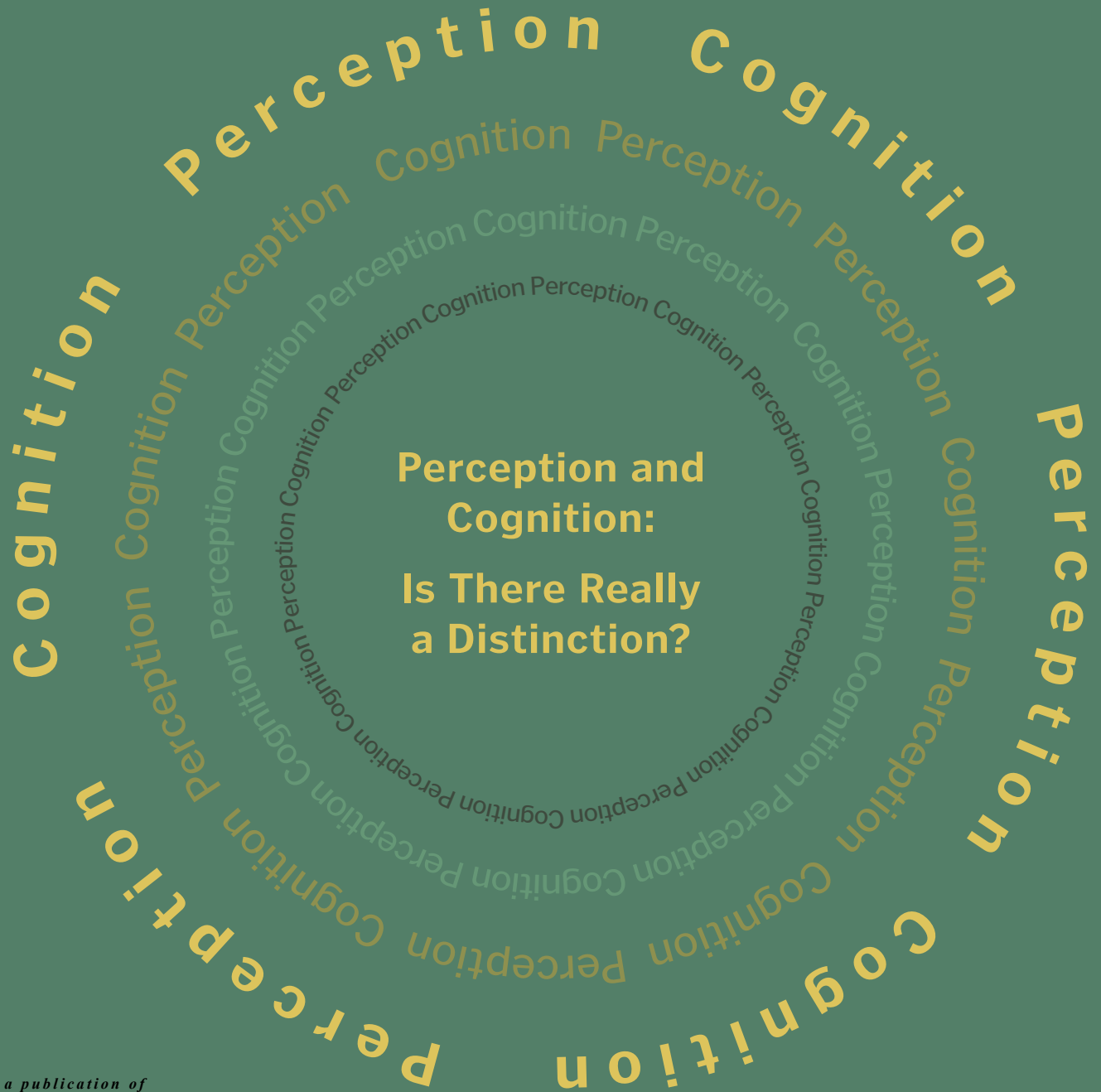


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Cognition:
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CALL FOR NOMINATIONS: APS PRESIDENT AND BOARD

The APS Election Committee seeks nominations for President and for two vacancies on the Board of Directors. The election will take place in April 2020.

QUALIFICATIONS

Candidates must be Members of APS. Nominees should be distinguished psychological scientists committed to the goals of APS and interested in contributing their time, expertise, and leadership to the organization.

