is organized into a coherent structure in the student's sensory memory, before working memory finally integrates those knowledge structures with each other and with prior knowledge drawn from long-term memory.

"When looking at trying to design effective games, I think we need games that prime these processes of selecting, organizing, and integrating," Mayer explained.

APS James McKeen Cattell Fellow **Richard E. Mayer** says including immersive elements such as narrative themes to a game actually can hinder students' performance on subsequent tests of the game material.

The Cognitive Consequences of Commercial Gaming

Off-the-shelf games offer players hours of entertainment, but do they offer a cognitive edge as well?

Portal, a popular puzzle-platform game released in 2007, asks players to navigate their way through a series of rooms using a "portal gun" that allows them to manipulate and transport objects based on real-world physics. One might expect that playing a physics-based spatial action game would increase players' understanding of physics principles or boost their perspective-taking and mental-rotation skills, but Mayer and the students working in his lab found that the effects were minimal at best.

In fact, even playing 15 to 20 hours of Lumosity, a suite of brain-training games advertised as being specifically designed to

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improve cognition, gave players little advantage over those who played no games at all on tests of attention and mental flexibility.

"Off-the-shelf games aren't the best way to try and improve cognitive skills," Mayer said. "They were designed for entertainment generally, not cognitive training."

What Features Add Value to a Game?

That doesn't mean video games are completely ineffective as educational tools: Designing games based on proven cognitive principles could still yield results, Mayer explained.

To this end, he and his students created a series of games called Design a Plant. In each version of the game, players are tasked with designing flora capable of surviving and thriving on another planet by selecting different root, stem, and leaf systems. In response to their choices, a character, or "on-screen pedagogical agent," named Herman the Bug explains how plants grow based on their interactions with different environments.

Herman is designed to interact with participating students in different ways depending on the condition to which each individual is assigned. The agent might communicate through speech in one condition and written text in another. The speaking tone might be conversational or formal. And participants may see the character on screen or hear a disembodied voice.

Students then complete a transfer test measuring their understanding of the botany principles presented in the game.

Findings across this and other games that Mayer has designed and tested in the lab suggest that students respond well to polite pedagogical agents who communicate informally; actually *seeing* that agent, however, may be of little help in improving their understanding of the material. Coaching players by providing them with feedback on the reasons their answers were wrong and prompting them to explain correct answers, on the other hand, were found to bolster performance on transfer tests.

Despite the relative success of socially engaging pedagogical agents such as Herman, Mayer has found that adding immersive elements such as narrative themes to a game can actually hinder students' performance on subsequent tests. In a game called Cache 17, for example, students were tasked with creating different electrical devices to recover art stolen during World War II. Participants who played the game after viewing an introductory animation about the lost artwork solved fewer electrical problems on average than those who played the game without narrative context.

"I'm not going to give up on immersion yet," Mayer said. "I think it has a lot of potential. It's just the games that we've used don't really need immersion." Features only augment student learning, in other words, when they target a specific skill. Providing captions for spoken dialogue, for example, was found to negatively impact native English speakers' understanding of botany compared with those who played Design a Plant with audio only — but redundant text has been shown to be very important for students learning in a second language.

Mayer said professional developers who view designing games as an art form are sometimes offended by the idea of adding instructional elements to games, or even by the notion of studying them scientifically, but this doesn't have to be contradictory.

"When our goal is to help people learn with games, we should base that on evidence and theory, and I think psychological science has something very important to contribute," he explained.

Games Versus Conventional Media

Rigorous studies comparing educational games with conventional media (such as books, handouts, and PowerPoint presentations) are scarce, however, and the results are mixed.

When Mayer measured the learning of students playing a decimal arithmetic game, he found that they learned better from lining up balloons with decimal values from smallest to largest than from an online tutorial with the same information. On the other hand, students were found to learn more about electrical devices from a PowerPoint presentation than from Mayer's Cache 17.

Playing games with virtual-reality headsets has also become increasingly popular, he said, but there is little evidence that it improves classroom learning.

Still, Mayer noted, research on educational games is only in its early stages, and the possibility that computing power can be leveraged to provide an adaptive resource for students' learning remains.

"We know from learning theory that the only time you really learn is when you make a mistake," he said. "I think that's one of the values of games. It's kind of a low-stakes environment where you can try things and learn from that." ◉ **–Kim Armstrong**

To watch video of Richard E. Mayer's award address, visit www.psychologicalscience.org/r/basic-research.

AT RANDOM

{ *"Today, more than ever, psychological science is needed to explain the subjective nature of human perception and how two people presented with the same stimulus — whether it's a person or an object — can form such different impressions."*
-APS Fellow **Saul Kassin**, John Jay College of Criminal Justice, on the importance of widespread dissemination of psychological science. Kassin's psychology textbook is featured in the recently released motion picture *Blindspotting*, which centers around two childhood friends' experiences with race and gentrification. }

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Overt**u**rning Myths in Introductory Psychology

Emphasizing the Science and Stamping Out the Myths

College students typically enter Introductory Psychology classes with numerous misconceptions about human behavior. Disturbingly, a half-century's worth of research shows that the introductory course probably won't reverse those erroneous beliefs in the long term. While students may ace a Psych 101 final exam or even graduate with a psychology major, within 2 years many of them will revert to believing that people use only 10% of their brains, that full moons activate abnormal behavior, and that people with schizophrenia have split personalities.

After reviewing relevant research, APS Fellow Douglas A. Bernstein, University of South Florida, concluded that the typical introductory psychology course largely fails to permanently correct students' misconceptions, and is calling for a sea change in the way these courses are taught. As he first proposed at a 2016 conference on the teaching of psychology, Bernstein argues that instructors should stop teaching massive amounts of traditional, but quickly forgotten, content on the science of psychology. Instead, courses can be designed to employ active learning experiences that combat the illusions and misconceptions students bring with them to the classroom.

> These lessons focus specifically on the major myths and misconceptions that students typically bring into the classroom, using as background reading only those sections of the textbook that are most useful in examining them scientifically.

"This alternative course could provide valuable insights for nonpsychology majors, give psychology majors a preview of courses to come, and promote everyone's critical/scientific thinking skills," Bernstein says.

With Bernstein's vision and participation, APS has launched an initiative called Reinventing Introductory Psychology, which takes the form of an innovative set of lesson plans available at www.psychologicalscience.org/members/teaching-psychology/reinventing-introductory-psychology. Each module is designed to

- portray psychology as an empirical science that can inform reasoning about claims regarding human behavior,
- show the range and diversity of psychological science,
- engage students in critical/scientific thinking through active research rather than memorization, and
- highlight applications of psychological science in everyday life.

Most importantly, these lessons focus specifically on the major myths and misconceptions that students typically bring into the classroom, using as background reading only those sections of the textbook that are most useful in examining them scientifically.

This instructional approach can be delivered in a number of ways. In one version, students could begin each section of a course by collecting evidence for a misguided hypothesis (e.g., "eyewitness testimony is the best kind of evidence" or "subliminal messages have powerful effects on behavior"). They would discuss the nature and source of that evidence (e.g., hearsay, survey, case study, correlational study, controlled experiment), then examine its quality and alternative interpretations.

The students would then find additional support for and refutations of the hypothesis and prepare to discuss those data in the next class session. During that session, they would work as a group to decide on the most reasonable conclusions that can be justified by the available evidence. Additional discussion could focus on what else psychological scientists have discovered about the topic and how the research is being applied in the real world.

"The lesson plans are meant as suggestions, not prescriptions," Bernstein says. "They can be structured in several different ways, each of which can easily be adjusted to match what individual instructors feel will work best for their courses and their students."

Working with Bernstein to develop the lesson plans are psychological scientists Erin Hardin, University of Tennessee Knoxville; Patricia Kowalski, University of San Diego; and Stephen L. Chew, Samford University.

Several lesson plans are now online, and additional ones are forthcoming. Members are invited to contact Bernstein at douglas.bernstein@comcast.net to suggest topics for additional lessons and even to propose lesson plans of their own. APS welcomes feedback on this new teaching resource. ◉ **–Scott Sleek**

More than **35,000 people are using Wikipedia to learn about psychology** every month. Yet, of the more than 8,000 psychology-related articles in Wikipedia, less *than 0.01%* have been assessed to have the quality of a professional encyclopedic entry. **Hundreds of articles are missing accurate content and reliable citations.**

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Join the thousands of psychological scientists who are undertaking an effort to improve the quality of information on psychological science and related fields in Wikipedia. You can help by **creating Wikipedia writing assignments** in the courses you teach. With guidance from instructors, **students are improving Wikipedia articles** about psychological science instead of writing traditional research papers.

APS is collaborating with the Wiki Education Foundation at wikiedu.org, which has developed a targeted set of resources for classroom use. For more information, go to **www.psychologicalscience.org/apswi**

Students Learn Science Communication Through Wikiversity

Whether by sating someone's curiosity about the answer to a trivia question or fueling the fires of future research, Wikipedia often serves as Internet users' first source of information. Given its worldwide reach and collaborative nature, the online encyclopedia is constantly changing as its users, "Wikipedians," edit, expand, and eliminate information in pursuit of accuracy. But Wikipedia isn't alone in this endeavor.

Wikiversity, Wikipedia's lesser-known sister site, allows individuals to create, edit, and disseminate teaching and learning materials to the public using the same accessible format as the Wikimedia Foundation's original website. Since 2006, Wikiversity has been amassing resources on everything from learning Swedish to the basics of radiation astronomy and how to play a danso, a Korean flute. Now, APS Fellow Eric Youngstrom, a professor of psychology, neuroscience, and psychiatry at the University of North Carolina at Chapel Hill (UNC Chapel Hill), is harnessing a grant from the APS Fund for the Teaching and Public Understanding of Psychological Science to train students on how to communicate the science of mental health issues.

The project uses Wikiversity as a platform to teach students how best to gather, critically evaluate, organize, and disseminate information about psychological science that may contribute to their understanding of clinical assessments and evidence-based evaluations down the line. As part of the information-gathering process, students create a portfolio of articles on clinical disorders and other mental health issues of their choice.

While Youngstrom said it can be difficult to teach professional "content experts" — whose time is already at a premium — the skills required to edit Wikipedia articles, students' and early-career scientists' familiarity with the platform streamlines the content-creation process. His student collaborators have contributed to nearly 200 pages since the project began in 2013, in addition to creating a student service club at UNC Chapel Hill known as HGAPS (Helping Give Away Psychological Science). The club equips members of the student body with the technical skills necessary for Wikiversity evaluation and editing, pairs them with projects, and helps them connect with content experts in their field.

The club now boasts more than 30 members and continues to contribute to Wikiversity as a nonprofit organization that hosts conferences and other networking events for students. The club has also established a nonprofit corporation, hgaps.org, to help support projects at other universities.

When the Netflix hit series "13 Reasons Why" sparked a conversation about adolescent mental health, for example, HGAPS partnered with psychological scientist Kurt Michael and students

HGAPS members at the University of North Carolina at Chapel Hill gathered for a Sunday edit-a-thon to organize evidence-based resources and information for schools and families in the aftermath of the Parkland, Florida, shootings.

at Appalachian State University to create an evidence-based lesson plan designed to tackle topics such as suicide, sexual assault, and cyberbullying as each issue emerged in the series. Similarly, in the aftermath of the Parkland, Florida, school shooting that left 17 students and staff members dead in February of 2018, HGAPS members banded together to create a package of tools and resources for those affected by the attack. This included links to psychological first-aid resources such as how to find a therapist and post-traumatic stress disorder screening tests, as well as a page on local mental health professionals.

HGAPS efforts have been met with some obstacles, however. While peer-reviewed articles in high-impact journals are regarded as good-quality sources by psychological scientists, the Wikimedia Foundation's policies don't always support the use of such primary sources, causing many students' edits to be rejected by editors. Youngstrom said he has been working to bring this issue to Wikipedia's attention and hopes a wider range of scientifically supported sources will be permitted in the future.

Going forward, Youngstrom and his students hope to create, evaluate, and edit pages on methodology, actigraphy data, and other technical tools for public use. Additionally, they are developing a plan to keep alumni engaged with the project, especially if they go on to pursue graduate degrees in STEM, becoming content experts themselves.

Youngstrom said he hopes that HGAPS's success will encourage educators and other members of the scientific community to consider the pedagogical possibilities of Wikipedia and Wikiversity. HGAPS documentation is available on the Open Science Framework and at hgaps.org so other universities can use it as a template to create their own Wikiversity groups. ●
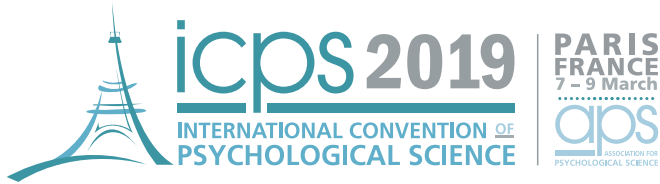
Making Statistics Personal

How Wearable Technology Can Help Teach Psychological Science

It's not often you hear undergraduate students studying statistics described as "surprised and enthusiastic," yet that's just how Gregory Samanez-Larkin, assistant professor of psychology and neuroscience at Duke University, says his students reacted to a semester-long project on health and well-being. Using FitBits to track real-world activity, the professor and his students were able to gather valuable personal data that they could anonymously incorporate into their classwork.

"They seemed excited to have the opportunity to actively apply the course content to data that would have just been intrinsically interesting for them to monitor without any formal analysis," Samanez-Larkin said.

Although the devices were originally meant for other research in his lab within the Department of Psychology and Neuroscience and the Duke Institute for Brain Sciences, the psychological scientist came up with a creative way to use them to get his students engaged with the often dense material covered in statistics classes.

"I personally don't learn things well unless I care about them," he said. "Using data that most students cared about — and was so personal — seemed to be motivating."

Samanez-Larkin was able to parlay that motivation into classroom activities that went beyond traditional homework assignments.

"Students generated the data, creatively generated research questions, identified appropriate statistical tests, wrote up the results as they would be reported in a formal research paper, and identified limitations of the data, analyses, and study in general," he explained. "This project helped them achieve everything I hoped they could get out of this course."

In particular, Samanez-Larkin found interesting effects centered on sleep variability and grades. He had students analyze these data for their final exam, which was in the format of an article that might be submitted to a journal in the future. After circulating an introduction and method section before the test, the psychological scientist had students write results and discussion sections based on their analyses. The students are now refining and combining their responses and writing an introduction, even though the class has ended.

"We will submit this as a manuscript with every student in the class as a coauthor — maybe even to an APS journal," Samanez-Larkin explained.

Students also were allowed to keep their FitBits if they wore them 95% of the time — a goal 70% of them achieved. In addition to being a nice perk for those participating in the class, Samanez-Larkin said, this helped create a greater awareness of physical health and well-being, which are major foci of his lab.

Gregory Samanez-Larkin and his students have found novel ways, including using FitBits to track real-world activity, to parse the often dense material presented in statistics classes.

"I randomly passed a student on campus one day on the phone who stopped and said, 'I'm telling my mom about our FitBit project right now!'" he noted. "The spread of this outside the classroom to family members was especially rewarding for me since my own lab is doing new work trying to motivate physical activity in middle age to improve brain health in old age."

This kind of transferrable knowledge can be beneficial to both younger and older generations, Samanez-Larkin said. "Learning about neurobiological aging can be depressing for young people — it was for me when I was 19 — but learning about effective interventions is empowering and makes people more optimistic about old age. I was so stoked to hear that students were spontaneously engaging their middle-aged parents in activity monitoring."

The class may be over now, but the professor's work with the fitness gadgets is not. His current research involves motivating adults to stay physically active as they age.

"We've run a few initial studies examining associations between daily activity and brain health in older age (e.g., bit.ly/2IiTkfp), but now we're moving on to interventions," the psychological scientist said. "We're trying to optimize messaging using a neuromarketing-like approach to see if we can enhance the effectiveness of motivational content being used in digital health interventions." ◉
–Mariko Hewer

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Scientists Turn to Machine Learning to Save Lives

Following the suicide of a relative or close friend, surviving family members and friends are left with a number of painful questions: "What made them do it?" "Why didn't they get help?" The most troublesome question is often, "Is there anything I could have done to prevent this?"

Clinical psychological scientists are asking that same question on a large scale and making progress on finding the answer with the use of Big Data and machine learning. Working with scientists in other disciplines including medicine and computer science, the psychological researchers hope their models will help clinicians identify and help individuals in immediate danger of dying by their own hand. Researchers are already exploring existing data sources, including medical records, brain scans, blood tests, fitness trackers, smartphones, and social media, which could be used for these models.

A Dire Need

Statistics on suicide lay bare the urgent need for better predictive models. The World Health Organization estimates that 800,000 individuals take their own lives every year, translating to about one suicide every 40 seconds. The US government's Centers for Disease Control and Prevention recently reported a rise in suicide rates in nearly every state between 1999 and 2016. Although suicide rates on college campuses are below those in the general population, suicide is surpassed only by accidents as the leading cause of death among college students.

But research has yet to produce tools that can help clinicians predict and prevent suicides, University of Rochester psychological scientist Catherine R. Glenn and colleagues Courtney Bagge (University of Mississippi) and Andrew Littlefield (Texas Tech University) reported in a 2017 paper in *Clinical Psychological Science*. And most existing risk factors predict suicide ideation, but not actual suicidal behavior, they write.

"Prior studies have focused on identifying which individuals are at risk for suicidal behavior. However, much less is known about *when* individuals are most at risk, which is extremely important for informing clinical care (e.g., deciding whether an individual needs to be hospitalized)," Glenn and her coauthors say.

Clinicians have traditionally focused on identifying a few risk factors in populations or patients. Among military veterans, for example, suicide risk factors include post-traumatic stress disorder, opioid dosage, and having killed in war. Data indicate that men are at a higher risk for suicide than are women in all populations. But relying on only a few risk factors to assess a patient leads to a danger of false positives and false negatives.

Researchers have found that the biggest risk factor across all populations for a future suicide attempt is actually a *previous* attempt.

Current risk assessments generally involve lengthy interviews and questionnaires, which fall short of reliable predictive power for several reasons — including their considerable reliance on self-reports.

"To assess current suicidal thinking and potential risk for suicidal action in most clinical settings and research studies, we ask individuals to indicate if they are thinking about suicide, if they have a plan, or if they intend to act on their suicidal thoughts," Glenn says. "People may be hesitant to respond accurately because they want to leave the hospital or do not want to be hospitalized. They may have an active suicide plan and don't want to be stopped."

Clinical psychological scientist David Rozek, director of training for the National Center for Veterans Studies and research fellow in psychiatry at the University of Utah, says that most assessments rely on measuring specific risk factors and on clinical judgement. But these assessments generally reveal nothing about the *progression* of a patient's suicidal thoughts, making it impossible to determine whether a suicide attempt is imminent or just probable in the next year.

"Our current measures have difficulty capturing clinically meaningful change in relatively short periods of time — hours, days — as the current measures often focus on risk that is longer in duration," Rozek said.

Predictive Algorithms

An emerging approach to developing more reliable prediction tools is the use of retrospective data in the form of electronic health records (EHRs).

"Most individuals who die by suicide will see a health-care provider in the year prior to death — and a sizeable percentage in the months and weeks prior to death," Glenn noted. "Detection via EHR may help identify high-risk individuals in need of more intensive risk assessment and connection to mental health treatment."

Colin Walsh, assistant professor of bioinformatics, medicine, and psychiatry at Vanderbilt University, is among the scientists developing methods to distinguish time-sensitive levels of risk. Walsh and colleagues from Florida State University combed through 5,000 patient EHRs with instances of self-injury to build a predictive algorithm for suicide attempts based on other information included in the charts. Self-injury is easy to spot from diagnostic codes in a medical chart but doesn't always reflect a suicide attempt. So the researchers

had to take a second look at each chart to find true cases of attempted suicide.

"The stakes are so high that we wanted to make sure that we really were very rigorous about the approach," Walsh said in an interview. "We identified in this paper 5,500 charts that had [self-injury] codes in our data. Our team decided to review every single one of those charts, which is not a minor undertaking."

Their computer program would eventually learn from this raw data how to predict suicide attempts, as the team reported in *Clinical Psychological Science*. Every false positive they identified before they built their model meant more accuracy in the final product.

"One of the first results we discovered was that 42 percent of the time, those codes for self-injury did not also have evidence on chart review of suicidal intent," Walsh said.