DEADLINE FOR NOMINATIONS

February 15, 2020

NOMINATE CANDIDATES BY E-MAIL

aps@psychologicalscience.org
Including the nominee's name and institutional affiliation

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Love and Marriage

Scientists have identified a number of factors that sustain love through better or worse. A roundup of articles on what makes relationships work. (*Research Topic*)



Love Stories: Adventures in the Study of Attraction

APS Fellows and other researchers share discoveries, challenges, and new directions in the study of love, desire, dating, and commitment. (*Observer, February 2019*)



Why Love Literally Hurts

In this *Observer* classic (approximately 100,000 views every year), psychological scientists explore some of the literal truths embedded in the metaphorical phrases comparing love to pain. (*Observer, February 2013*)



How Current Thinking Can Sway Our Memories of Love

As our memories fade, we rely on our current assessment of a person to remember how we felt about them in the past. This extends to some of the most central figures in our lives. (*Research News, February 2019*)



The Many Flavors of Relationships

There's more to love than parental and romantic relationships. Five psychological scientists explore sibling bonds, friendships, work mentors, and other types of relationships. (*Observer, July/August 2017*)



The Science of Love Is All Around

A sampling of new and notable research examining matters of the heart, including claims made by online dating sites. (*Observation, February 2017*)

Call for Applications

APS Teaching Fund

Small Grants Program

APS invites applications for nonrenewable grants up to \$5,000 to launch new projects broadly addressing the categories below:

- **Scholarship of Teaching and Learning (SoTL):** Grants in this category support high quality, potentially publishable scholarship directed at the teaching and learning of psychological science.
- **Meetings and Conferences:** Grants in this category support efforts that facilitate communication among teachers of psychological science who share common challenges and who would benefit from sharing ideas and resources.
- **Technology and Website:** Grants in this category support projects leveraging technological resources to enhance the teaching and learning of psychological science, and to increase the reach and efficient dissemination of related resources.

NEXT APPLICATION DEADLINE: MARCH 1, 2020

For details, go to: www.psychologicalscience.org/smallgrants

Questions? Contact teachfund@psychologicalscience.org

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A DAY IN THE LIFE

By Lisa Feldman Barrett
 APS President

A lot happens in the day-to-day running of a scientific society like APS. Some things are visible to members: emails about next year's convention, the *Observer* for your reading pleasure, and everyone's favorite, reminders to pay your dues. Many other activities are not generally visible, however. Today, I'd like to share a peek behind the scenes, so you can see the details of one of the most difficult situations that APS has faced since I was elected President.

On Monday, December 16, 2019, I had just settled in to start some much-needed scientific writing when I received an urgent email from APS Executive Director Sarah Brookhart, informing me that the Trump administration was about to release an executive order that would impact APS and other scientific societies in the country. This executive order would require all papers involving research supported by US federal funding to be made freely available immediately upon publication. As I understand the circumstances, an executive order was rumored as early as December 9, 2019. A broad group of science-society CEOs,

representing a cross-section of the larger scientific community, became more fully aware of the executive order and its timeline — there was a possibility that it might be signed within the week — on Thursday December 12, 2019. Information about the impending executive order was confirmed by a credible source, Research!America, the next day — yes, on Friday the 13th.



Making open access complete and immediate is a great goal and a necessary element of any plan to democratize science.

Under today's system, papers reporting on US federally funded research become freely available after 12 months, and some journals let you pay for open access immediately when your paper is published. Making open access complete and immediate is a great goal and a necessary element of any plan to democratize science. In fact, the APS Board of Directors had just voted nine days earlier to strike a committee to develop tangible, significant efforts to strengthen open and transparent scientific practice. And we have begun the planning process to transition to a future where all scholarly articles will be peer-reviewed and made available upon publication at no cost.

As scientists, we place high value on making our research discoveries available to the scientific community, and many scientists are in favor of doing so via publishing with complete open access. But this executive order could bring far more harm than good. In the short term, the immediate removal of the 12-month embargo period could disrupt the parts of the peer-review infrastructure that are supported by US commercial publishers (under the current system, for example, peer review for APS journals is built and operated by a company called ScholarOne, which licenses its platform to SAGE). The executive order could financially burden individual scientists. If library subscriptions

Under the current system, all APS journals have an immediate open access option which requires authors to pay the article processing charges. Authors can self-archive accepted manuscripts with no embargo. Learn more at psychologicalscience.org/publications/open-science.

Lisa Feldman Barrett is a University Distinguished Professor of Psychology at Northeastern University, with appointments at Harvard Medical School and Massachusetts General Hospital. Her research focuses on human emotions and how they are constructed. She is the author of the book *How Emotions Are Made: The Secret Life of the Brain* and is a recipient of the APS Mentor Award, the National Institutes of Health Director's Pioneer Award, and a 2019 Guggenheim Fellowship. Barrett can be contacted at lfeldmanbarrett@psychologicalscience.org.

and universities do not cover the costs of publication, then publishers may require individual scientists to pay expensive article-processing charges, which could disproportionately hurt young scientists and those without much grant funding. (Stay tuned for more on this point.) My own lab would be forced to cut a full-time researcher to free up the necessary funds. And the executive order would likely jeopardize nonprofit scientific societies, such as APS, that rely on partnerships with professional publishers for much of the funding that provides member services. All this would happen *imminently*, without any input from the communities it would affect. It was a recipe for chaos.