Walsh and colleagues took those EHRs and used the data to develop a machine-learning program to find patterns. They compared records with later suicides and suicide attempts. The computer algorithm tested millions of different patterns, taking the entries in EHRs and plugging them into equations, building an accurate model through trial and error. When it was done, it could take a single medical record and calculate the probability of an individual's attempt to kill himself. Its accuracy comes from the ability to consider so many variables and their large or small contributions to risk and to quickly solve equations. While the best human prediction models have an accuracy of about 60%, Walsh and colleagues' algorithm identified future suicide attempts with 84% accuracy.

A Blend of Data

While Walsh and his colleagues' model used electronic health records, machine-learning algorithms can be used with many types of data. Researchers in the United States and Canada have found differences in brain-scan and neural-response data between those who died by suicide and those who died of sudden but nonsuicide death at the same age. Military veterans who attempt suicide have distinct genetic expressions when compared with veterans who have not tried to take their own lives. These data also could be considered and built into an algorithm that uses behavioral, medical, neurological, and genomic data to make predictions.

The United States Veterans Association has already begun to incorporate predictive technology into their efforts to improve veteran well-being and prevent veteran suicides, including their Recovery Engagement and Coordination for Health-Veterans Enhanced Treatment initiative. Their efforts to identify the veterans most at risk of suicide are promising, but still in the proof-of-concept stage.

Patterns in Social Media

EHRs form a promising base for suicide risk assessment, but what about individuals who have suicidal thoughts yet never set foot in a doctor's office or mental health facility?

Text recognition and photo analysis are opening the door to screening large swaths of the population based on information they give up willingly, even though they might not be seeking psychological help. These algorithms scan social-media profiles and timelines to assess a user's state of mental health. One machine-learning algorithm was able to identify common social-media posting behaviors in military personnel who eventually killed themselves, and another spotted those later diagnosed with depression (but who did not attempt suicide) based on Instagram photo characteristics such as color saturation, brightness, and the number of faces in pictures. These patterns weren't always distinct enough to be useful in diagnosis, but they may lead to some valuable risk-assessment tools in the future. Medical professionals or organizations that scan profiles or use social-media data in the future also will have to address privacy concerns before these data find use in clinical settings.

Into the Field

Dartmouth College psychological scientist Bill Hudenko and his partners are pushing the latest suicide risk and prevention techniques outside the lab and into the hands of clinicians. A promising 2012 study by his colleagues Rob Althoff, Sanchit Maruti, Isabelle Desjardins, and Willy Cats-Baril at the University of Vermont Medical Center indicated that a brief, adaptive questionnaire could screen emergency room (ER) patients for the risk of a suicide attempt within 72 hours as accurately as a trained psychiatrist. After partnering with Hudenko, the team found that as many as 5% of ER patients may be at high short-term risk for suicide, but only half of those patients come to the ER with a psychiatric complaint.

Hudenko saw an opportunity in the screening approach because the risk questionnaire was scored through software that was capable of increasing in predictive accuracy over time. With the novel screener as a start, Hudenko then built beyond it. His vision is a quick, easy-to-use set of questions that every ER patient in the country would fill out. Those who are flagged for high risk would be given acute care consisting of psychiatric evaluation or supervision. Once the patients leave the hospital, expert clinical help, social support, and artificial intelligence would be combined in a smartphone app to give them personal, effective care in their own environment. The app would connect the patient with a behavioral health coach, who would then link the patient with family, friends, clergy, or other people close to them who could be educated and enlisted to form a support network.

"After reviewing research on the most efficacious way to prevent suicide when someone is identified as high risk, time and again we found that one of the most important factors for maintaining safety is positive social support for the person at risk," Hudenko said.

The patients would continue to complete risk assessments via the app, and a natural-language processor within the app could monitor their messages (with the patient's permission) for language indicative of an imminent suicide attempt. If the app

picked up on a serious risk, the behavior health coach would be able to contact the patient within 5 minutes and activate an active rescue within 10 minutes.

"One of the biggest challenges with suicide prevention is that very often those who are at greatest risk aren't reaching out for help," Hudenko said. "So we're taking a different approach. We're working to predict and understand when risk escalates so that we can reach out and prevent suicide instead of reacting to dangerous situations."

In his new role as Chief Science Officer at Voi (a company dedicated to reducing suicide rates across the country), Hudenko and his colleagues are now researching and disseminating both the suicide-risk assessment and prevention software across the United States.

Tailoring Assessment Tools

Glenn points out that different risk-assessment strategies may be effective for different populations.

"Older adults may see their primary care doctor more often, and therefore EHR may be a richer source of information than for younger people," she said. "For younger people, we may get a richer signal from their social media or other methods of 'digital phenotyping' such as active or passive monitoring via smartphone or wearable sensors."

While these new models may not explain the mental health conditions and life circumstances that could be playing a role in an individual's suicide risk, researchers say, the large-scale algorithms nevertheless hold the promise of identifying high-risk individuals who can be targeted for intervention or supplied with resources to voluntarily seek help. ◉ –**Joe Dawson**

For a full list of references, visit www.psychologicalscience.org/r/prediction.

1 Every ER patient fills out a short questionnaire designed to assess risk of an imminent suicide attempt.

2 Patients identified as high risk receive acute psychiatric care.

3 Upon discharge, high-risk patients are set up with a smartphone app and connected to a behavioral health coach. The coach connects the patient to their friends, family, clergy, etc., to form an online support network.

4 The app prompts the patient to complete regular assessments. With the patient's permission, it also monitors communications and uses natural-language processing to assess risk via the individual's communications.

5 If assessments, communication monitoring, or the support network alert the behavioral health coach of an urgent risk, the coach contacts the patient and activates a rescue.

Dartmouth College psychological scientist Bill Hudenko and his partners have been testing a combination of clinical intervention and artificial intelligence to better improve suicide risk assessment and prevention.

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Firm Foundations II

Scientists continue to share opinions on the most replicated discoveries in psychological science.

Social Behavior in Context
Diane Sunar
Istanbul Bilgi University

One of the most replicated findings in social psychology has been that social behavior of all sorts is predicted better by context and relationship than by individual characteristics.

Following Allport (1985), who defined social psychology as the scientific study of how the "actual, implied, or imagined presence of others" affects behavior, we can define social behavior as "acts that have actual, intended, or imagined effects on others."

Barker (1968) pointed out that our physical/social world is marked by "behavior settings" within which behavior is highly predictable: classroom versus playground, kitchen versus bedroom, sports match versus religious service, political rally versus polling center. Simply knowing the behavior setting in which a person is acting allows us to predict with considerable accuracy which behaviors are likely to be enacted.

Our very perceptions of physical stimuli are influenced by culture (Nisbett, 2003) and by the people around us (Sherif, 1936). Our reports of experience tend to conform to those of others (Asch, 1956). Our expressions of emotion are influenced not only by culture but also by the closeness of our relationship to another person, their status relative to our own, and the private or observable nature of the interaction (Matsumoto, Yoo, & Fontaine, 2008). Likewise, when we speak, we calibrate our tone, volume, word choice, and prosody according to audience characteristics (such as relative age, gender, number of listeners, closeness, and relative status or power), roles of self and other, and public or private context (Giles, Coupland, & Coupland, 1991).

Our behavior toward others is strongly contingent upon whether they belong to our in-group or to an out-group (Tajfel, 1981). Our stereotypes of members of other groups depend largely on the relationship between their group and ours — whether the other group is competitive or cooperative, superior or inferior to ours (Fiske, Cuddy, Glick, & Xu, 2002). Those stereotypes become embedded into our cognitive machinery through nonconscious implicit associations (Greenwald, McGhee, & Schwartz, 1998) and in turn, particularly when nonconsciously primed by aspects of the situation, are reflected in our behavior toward representatives of the groups in question (Bargh & Chartrand, 1999).

By definition, most social behavior follows social norms, including norms supporting conventional or traditional behavior, politeness, and obedience or deference to authority (e.g., Milgram, 1974; Cummins, 2016). Our moral behavior and moral judgments take place not only within a culture (Shweder, 1997) but also in the context of relational models (Rai & Fiske, 2011), and may vary considerably depending on the culture and features of the relationship, including ingroup/outgroup status, norms governing cooperation and competition, and status position.

Thus we can say that our social behavior depends more on the target of behavior than on the actor; more precisely, it depends more on the relationship than on the individuals. Are they in the same or different groups, close or distant, competitive or cooperative, equal or unequal — and if unequal, who is superior or dominant? These things matter in almost all social behavior, and together with culture, norms, and immediate context, have repeatedly been shown to be more predictive than the particular personality characteristics, attitudes, or beliefs of the actors themselves.

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Goal Setting Theory
Edwin Locke
University of Maryland, College Park

Theories come and go in psychology, yet goal setting theory (GST; Locke & Latham, 1990) has withstood the test of time as it has been rated the most valid theory of motivation in organizational behavior and organizational psychology. We attribute this primarily to the use of the inductive method. GST is based on 25 years of programmatic research by ourselves and others. The theory was induced from close to 400 studies. The process began with a clear definition of a goal — namely, the object or aim of an action. The next step was to integrate empirically derived findings. Generally, goals lead to the best performance when they are specific and challenging. The studies on which GST is based include close to 40,000 participants from seven countries and the use of 88 different tasks in laboratory, simulation, and field settings. Individuals, groups, and organizations were the units of analysis assessed using multiple criteria (dependent variables) and a variety of timespans ranging from 1 minute to, more recently, 25 years. Goals were shown to positively increase performance regardless of whether they were assigned, participatively

set, or self-set. Multiple goals set simultaneously were also studied. The theory identified moderator variables such as feedback showing goal progress, goal commitment based on value importance and self-efficacy, and ability in terms of task knowledge and skill. Four mediators — direction of attention and action, effort, persistence, and strategy — also were identified. Affect was shown to be a function of degree of goal achievement. *It should be noted that goal-setting studies were not designed to perform an exact replication of one or of the very first study. Variations, whether natural (unplanned) or deliberate, were what allowed us to show generality, to discover moderators and mediators, and to resolve controversies. (On the latter, see Latham & Locke, 2018.)*

Our inductively derived theory led to hundreds of conceptual replication studies, as well as the extension and/or application of the use of goal setting in many domains (Locke & Latham, 2013) including strategy development, when to set learning instead of performance goals, creativity, leadership, sports, psychotherapy, negotiation, health behaviors, entrepreneurship, academic achievement, and personal development. Because the theory was inductively derived, new discoveries are not a threat to GST; rather, they are an invitation to enlarge and refine the theory through further induction.

We should note that the development of GST was fundamentally at odds with what most journals demand today: starting with a theory in advance, deducing hypotheses (which are typically made up after the fact), testing them, and then implying that the theory-building process is complete, which includes having little or no interest in further development. Our view is that science progresses fundamentally by induction (Locke, 2007).

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Research Reasoning
Philip Johnson-Laird
Princeton University

In reasoning, the most replicated effect (in at least 228 separate experiments) is the failure of individuals to select all potential counterexamples to a conditional hypothesis, i.e., Wason's selection task. Likewise, the relative difficulty of syllogisms has been well-corroborated.

Genetic Influences
Judith Rich Harris
Developmental researcher

Surely the most robust findings — and very possibly the most important ones — in all of psychological science are that virtually all human characteristics are influenced by genes; that genetic differences account, on average, for about half of the measured variation in these characteristics; and that the home environment shared by reared-together siblings accounts for little or none of the variation. Studies by behavioral geneticists dating back to the 1970s, employing various methodologies (twin studies, family studies, adoption studies) and measuring a wide range of human characteristics (intelligence, personality traits, behavioral outcomes), have almost invariably led to these same conclusions. The implications of these findings are too often ignored, in particular by researchers who carry out correlational studies (e.g., adverse childhood experiences) without taking into account the possible influence of genetic differences — or, more to the point, genetic similarities — on the outcomes they are measuring.

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Behavioral Conditioning
Scott Parker
American University

The Law of Effect and Pavlovian/classical conditioning seem to have held up pretty well over the years. And they are hardly restricted to "Applied Behavior Analysis," which did make the list.

Prisoner's Dilemma
Andrew Colman
University of Leicester

The failure of human decision-makers to optimize their own payoffs in unrepeated Prisoner Dilemma games is surely among the most replicated findings, especially now that behavioral economists have taken the baton and run with it for several decades.

A 'Hung Jury'?
Stephen Kelner
Leadership consultant, Spencer Stuart International

Seems to me people overlooked the most obvious finding of replication, and one demonstrated well by this article: that psychological science is so wide and so diverse that it is hard to find two psychologists who agree! ◉
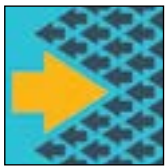
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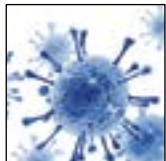
Our Minds Are Not Our Own: The Role of Guts and Germs

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The Consequences of the Evolution of Language on the Mind

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José Morais, *Centre for Research in Cognition & Neurosciences, Université Libre de Bruxelles, Belgium*

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Collective Emotions in Cooperation and Conflict

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How Changing Our Bodies Changes Our Selves

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Melvyn Slater, *Department of Clinical Psychology and Psychobiology, Universitat de Barcelona, Spain*

From the Heart to the Eye: Interoception and Awareness

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Remembering Anne Treisman
(February 27, 1935–February 9, 2018)

Lynn C. Robertson
University of California, Berkeley

APS William James Fellow Anne Treisman was not only a giant in psychological science; her work influenced a broad set of scientific fields, including vision and auditory sciences, computational science, philosophy, linguistics, neuropsychology, and cognitive neurosciences (both applied and experimental). From her student days until she retired, she was driven by questions of whether and how selective attention influenced perception in cognition and in the brain. Her hallmark theory of feature integration proposed a means by which the multitude of sensory signals received at any given moment were bound to their locations and to each other in conscious awareness. Through the use of convergent methods and impressively original thinking, she proposed that stimulus features (e.g., color, shape) were separately coded in different "feature maps" and bound in awareness through spatial attention. Although details of her theory changed a bit over time, spatial attention continued to have a central role in the perception of bound features. This was a radical idea at the time she proposed it, but hundreds, if not thousands, of studies have upheld the basic tenets.

Anne was a pioneer in the emergence of cognitive psychology, and her work was central in questioning the strictly behavioral approaches that were dominant at the time she began her studies. She argued persuasively that cognitive data were critical for understanding functional systems of the brain, without which cognitive neuroscience had no idea what it was looking for: "What is the brain trying to solve? That is the job for psychologists to work out."

Anne was warm and generous. She was polite and reserved, but also a force of nature. She was an incredible role model for women in science, and she lived an astonishing life. As a young girl growing up in England during World War II, she and her family moved to the country to flee bomb-battered London. From that inauspicious beginning, she grew up to attend both Cambridge and Oxford universities and to basically establish the scientific study of selective attention and its effects on perception. She received her BA in psychology from Cambridge in 1 year without any prior scientific training (her first BA was in literature) and then went on to Oxford, where she completed her PhD and was offered and accepted a research position. Her other academic appointments included faculty positions at the University of British Columbia, Canada, the University of California, Berkeley, and Princeton University, from which she retired in 2010. Along the way she was elected as a Fellow of the Royal Society and the US National Academy of Sciences and then awarded the National Medal of Science, which was

APS William James Fellow Anne Treisman was awarded the National Medal of Science by President Barack Obama in 2013.

placed around her neck by President Barack Obama in 2013.

What a journey!

Anne was a dear friend of mine, and she was fun. We often vacationed together, even riding the rapids on the Colorado River for 5 days with six other women. We cruised the Antarctic and the canals of France. In fact, it was on the Canal du Midi that we received a message that the National Science Foundation (NSF) was trying to contact us. We were keen to know what they wanted, since we had a proposal pending. These were the days before cell phones, but we found a landline phone on a dock in the middle of nowhere and, after pooling all of our change to return the call, were informed we had been funded. Whoops and hollers followed in a place where only the birds could hear us. (Our traveling companions had become bored and were looking for other adventures.)

The studies that were funded by the NSF award supported Anne's theory of attention and its interaction with perception. When deficiencies occurred in a patient's internal spatial map from brain injury, spatial attention could not be allocated properly. Yet features were detected no matter where they appeared (although the locations were unknown), and correctly integrating two features to perceive a conjunction was all but absent. Spatial attention does not simply move attention to desired locations but also affects the nature of the objects we perceive, store in memory, and use to understand the world we live in. The internal representation of space is fundamental.

In the following vignettes from her family and colleagues, we are given a small taste of Anne's broad influence and the love and respect that she engendered. I am so lucky to have had the pleasure of working and playing with such a brilliant woman.

Michael Gazzaniga
University of California, Santa Barbara

There was no one like Anne. I have been fortunate in my life to be surrounded by a group of scientists hopelessly committed to the study of attention. All of them, every single one, had a single idol, and that was Anne. I don't think I have ever experienced that kind of unity of opinion anywhere else.

Anne's poise and calming presence belied the mirth and wit she carried with her at all times. Sometimes it spread imperceptibly, a slight grin resolving into a twinkle in her eye. In 2012, there was a party in New York City to celebrate the 20th anniversary of cognitive neuroscience. A band was brought in from San Francisco and enthusiasts from all over New York, Connecticut, and New Jersey showed up. Christopher Buckley, Tom Wolfe, Steven Pinker, Rebecca Goldstein, Robert Bazell, Paola Antonelli, Ben Carey, and Dan Henninger were all there to celebrate. So were the stunning couple from Princeton, Anne and Danny Kahneman. The music rocked on late and the last to leave with grins a mile wide were Anne and Danny. Together their warmth, love, and delight with life that night was evident to all. It was supposed to be a night to remember and it was. It is how I will remember Anne.

Ervin Hafter
University of California, Berkeley

A testament to the brilliance of Anne Treisman's career is clearly seen in the myriad of prizes and awards granted to her by her peers, along with her fellowships in both the Royal Society and the National Academy of Science. I will just touch on a few of the remembered moments that remind me of why I cherished her as a friend.

On first meeting, Anne seemed like one of those reserved women in classic British movies, but one soon learned that she was not afraid to stand up for what she felt was right. While at Oxford in 1973, I was able to sit in on her graduate seminar and, after a particularly stormy session, I asked about the ferocity with which students critiqued one another's work. She said it was a form of gamesmanship learned in English public schools and should not be taken too seriously; however, it worried her that Americans sometimes saw this as rudeness. Later, when I spoke to the department, I gave what was probably a pretty esoteric model of spatial hearing, and the man running the series quickly fell asleep. When his internal clock went off with 2 minutes to go, he awoke and fired off a stream of off-the-wall criticisms. Before I say could anything, Anne leapt to her feet and shouted "You have entirely missed his point" before giving him a clear version of what I had said, only better.

Anne was such a delightful person; forever full of fun. Once our Halloween picnic on the beach in California featured a touch football game. After a play in which she had been flattened, Anne bounced into the huddle laughing and sang out, "I love this, but I have no idea of what we are doing. Are there any rules in this game?"

Other favorite memories include walking into her house when she was listening to Puccini through earphones. Anne was holding the libretto and singing along with the soprano. Over one of her marvelous dinners, she avowed her love of the small Monterrey Market and fought fiercely with those touting the more chic Berkeley Bowl. Anne gravitated toward French movies, but she came alive during the English film "Hope and Glory" when the barrage balloon fell on London during the blitz. She turned to me with a smile and said, "We had a balloon like that in our garden." The woman was a oner, a kick, and a treasure to us all. Her early work on auditory filtering influenced my own work substantially, but what I will most remember is our friendship.

Shaul Hochstein
Hebrew University, Jerusalem

Anne was a colleague and friend for over 30 years. I visited her twice or three times a year, while she came to Israel many times over the years.

During a sabbatical at MIT, I began studying attention effects in primate neurons. Returning, I organized a conference on attention. Naturally, Anne was the keynote speaker. Hearing about Feature Integration Theory, for the first time directly from Anne, I asked her if the difference between single-feature and conjunction search was just due to lateral inhibition. Anne's response was only to smile her Mona Lisa smile. I understood that I'd better think it through again.

Our long collaboration was supported by grants from the US–Israel Binational Science Foundation. We analyzed attention, perceptual learning, binocular rivalry, and ultimately set summary statistics, and we discussed a broad spectrum of scientific work. One delight was our different points of view, since Anne was solidly a cognitive psychologist and I a physiologist. The meeting of these fields, reflected in our conversations, profoundly shaped my work and perhaps some of hers, too.