In response, affected parties mobilized over the weekend and swiftly drafted two letters to the Trump

administration. By Monday morning, both letters were complete and scientific societies were being asked to sign on. One letter was led by the American Chemical Society (ACS). It focused on the problems with an immediate, abrupt change to the current system, as well as the fact that scientific societies like ACS and APS depend on publishing revenues to survive, all while extolling the virtues of open access.

The second letter, led by the Association of American Publishers (AAP), had a different emphasis. It focused rather enthusiastically on US dominance in commercial science publishing worldwide. It implied that scientific publications are a commodity to be sold throughout the world to benefit US industry. And it cautioned against giving away “valuable American intellectual property [...] to the rest of the world for free.” Sentences like these were definitely not to my liking. A scientist’s work should not be the intellectual property of publishers (in APS journals, authors retain copyright ownership of their articles). And it is *precisely* APS’s goal to give away psychological science (Miller, 1969)! It is also APS policy to be an international society. In fact, in addition to striking the committee to advance open and transparent scientific practices, the APS Board had also just voted to reconstitute a committee to internationalize the research and ontology of psychological science in the broadest terms, beyond North American and Western Europe.

APS will always support activities that are in the best interest of science, even when those scientific interests might compete with commercial ones. So why consider signing a letter that conflicts with APS policy? Because these letters were not policy statements. They were political advocacy documents designed to convince a US administration — one that cares more about business and less about science — to stay a hasty and potentially damaging executive order. The AAP-led letter, in particular, used arguments from the administration’s own world view as tools for persuasion.

So there I was, on a rainy Monday in mid-December, being asked whether I’d authorize APS to sign both letters. The ACS-led letter was an easy yes. But would it be enough? In that moment, I believed that the more strongly worded, AAP-led letter seemed more likely to influence the current US administration because it clearly argued against the executive order on commercial grounds. Interestingly, it also ended up having far more signatures (120 scientific organizations and five commercial publishers) than the ACS-led letter. (Some organizations, such as the Psychonomic Society and the Federation of Associations in Behavioral & Brain Sciences, declined to sign the letter, however.)

While thinking this through, I was required to consider another factor: APS is a nonprofit organization, which means its president and all members of the board of directors are *required by law* to act to safeguard its financial health. So I had to consider what could happen if I declined to have APS sign the AAP-led letter, and the executive order went into effect and harmed APS. The entire board could be held legally accountable.

Welcome to a *bad day* in the life of a society president: a looming crisis with two imperfect options. I could refrain from signing the AAP-led letter and risk harm to psychological science and some of the scientists themselves, not to mention possible financial ruin for APS (and possibly legal negligence for the board and me). Or I could authorize APS to sign both letters, one of which included advocacy language that would never appear in any APS policy statement. Which would you choose?

In the end, I gave my permission for APS to sign both letters. In my view, it was perfectly consistent for APS to have a goal such as “achieve complete open access as quickly as is feasible” while also signing advocacy letters to

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prevent a harmful way of achieving that goal. Shortly thereafter, ACS and AAP submitted their letters to the US government, and they seemed to have the desired effect, at least for the moment. As I write these words, the executive order has been temporarily stayed but is still in play.

This decision to sign or not sign was within my responsibilities as APS President, and the path forward seemed clear to me in the moment. There was no requirement for me to deliberate with or seek approval from the rest of the board, the APS Publications Committee, our team of editors, or the broader APS membership. Nevertheless, some actions can be a really, really good idea even if they are not required. Reasonable people can disagree whether signing the letters was the right choice. And guess what? They did.

Almost immediately, I received emails from the chair of the APS Publications Committee and several of our journal editors, voicing serious concerns, particularly about the tone and content of the AAP-led letter. Should we have signed one letter and not the other? Should others have been consulted before APS signed the letters? Should APS retract its signature from the AAP-led letter (if that's even possible), and if so, would a retraction be seen by the current US administration as weakness and undermine the scientific coalition?

A vigorous discussion ensued, occupied the entire winter holiday, and took most of the month of January to resolve. The discussion was anchored in a shared goal of finding a productive way forward — one that honors

When a society that is supposed to serve you signs a letter that appears to uphold a system that you experience as oppressive, it's understandable to feel angry. I totally get this.

APS's ongoing commitment to open and transparent science and its growing international focus, the various concerns with the AAP-led letter, and the threats posed by instituting immediate open access by executive order. For me, it's been a valuable lesson in how to make decisions in the midst of a multivariable problem with competing priorities and obligations.

(Questions and concerns also appeared on Twitter, a forum that I read when I have time but not as part of my APS duties. The tweets quickly led to a petition, which had been signed by about 500 people when this column went to print, protesting APS's signature on the AAP-led letter. Petition and protests are a time-honored tradition in the academy and can sometimes be a useful way to make voices heard. Arguing with each other is, after all, part of our job description.)