Anne was not just a scientist, and our connection was not just about science. Together with Danny, we went to the Joyce to see dance; we saw movies. We discussed life, family, her pride and joy in children and grandchildren, politics — American and Israeli — and science politics, too. Anne was always astute, sharp, profound, thoughtful, kind, and generous in spirit. She loved her work, her students and colleagues, and watching the field gradually accept her work as she expanded it. Anne read the scientific literature voraciously, enriching her theories with each new finding.

I was privileged to talk at the Fest in Anne's honor, where I mentioned her amazing early study of binocular rivalry. Anne found that rivalry wasn't binocular, but rather high-level interpretation rivalry — some 30 years ahead of the field! At my retirement party, Anne complimented me by devoting most of her talk to what she disagreed with in Reverse Hierarchy Theory. This was classic Anne: serious and forthright, a true friend. We miss her.

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Nancy Kanwisher
Massachussetts Institute of Technology

Anne was a huge inspiration to me, and indeed to all the cognitive psychologists of my generation. She is responsible for an astonishing number of the foundational discoveries in our field. Her papers are full of daring ideas articulated in clear bold prose that sends shivers down the spine.

But at the same time, Anne was a generous, kind, and unpretentious person. To enable me to come to Berkeley as a postdoc, Anne battled extensively with the campus bureaucracy so that I could bring my own grant; she found space for me when her own lab was tiny; and she did all of this before we had even met — despite the fact that I had yet to publish a paper.

Anne had a wry sense of humor that was all the more delightful coming from this otherwise reserved and gracious giant of the field. I remember us "kids" in the lab worrying about the latest attack on feature-integration theory, and Anne just responding with a mischievous grin and a sparkle in her eye, saying: "Here we go again!"

I remember a star-struck graduate student approaching her at a conference and telling her about their obscure psychophysical finding, and Anne saying: "What would you like, my blessing?" I remember her reporting that when she first moved to California, one of the very Californian psychologists at Stanford asked her, "What do you do for your body?" She replied, "I feed it!"

Our field has lost an intellectual beacon and a lovely human being.

Nilli Lavie
University College London

Anne's legacy as one of the giants that shaped the field of attention research as we know it today is beyond what can be captured in a few words. Here I will just share a few personal memories of Anne as my mentor, role model, and very dear friend.

As a student of attention at Tel Aviv University, I admired Anne's work and felt extremely fortunate when I succeeded in securing a postdoc fellowship from the Miller Institute to be hosted in Anne's lab at the University of California, Berkeley.

My postdoc with Anne was a formative experience, and much of my research style has been inspired by her ways. In our regular meetings, I deeply enjoyed her razor-sharp mind and her rigorous, hard-nosed, empiricist approach. The most frequent sight I would encounter upon arriving to our meeting was Anne sitting on the baby-blue sofa in her lab, going over long data files from her students. As a true empiricist, Anne always examined the data very carefully and would make sure not only that the overall data were accounted for, but also that the pattern held when individual subjects were examined. She remained skeptical of her own ideas until they were fully supported by a large amount of data. It was continually impressive to see how humble she remained despite her legendary name.

The importance of having robust data as a strong foundation for any theoretical argument struck a strong chord in me, and I ended up replicating some of my PhD experiments in her lab to ensure that my load theory was replicable before I submitted it for publication. I can still hear Anne saying to me: "You don't just want to publish your load theory: You want to convince the world [with very strong empirical grounds for the theory]." This was long before the "replication crisis" in psychological science, and I believe that if more people had had Anne's attitude this crisis wouldn't have arisen.

While I deeply cherished having Anne as a role model for my scientific approach, I was also struck by Anne's exceptional generosity from the first day of my fellowship. I had originally requested to be able to work in a nonshared office; however, upon my arrival at Berkeley, the only space available was a desk at Anne's lab. Anne offered that I work from her own departmental office, and we both agreed this was a great solution since I could set up a dedicated subject-testing desk right next to me within the office. She did not care in the slightest about not being able to use the grander departmental office; with her modest and down-to-earth character she was, if anything, rather pleased about the efficiency gained by my collecting data in her departmental office instead of drawing on the lab's shared testing cubicles.

Anne's generosity and kindness continued throughout my postdoctoral period. Although we never actually collaborated, she was highly supportive of my endeavours. We regularly met for mentoring sessions and discussed my work. Anne carefully read the draft paper from my PhD work and even corrected my English, which was no minor ask: Back then, my English was in fact "Hebrish" (an often entertaining hybrid of Hebrew and English). I am still in deep awe of this level of generosity!

I feel fortunate to also have had precious time with Anne as a very dear friend. Already early in my postdoc days in Berkeley we formed a tradition of going out for dinners together, during which I relished her gentle and self-humouring nature. Our conversations spanned from discussing highly intellectual matters to musing over whether the neck is a body part or part of the face (which of course has important consequences for choosing the right moisturizing cream!). We continued this tradition across many years during her visits to the United Kingdom, and in the last few years it was remarkable to also see her strength of spirit, conquering any physical discomfort and keeping her good humour still.

She was a beautiful and admirable person — one of a kind! (I think Anne would have advised me not to put that exclamation mark there.) She is unforgettable and her voice will always stay alive with me and, more importantly, for the field of attention as a whole.

Barbara Mellers
University of Pennsylvania

I first met Anne when she became my colleague at the University of California, Berkeley, in 1987. She had a unique personal presence in the department. She was brilliant and funny, but also shy and self-effacing. Her intellectual presence was enormous. Objects in the world, such as cars, trees, houses, and streets, are first perceived as a set of distinct features, such as shape, size, and color. Anne theorized that attention was the glue that held them together. For years, she and her students tested implications of the theory. Her insights stood the test of time: Later studies in neuroscience further supported her feature-integration theory.

For more than 30 years, Phil Tetlock and I spent evenings with Anne and Danny enjoying dinners and conversations. After they moved to Princeton, we would see them in the summers in Berkeley, where we would magically pick up where we had left off. When we moved east, we would get together again in New York and continue those delightful old habits.

I often marveled at what Anne had done — transformed herself from a modern and medieval language major into a world-class psychological scientist who had profoundly shaped the fields of attention, perception, hearing, and memory. And she did all of that while raising four amazing children. Sometimes I would ask her, "How did you do it all?" and she would reply, "Badly." Years later I asked her daughter, Deborah — who has a spectacular career and two amazing children — "How do you do it all?"

"Badly," she said, reminding me of her mother's charming and self-effacing ways. ◗

Teaching Current Directions in Psychological Science

Edited by C. Nathan DeWall and David G. Myers

Aimed at integrating cutting-edge psychological science into the classroom, Teaching Current Directions in Psychological Science offers advice and how-to guidance about teaching a particular area of research or topic in psychological science that has been the focus of an article in the APS journal Current Directions in Psychological Science. Current Directions *is a peer-reviewed bimonthly journal featuring reviews by leading experts covering all of scientific psychology and its applications and allowing readers to stay apprised of important developments across subfields beyond their areas of expertise. Its articles are written to be accessible to nonexperts, making them ideally suited for use in the classroom.*

Visit the column online for supplementary components, including classroom activities and demonstrations: www.psychologicalscience.org/teaching-current-directions.

Visit David G. Myers at his blog "Talk Psych" (www.talkpsych.com). Similar to the APS *Observer* column, the mission of his blog is to provide weekly updates on psychological science. Myers and DeWall also coauthor a suite of introductory psychology textbooks, including *Psychology* (*12th Ed.*), *Exploring Psychology* (*10th Ed.*), and *Psychology in Everyday Life* (*4th Ed.*).

Reflecting on 5 Years of *Teaching Current Directions*

By C. Nathan DeWall and David G. Myers

*T*eaching Current Directions brings cutting-edge psychological science into the classroom. In January 2018, we celebrated 5 years of using the column to share our passion for teaching psychological science. Its mission endures, but the contents and contributors have evolved. Here we share the column's history, our reflections on its first 5 years, and our goals for its future.

Teaching Current Directions can be traced to a November 20, 2002, email from APS Executive Director Emeritus Alan Kraut to David Myers. *Current Directions in Psychological Science* was flourishing, and Kraut wondered whether Myers might help him with a pet project. "What we haven't done is make the more direct connection between the journal and teaching," Kraut said. "I always thought that what was missing was a section in each issue on how certain articles

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APS Fellow **David G. Myers** *is a professor of psychology at Hope College. His scientific writing has appeared in three dozen academic periodicals, and he has authored or coauthored 17 books, including* Psychology *(11th ed.),* Exploring Psychology *(9th ed.), and* Social Psychology *(12th ed.). Myers can be contacted via his website at www.davidmyers.org.*

in that issue might be used in the classroom." A few emails fluttered between Kraut and Myers in the ensuing year. Nothing solidified and the case went cold.

In 2012, two unrelated events led to the birth of *Teaching Current Directions*. First, Myers recruited Nathan DeWall as successor coauthor on his *Introduction to Psychology* textbook series. Second, Kraut cleaned out his email inbox, leading him again to invite Myers to write a teaching column that featured *Current Directions* articles. Now working as a duo, Myers and DeWall enthusiastically agreed to select, summarize, and showcase *Current Directions* articles in the APS *Observer*, describing how instructors could bring the science into the classroom through engaging activities. Apart from the convention issue, *Teaching Current Directions* now appears in each issue of the magazine.

We spent the first few months trying to establish the column's mission, vision, and values, which include writing essays that highlight new psychological science insights for all *Observer* readers. With support from the *Current Directions* authors whose work we feature — and whom we invite to fact check and comment on our essays — those early columns covered topics such as desire, happiness, morality, and residential mobility. As we hit our stride, we began to receive feedback from other instructors who had read the column. To our surprise, more and more people were reading the column and using the activities in their classrooms. Even people with reduced teaching loads, who might not have been getting the opportunity to use the activities we described, told us they read the column every time they received the *Observer*. We had hit a nerve.

The column wasn't free of weaknesses. We struggled to cover topics outside of social psychology, our shared area of expertise. To fill this gap, we recruited two talented cognitive psychologists, APS Fellows Cindi May (College of Charleston) and Gil Einstein (Furman University), who began contributing several coauthored columns each year beginning in 2016. Their expertise and creativity helped add breadth and depth to the topics covered, which increased the column's impact.

Psychological science embraces and celebrates all forms of diversity. To ensure that the column did its due diligence in addressing issues of cultural diversity, we called upon the accomplished cultural psychologist Beth Morling as a contributing columnist in 2018. Morling's research methods, textbook authorship, and multifaceted experimental and teaching experience enable her to add a unique cultural perspective to the column.

The future of *Teaching Current Directions* is bright. Mariko Hewer and Kimberly Armstrong at APS continue to provide excellent editorial and technical support. This includes establishing an electronic database of all *Teaching Current Directions* columns (https://bit.ly/2AHIpZa). We hope to engage readers further by creating an interactive online feature in which instructors can share their experiences using the activities included in each column. Although both of us plan to continue contributing columns, we also hope to approach other talented teacher–writers who can aid our mission of bringing cutting-edge psychological science into the classroom.

The first 5 years of *Teaching Current Directions* have taught us that people are hungry to learn about psychological science and how to share its insights with others. Whether in a classroom, a conference presentation, or an informal hallway chat, people are eager to teach others how to better understand themselves, their fellows, and their global community. We look forward to touching base with you again in 5 years.

Teaching Students Why Warmth and Competence Matter

By Beth Morling

Fiske, S. T. (2018). Stereotype content: Warmth and competence endure. *Current Directions in Psychological Science, 27*, 67–73.

What do dogs, Hershey's chocolate, and middle-class people have in common? What about rats, Goldman Sachs, and teenagers?

Despite their disparate categories, each triad has a similar "feel" to it. I would guess you feel pretty good about the first triad, but a bit icky about the second.

Now consider this triad: hamsters, the United States Postal Service, and the disabled. Do you feel ambivalent about these seemingly pitiful groups?

Emotional responses to social categories such as these are predictable from the Stereotype Content Model (SCM; Fiske, Cuddy, Glick, & Xu, 2002). Social psychologists have long studied *processes* of stereotyping; the SCM documents stereotype *content*. According to this model, group stereotypes are organized along two big dimensions:

Warmth addresses a group's intent: Are they sociable, trustworthy, and cooperative, or cool, untrustworthy, and competitive?

Competence addresses a group's capability and effectiveness: Can they act on that intent, or can a person safely ignore them because they present no threat?

The SCM argues that warmth and competence dimensions convey evolutionarily functional information.

Stereotype content research captures what "everybody knows" about the groups in their community. People's ratings populate four quadrants of a two-dimensional space, with in-groups (e.g., Christians, Whites) rated as both warm and competent and out-groups (e.g., drug addicts, teenagers) seen as neither. There are also two ambivalent quadrants. Some groups are perceived to be competent but cold (e.g., rich people, professionals); others are incompetent but warm (e.g., the elderly, disabled).

Exposing undergraduates to the SCM introduces key psychological constructs such as stereotyping, ambivalence, and evolutionary reasoning, as well as the quantitative concept of dimensional space. Here's a way to make the theory come alive in your classroom.

First, work with your class to create a big list of groups in the local campus community. List them on the board while a volunteer writes each on its own sticky note. Come prepared to seed the list with groups from each quadrant, such as engineering majors, middle-class students, landlords, professors, honors students, custodial staff, LGBTQ individuals, Lambda Chi Alpha members, and so on.

Next, put students in teams and give each a handful of the group-labeled sticky notes. Teams should decide, for each group they received:

1. As viewed by people on campus, how competent and efficient are members of this group?

1	2	3	4	5	6	7
Not at all						Extremely

2. As viewed by people on campus, how friendly and trustworthy are members of this group?

1	2	3	4	5	6	7
Not at all						Extremely

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Announce that you are not interested in students' personal beliefs, but in how each group is viewed by others. As teams decide their ratings, prepare the chalkboard with two axes: competence (horizontal) and warmth (vertical). Teams will come up and affix each Post-it note to this two-dimensional space.

Subsequent questions should first address how the two dimensions have practical utility. Warmth answers the evolutionarily important question, "Are they friend or foe?" Competence answers the equally important "How effective are they?" Human social cognition that focused on these two questions probably assisted survival in the distant past.

Second, discuss the four quadrants. Researchers use cluster analyses to quantify the similarities, but your class map probably includes some "in-groups" (perhaps *middle-class students*) who are high in both competence and warmth. Look for a low–low quadrant (perhaps *local homeless people*). Check for off-diagonal, ambivalent quadrants: Groups considered warm but incompetent (*football players,* perhaps?) or competent but cold (maybe *Asian international students*?). Explain the concept of ambivalence and how SCM's two dimensions predict these mixed stereotypes.

Third, reflect on how your map of campus subgroups compares with research findings. Fiske's lab website (bit.ly/2ORNQHk) provides maps of stereotypes around the world. Display your country's data, such as this one from the United States:
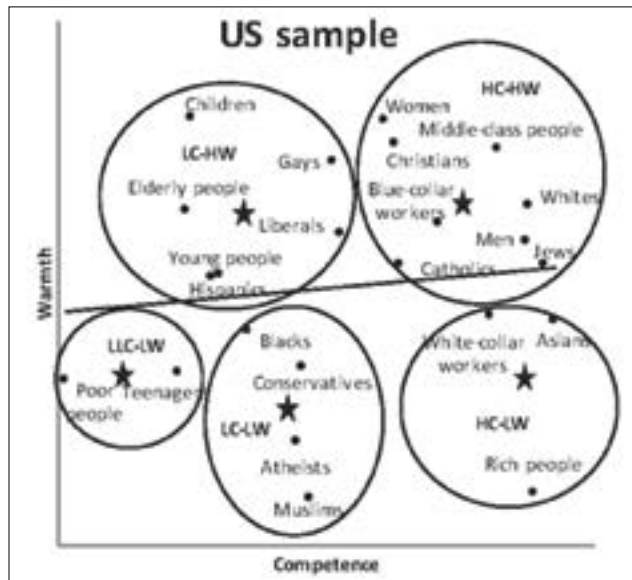

Figure, used with permission, drawn from data in Kervyn, Fiske, & Yzerbyt (2015). Circles in all figures indicate the results of statistical cluster analyses. HC = high competence; HW = high warmth; LC = low competence; LW = low warmth

At this point, some students may take offense at what they see. Now's the time to remind them that *normative stereotypes* — conventional wisdom — are not personal beliefs. In fact, even members of stigmatized groups can reliably report what others think of their own category. To lighten the mood, show how US brands and animal subgroups adhere to the warmth/competence space (see top right page). Finally, describe the emotions that are reliably associated with each quadrant. Typically, people feel admiration for groups in the top

right and disgust or contempt for those in the lower left. Ambivalent emotions go with ambivalent quadrants, with pity in the top left and envy in the bottom right.
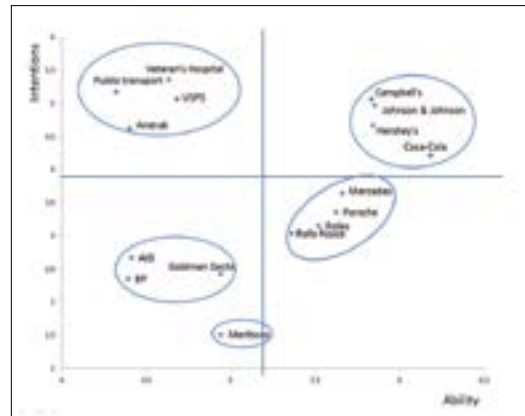
Source: Kervyn, Fiske, & Malone, 2012. Figure originally published in *Journal of Consumer Psychology*
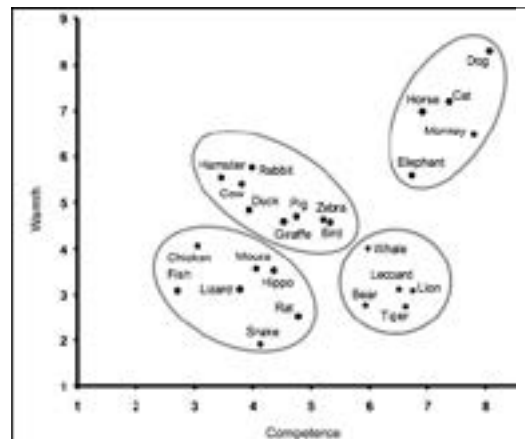
Source: Sevillano & Fiske, 2016. Figure originally published in *Journal of Applied Social Psychology*

Discussion questions can deepen students' engagement. For example, you can note, "Stereotypes about these groups are just superficial images. If nobody personally believes them, do they matter?" You can also ask, "Can current events or public campaigns change people's perceptions of stereotype content?"

The SCM strengthens our understanding of social cognition by showing how the content of our stereotypes reflects the essential questions we ask about others. ◉

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A Call for the Positive

*Why Young Psychological Scientists
Should Take Positive Psychology Seriously*

By Bryant M. Stone

Although there are benefits to studying the faults in airplanes that cause crashes, would it not be better to study the mechanisms that allow flight? Sonja Lyubomirsky, a positive psychology pioneer, introduced this analogy at the 5th World Congress on Positive Psychology in Montreal, Canada: Consider that humans are like airplanes. Traditionally, psychological science has favored studying the factors that cause "crashes," holding an apparent bias toward studying what goes wrong with the mind and behavior. The new 20-year-old field of positive psychology is growing up to meet this negative bias with a focus on the positive, flourishing, happiness, and well-being — essentially, what happens when airplanes fly. As young psychological scientists, we need to recognize and understand the benefits of supporting and embracing this perspective shift.

History

Positive psychology has roots in humanism; it was first mentioned by Abraham Maslow in his 1954 book *Motivation and Personality*. In 1998, APS William James and James McKeen Cattell Fellow Martin E. P. Seligman suggested that clinical psychology focused too much on dysfunction and neglected normal and above-average functioning. Since then, the field has become a well-supported scientific discipline that seeks to understand the mechanisms that allow individuals and communities to flourish.

A New Way of Helping People

For those who work with individuals in applied settings, positive psychology offers a novel and effective method of helping people live better lives through the study of positive psychological interventions (PPIs). Researchers define these interventions as empirically supported activities that cause a positive change in a population (e.g., increased prosocial behaviors) by targeting positive variables (e.g., kindness or empathy; Parks & Biswas-Diener, 2013). PPIs are usually

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simple, quick to complete, and easy to comprehend, with immediate and often long-lasting effects (e.g., researchers have demonstrated that writing and delivering a gratitude letter can increase happiness for the following 6 months; Seligman, Steen, Park, & Peterson, 2005).

Although PPIs target a wide range of positive variables, seven domains in the literature stand out as being reliable, relevant, and well-researched. These domains include expressing gratitude, using strengths, finding meaning or purpose, being optimistic, participating in acts of kindness, engaging in empathy, and savoring moments or experiences. These kinds of PPIs have the potential to increase positive affect, prosocial behaviors, social connectedness, subjective well-being, life satisfaction, and post-traumatic growth. They also can decrease depressive symptoms, suicidal ideation and attempts, and negative affect (see Stone & Parks, 2018, for a review). Additionally, many PPIs are effective in different countries and cultures, although the benefits may be dissimilar because of differences in the determinants of happiness (e.g., self-esteem is more important to well-being in Western cultures; Boehm, Lyubomirsky, & Sheldon, 2011).

Promising for Research

The field needs empirical studies to further delineate the nature of positive psychology phenomena and how they relate to other psychological constructs. This demand means ample, highly publishable research opportunities for graduate students. In 2000, PsychInfo cataloged 39 papers with the words "positive psychology" in the title. In 2005, that number jumped to 131; then to 320 in 2010 and 550 in 2017. This pattern is found with similar search terms such as PPIs (0, 0, 8, 140), happiness (70, 84, 174, 194), well-being or wellbeing (334, 497, 910, 1,598), life satisfaction (45, 96, 134, 246), and positive emotions or affect (30, 53, 86, 152). The growing demand for positive psychology research is evident.

For their theses and dissertations, students should consider several notable concerns within the field that need further examination. First, less popular domains of PPIs (e.g., forgiveness or positive empathy) require additional empirical testing. Individuals can investigate how engaging with these domains affect variables such as happiness, passive suicidal ideation, or social connectedness. Second, individuals should

assess new methods of realistic dissemination of positive psychology educational materials and interventions. For example, individuals could test the effectiveness of delivering interventions through mobile devices (e.g., Happify) or self-help books (e.g., *The How of Happiness*). Third, researchers should examine how sex and gender affect the experience, expression, and benefits of positive variables (e.g., are men or women more likely to express gratitude?). Finally, there is a need for longitudinal or cross-sectional studies to assess the long-term effects of practicing happiness.

Promoting Student Happiness and Well-Being

Happiness is practicable and changeable. According to twin studies, the factors that determine long-term happiness are 50% genetics and 10% circumstance (Lyubomirsky, Sheldon, & Schkade, 2005). The remaining 40% is determined by learned techniques and active efforts to promote happiness, which is important for the experience of frequent positive emotions and life satisfaction because of *hedonic adaptation* (i.e., the Hedonic Treadmill; Diener, Lucas, & Scollon, 2006). Hedonic adaptation occurs when, despite positive or negative events, healthy individuals tend to return quickly to a relatively stable emotional baseline. By studying the field of positive psychological science, one can learn the empirically supported techniques and skills that, when practiced, may lead to more frequent experiences of happiness beyond one's affective baseline.

Such techniques can be implemented immediately. First, research suggests that doing five novel acts of kindness (e.g., buying someone a coffee) in 1 day will result in higher levels of well-being than doing one act per day in the course of a week (Lyubomirsky, Tkach, & Sheldon, 2004). It is important that the acts are novel: For example, if one always holds doors open for people, one is unlikely to benefit from holding doors as an act of kindness. Second, the Three Good Things activity (i.e., counting blessings) involves noting three good things in your life once a day. This activity can lead to a decrease in negative affect that remains for 6 months (Seligman et al., 2005). Last, one can complete a character strengths assessment (e.g., the VIA Strengths Assessment). Using one's strengths in a novel manner may lead to a decrease in depressive symptoms and an increase in happiness, even at a 6-month postassessment follow-up (Seligman et al., 2005).

Pollyannaism: What Positive Psychology Is Not

Pollyannaism characterizes an overly optimistic demeanor and an irresponsible negligence or disregard for the bad. Some might argue that positive psychology shares this philosophy — conversely, those working in the field understand that not experiencing or ignoring negative stimuli may be as harmful to happiness as excessively experiencing or attending to the downsides of life. One does not need to be free of negative emotions to be happy or flourish. In fact, research suggests that negative and positive emotions exist on separate spectra (Watson, Clark, & Tellegen, 1988). Instead, positive psychologists are focused on increasing our knowledge of how positive variables (e.g., savoring experiences) affect functioning, thereby discovering what makes individuals and communities flourish.

Conclusion

Psychological science graduate students should take advantage of the increasing demand for positive psychology information that drives the field's rapid applied and theoretical growth. We should recognize that, as students, we are in a unique position: We are able to study positive psychology while it is a relatively young field. In the next several decades, the field will mature and expand; we have a great opportunity to get involved while the field is still young and needs support. Put simply, happiness and well-being are desirable, worthwhile, and relevant pursuits. As a result, psychological science is changing and accepting the idea that the study of happiness and well-being is a necessary component to developing a better understanding of the human experience. ●

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Requirements: Applicants are expected to have a Ph.D. in Industrial/Organizational Psychology or a related field. The teaching load is three graduate courses each semester. The Assistant or Associate Professor will also be responsible for the administrative components of the I/O Master's Program, including admissions, student internship coordination, and overseeing review and revision of the program. Graduate courses taught would include Introduction to I/O Psychology, Organizational Development, Effective Interviewing, and Consulting Theory & Practice, as well as courses in the candidate's area of specialization. Opportunities also exist for teaching undergraduate psychology courses.

Additional Information: The psychology department consists of 10 full-time faculty representing a range of specialties and is housed in a spacious, well-equipped facility in the Bannow Science Center. There is a vibrant culture of student–faculty research. The department offers a robust internship program, a Psychology Club, and chapters of Sigma Xi and Psi Chi. The salary and the benefits for the position are competitive.

Fairfield University is an Equal Opportunity/Affirmative Action employer, committed to excellence through diversity, and, in this spirit, particularly welcomes applications from women, persons of color, and members of other historically underrepresented groups. The university will provide reasonable accommodations to all qualified individuals with a disability.

Application Instructions: Review of applications will begin immediately; for full consideration all material must be submitted by October 12, 2018.

For full consideration, please visit https://ffd.wd1.myworkdayjobs.com/en-US/EmploymentOpportunities/job/Fairfield-CT/Non-Tenure-Track-Assistant-or-Associate-Professor--Industrial-Organizational-Psychology_JR0000113 and upload the following materials: 1) a curriculum vitae 2) a letter of application 3) a statement of teaching philosophy 4) examples of syllabi and teaching evaluations if available 5) representative reprints of scholarly work if available 6) unofficial graduate transcript 7) contact information for three references.

CONNECTICUT

Fairfield University   **Department of Psychology**   **Tenure-Track Assistant Professor in Cognitive Neuroscience**

The Department of Psychology in the College of Arts & Sciences at Fairfield University invites applications for a tenure-track Assistant Professor position in Cognitive Neuroscience beginning Fall 2019. Applicants must have a strong commitment to excellence in undergraduate teaching, including a commitment to innovation and demonstrated excellence in using technology in the classroom. The potential for developing an active research program in the candidate's area of specialization is also required.

Requirements: Applicants are expected to have completed a Ph.D. in Cognitive Neuroscience or a related field, but ABD candidates who expect their degree by Fall 2019 will also be considered.

The teaching load is three undergraduate courses each semester. Courses taught would include Behavioral Neuroscience, Cognitive Neuroscience, and Psychological Statistics, as well as courses in the candidate's area of specialization. Preference will be given to candidates who are able to teach additional courses such as Cognitive Psychology, Learning, Sensation/Perception, Research Methods, and/or General Psychology.

Additional Information: The department consists of 10 full-time faculty representing a range of specialties and is housed in a spacious, well-equipped facility in the Bannow Science Center. There is a vibrant culture of undergraduate student–faculty research and a growing institutional emphasis on the health sciences. Faculty routinely present at regional, national, and international conferences, frequently with undergraduate students as coauthors. Psychology is one of the largest majors in the College of Arts & Sciences, offering a Psychology Club, a large internship program, and chapters of Sigma Xi and Psi Chi. The salary and the benefits for the position are competitive.

Fairfield University is an Equal Opportunity/Affirmative Action employer, committed to excellence through diversity, and, in this spirit, particularly welcomes applications from women, persons of color, and members of other historically underrepresented groups. The university will provide reasonable accommodations to all qualified individuals with a disability.

Application Instructions: Review of applications will begin immediately; for full consideration all material must be submitted by October 18, 2018.

For full consideration, please visit https://ffd.wd1.myworkdayjobs.com/en-US/EmploymentOpportunities/job/Fairfield-CT/Tenure-Track-Assistant-Professor--Cognitive-Neuroscience--Department-of-Psychology_JR0000114 and upload the following materials: 1) a curriculum vitae 2) a letter of application 3) a statement of teaching philosophy 4) examples of syllabi and teaching evaluations if available 5) representative reprints of scholarly work if available 6) unofficial graduate transcript 7) contact information for three references.

MASSACHUSSETTS

Tufts University   **Department of Psychology**   **Assistant Professor (Tenure Track)**

The Department of Psychology at Tufts University is seeking applicants at the assistant professor level for a tenure-track position in computational clinical neuroscience to begin September 1, 2019. The successful candidate will have a PhD (or be ABD) and an active research program capable of supporting extramural funding. Area of specialization is open, but candidates should use mathematical and computational modeling approaches (e.g., Bayesian, connectionist, reinforcement learning) and/or data science approaches in their research; candidates with research interests that bridge to those of other members of the department are of particular interest. Potential research areas might include, but are not limited to, characterizing core computational and/or neural network disruptions underlying psychological disorders; identifying neural markers that predict mental health problems and/or treatment response; testing predictions developed from computational models of basic perceptual, cognitive, or affective mechanisms in clinical populations; and applying advanced analytic approaches (e.g., multivariate analysis, machine learning) to complex neuroimaging datasets (including fMRI, EEG/ERP, and MEG).

The successful candidate will utilize methods and ask questions that can contribute to the university's new Data Intensive Studies Center (or DISC, see http://viceprovost.tufts.edu/data-intensive-study-center/). Applicants should be interested in teaching introductory, advanced, and quantitatively-oriented courses that will contribute to our undergraduate majors in Biopsychology, Clinical Psychology, and Cognitive & Brain Sciences; to our PhD graduate programs in Experimental Psychology and Cognitive Science; and to the new degree programs within the DISC. Teaching load would be four courses per year or the equivalent, with opportunities for workload-related reductions.

Applicants should submit via Interfolio (https://apply.interfolio.com/51438) the following materials: a one-page cover letter discussing their potential contributions to the department and to the DISC initiative at Tufts; a C.V.; a statement of research accomplishments and future plans (note that our department embraces open and reproducible science, and candidates are encouraged to address how they pursue these goals in their work); a statement of teaching experience and approach; three letters of recommendation which should be uploaded by recommenders directly to the Interfolio site; copies of representative scholarly work (no more than three); and a brief diversity statement that describes the candidate's aspirations and potential for promoting diversity

and inclusion in their professional career. Inquiries should be emailed to Department Manager Jessica Storozuk (Jessica.Storozuk@tufts.edu). Review of applications will begin October 1, 2018, and will continue until the position is filled.

Tufts University, founded in 1852, prioritizes quality teaching, highly competitive basic and applied research, and a commitment to active citizenship locally, regionally, and globally. Tufts University also prides itself on creating a diverse, equitable, and inclusive community. Current and prospective employees of the university are expected to have and continuously develop skill in, and disposition for, positively engaging with a diverse population of faculty, staff, and students.

Tufts University is an Equal Opportunity/Affirmative Action Employer. We are committed to increasing the diversity of our faculty and staff and fostering their success when hired. Members of underrepresented groups are welcome and strongly encouraged to apply. If you are an applicant with a disability who is unable to use our online tools to search and apply for jobs, please contact us by calling Johny Laine in the Office of Equal Opportunity (OEO) at 617-627-3298 or at johny.laine@tufts.edu. Applicants can learn more about requesting reasonable accommodations at http://oeo.tufts.edu.

MICHIGAN

Michigan State University   **Department of Psychology**   **Assistant Professor, Tenure System Position**
The Department of Psychology at Michigan State University seeks candidates for a 9-month academic year, tenure-system position. We are looking to hire at the assistant professor level in the area of political psychology, with a focus on minority politics. Position begins August 16, 2019.

Successful candidates will have a promising research agenda, strong analytical skills and commitment to open science, and potential/record for securing extramural funding. We are particularly interested in researchers studying political psychology in a way that connects both with the multicultural initiative in the Psychology Department as well as with hires in minority politics in the Political Science Department. The hire will be part of a batch hire on minority politics with MSU's Department of Political Science and collaborations are expected. Candidates will also contribute to undergraduate and graduate training in political psychology.

MSU is an Affirmative Action/Equal Opportunity employer, committed to achieving excellence through a diverse workforce and inclusive culture that encourages all people to reach their full potential. The University actively encourages applicants and/or nominations of women, persons of color, veterans, and persons with disabilities; applicants with diverse ideological views are encouraged to apply.

Interested applicants must apply for this position via Michigan State University Applicant Page (MAP). Please access the MAP system at https://careers.msu.edu, posting number 518700. Please submit your curriculum vitae, a cover letter, a research statement, three sample of your written work, a teaching statement, and a diversity and inclusion statement, which should address your ability and experience working with underrepresented student populations. Applicants should arrange for at least three reference letters to be submitted.

Contact Joseph Cesario (cesario@msu.edu), chair of the search committee, with any questions. The closing date for applications is October 1, 2018.

MISSOURI

Washington University in St. Louis   **Department of Psychological & Brain Sciences**   **Assistant Professor**
The Washington University in St. Louis Department of Psychological & Brain Sciences is seeking candidates for a tenure-track Assistant Professor position in the area of Brain, Behavior, and Cognition. All areas of Brain, Behavior, and Cognition will be considered. We are a highly collaborative department and are especially interested in candidates whose research programs connect to other areas of current strength or emerging focus at Washington University, including cognitive aging, healthy and disordered cognition, development, neuroimaging, computational modeling, and data science. The individual in this position will conduct research, publish in peer-reviewed journals, advise students, teach psychology or related courses, and participate in department governance and university service. The primary qualifications for this position are demonstrated excellence in empirical research and teaching; a PhD in psychology or another directly relevant field is required. We especially and strongly encourage applications from women and members of minority groups.

Send curriculum vitae, reprints, a short statement of research interests, and teaching experience to our website at https://jobs.wustl.edu and apply to job posting number 40761. Also arrange for three letters of reference to be emailed to: Cheri B. Casanova at cbcasano@wustl.edu. The Search Committee will begin the formal review process as early as September 15, 2018, but applications will be accepted until the search is concluded. Washington University in St. Louis is committed to the principles and practices of equal employment opportunity. It is the University's policy to recruit, hire, train, and promote persons in all job titles without regard to race, color, age, religion, sex, sexual orientation, gender identity or expression, national origin, protected veteran status, disability, or genetic information.

ANNOUNCEMENTS

Send items to apsobserver@psychologicalscience.org

GRANTS

NIH Funding Announcements for Methodology Research

The National Institutes of Health (NIH) has released a new funding opportunity announcement designed to support research on methodology and measurement in the behavioral and social sciences. NIH is supporting research on methodology and measurement via the R21 grant mechanism, which is a 2-year grant for exploratory or developmental research providing up to $275,000 in direct support. NIH encourages applicants to contact one of the many NIH Institutes or Centers participating in the funding announcement which matches the research focus of the proposed project before applying for funding.

Applicants are encouraged to propose research projects that address methodological issues related to: interdisciplinary, multimethod, and multilevel approaches that integrate with biomedical, physical, or computational science research; integrating, mining, and modeling data in combination with genetic, epigenetic, biomarker, and imaging data, research in and on diverse populations, the study of sensitive health-related behaviors in the context of healthcare, the social environment, and policy; and ethics in research. NIH encourages applicants to contact one of the many NIH Institutes or Centers participating in the funding announcement that matches the research focus of the proposed project before applying for funding. The participating Institutes and Centers are: Office of Behavioral and Social Sciences Research, National Cancer Institute, National Eye Institute, National Institute on Aging, National Institute on Alcohol Abuse and Alcoholism, National Institute on Deafness and Other Communication Disorders, and the National Center for Complementary and Integrative Health. Applications are due October 16, 2018.

NIH Funding for High-Priority Behavioral and Social Research Networks

The National Institute on Aging (NIA) has released two new funding announcements encouraging submission of proposals to develop research networks dedicated to behavioral research connected to aging, Alzheimer's disease, and Alzheimer's disease related dementias. Applications are limited to scientists wishing to develop networks in high-priority areas including midlife reversibility of biobehavioral risk associated with early life adversity, stress measurement, reproducibility in the social and behavioral sciences, life course health disparities at older ages, genomics and social sciences, integrating animal models to inform behavioral research on aging, rural aging, Alzheimer's disease care and services research, and coordination of international studies conducting the harmonized cognitive assessment protocol.

Successful applicants will receive up to five years of funding and a budget of up to $250,000 per year. Interested applicants should submit a letter of intent by January 1, 2019 and applications are due by February 1, 2019.

MEETINGS

41st Annual National Institute on the Teaching of Psychology
January 3–6, 2019
St. Pete Beach, Florida, USA
nitop.org

3rd International Convention of Psychological Science
7–9 March 2019
Paris, France
icps2019.org

31st APS Annual Convention
May 23–26, 2019
Washington, DC
psychologicalscience.org/convention

The Psychological Science of Studying, Learning, and Teaching

The academic year has begun throughout much of the world, with students at both the undergraduate and graduate levels facing the challenges of new classes and research pursuits. Research published in APS journals shows some of the strategies and traits associated with student success.

Retrieval and Distributed Practice Can Boost Students' Study Strategies

Using flashcards, reviewing notes, and rereading textbooks probably isn't teaching students as much as they think: Real learning is an effortful process, says Toshi Miyatsu, a graduate research fellow at Washington University in St. Louis. An overview of the research suggests that spacing out study sessions and doing the hard work of recalling information from memory instead of passively reviewing materials can make all the difference come exam time.

Miyatsu, T., Nguyen, K., & McDaniel, M. A. (2018). Five popular study strategies: Their pitfalls and optimal implementations. *Perspectives on Psychological Science, 13*, 390–407. doi:10.1177/1745691617710510

Efficient Learners May Remember More

Psychological science suggests that people who learn fast may also remember what they've learned longer. A team of researchers found that the speed at which language learners memorized Lithuanian and English words was linked with their ability to recall foreign vocabulary up to 3 years later. This hints at relationships among efficient learning and processing speed, general memory, and intellectual ability.

Theobald, M., Bellhäuser, H., & Imhof, M. (2018). Identifying individual differences using log-file analysis: Distributed learning as mediator between conscientiousness and exam grades. *Learning and Individual Differences, 65*, 112–122. doi:10.1016/j.lindif.2018.05.019

How to Learn What Not to Study

Research out of the University of Maryland suggests that students can more accurately evaluate their own knowledge by framing understanding in terms of what they do know instead of what they will know. Students who dropped study terms based on how confident they felt in the moment were "overwhelmingly" better at identifying what they didn't need to restudy than were those who focused on the future, says coauthor Alison Robey.

Robey, A. M., Dougherty, M. R., & Buttaccio, D. R. (2017). Making retrospective confidence judgments improves learners' ability to decide what not to study. *Psychological Science, 28*, 1683–1693. doi:10.1177/0956797617718800

Balancing Speaking and Listening for Language Learning

Listening to a native speaker can do wonders for students' comprehension of a new language, but production practice may benefit language learners' understanding as well. A study by psychological scientists from the University of Wisconsin-Madison found that students who learned an artificial language by receiving immediate feedback from peers outperformed those who listened to recorded speech. Production practice also has the potential to generalize across vocabulary, grammar, and other aspects of language, wrote APS Fellow Maryellen MacDonald and graduate student Elise Hopman.

Hopman, E. W., & Macdonald, M. C. (2018). Production practice during language learning improves comprehension. *Psychological Science, 29*, 961–971. doi:10.1177/0956797618754486

Trying to Get Ahead? Plan in Reverse

We tend to be the most enthusiastic about a project at the beginning and the end, but what about the time in between? According to an international team of researchers from the Peking University HSBC Business School, the Korea University Business School, and the University of Iowa, graduate students looking to make the most of their education might want to try working backwards. Over the course of five studies, participants who used "future retrospection" to envision the steps just before their goal were found to be more motivated than were those who planned in chronological order.

Park, J., Lu, F., & Hedgcock, W. (2018). Relative effects of forward and backward planning on goal pursuit. *Psychological Science, 29*, 312–313. doi:10.1177/0956797617752922

Time-Sensitive Material