The situation, as it unfolded, provided me with the opportunity for a couple of observations that I'd like to share. First, we are a community of scientists who care passionately about psychological science. It's been heartening to learn that most of us share the same larger goal, making a global psychological science open and available to all, even if we disagree on whether I made the best call regarding the signatures.

Second, some of our colleagues feel underappreciated or exploited by today's system of commercial publishing. When a society that is supposed to serve you signs a letter that appears to uphold a system that you experience as oppressive, it's understandable to feel angry. I totally get this. When I was an assistant professor, I thought the whole system of commercial publishing was nuts. I can still hear my younger self in my head: "We write papers for free. We review them for free. We edit journals — a thankless and often painful job full of conflict and discontent — for a pittance. And then we pay to read the papers in print, including our own work. What the ????" Never did I think that I would one day be APS President, let alone be in a position where people perceived me as defending the status quo (rather than preventing a terrible implementation of something that should be done planfully and thoughtfully).

Third, some of our colleagues are deeply frustrated with what they perceive as an apathy toward scientific openness. It's easy to *say* that APS supports open and transparent science across the globe, that we want to give psychology away, but what concretely is APS going to *do* to make that happen? Words are cheap; actions count. I am sympathetic to that sentiment. Nonetheless, I also know that APS remains firmly committed to broadening open access in a way that is responsive to the needs of the scientific community, including undue financial burdens on individual scientists, particularly in an era when grant funding is sparse.

While things might not be moving fast enough for some members' liking, they are moving in the right direction. APS is already engaged in ➡

See this article on psychologicalscience.org for links to the letters and other items cited in this article.

fact-finding and discussions to explore the possibility of making *Advances in Methods and Practices in Psychological Science* a fully open-access journal. And the new APS committee to strengthen and expand open and transparent science is setting its own terms and its own scope, and it will be significantly supported and resourced as it works with other APS committees and the broader scientific community to get the job done. These are just first steps.

When I consider the concerns raised by colleagues, along with my extended discussions with the rest of the board, I honestly wish I'd had the benefit of these considerations before making my decision to approve APS's signature on the AAP-led letter. I don't know if these considerations would have changed my decision; to claim otherwise is hindsight bias. I *can* say what I would do if faced with the same decision right now: I would not give my approval for APS to sign the AAP-led letter. And then, I would be writing this column about how deeply worried I am that the executive order will bring harm to APS and science more broadly. And I would be agonizing over whether I made the right decision.

When it comes right down to it, I honestly did not anticipate that my decision to sign the AAP-led letter would cause some colleagues to question APS's core commitment to psychological science, including open and transparent practices and international participation in the broadest terms. To rectify that impression and provide a much-needed course correction, I have taken two steps. First, I drafted and signed an open letter to you, the APS membership, with the full backing of the board of directors, communicating profound regret — along with an apology — for allowing APS to sign the AAP-led letter. Second, I drafted and signed a letter on behalf of the

APS Board, sent to the Trump Administration, expressing regret for having signed the AAP-led letter. And here, I will offer one further deeply felt apology, specifically to those who wanted a voice in the decision of whether or not to sign the letters but did not have an opportunity to be heard (also see this article online for a message from the board of directors published December 23, 2019). Sure, there was an urgency to the situation that made a thorough discussion difficult, but it was never my intent to leave anyone feeling excluded or disenfranchised by my actions.

A system of full and immediate open access is desirable, but it will require sweeping reforms, so let's proceed planfully. The process will be more complex than we want and may take longer than we wish. For example, under the current commercial system, the cost to publish one article is estimated to be, on average, around \$3,500 to \$4,000, in part because typical profit margins for the publishing industry run around 20 to 30 percent. On the one hand, you might think the cost is set high to serve commercial publishing interests. On the other hand, some of those publishing revenues subsidize activities that are critical to APS's members — from advocating for more grant funding for psychological science at the US National Institutes of Health and US National Science Foundation to supporting student research and offering cutting-edge workshops at the annual convention. If APS lost those revenues, these and other activities would be compromised.

As we look to the future, beyond the difficulties of the moment, let's discuss the pros and cons of various economic models. Once we put an alternative in place, let's test it, and *then* dismantle the current system. Wherever this adventure takes us, it will be better if we face it together as a scientific community. APS welcomes all practical, actionable suggestions for how to broaden open access and encourage international participation. Email us at apsboard@psychologicalscience.org with your most creative ideas. And as we move forward, please watch for future opportunities to participate.

So, there you have it: This is the sort of thing that goes on behind the scenes of a large, diverse society of scientists when an urgent issue drops out of nowhere into your lap one rainy day when you are trying to get some writing done. I hope you found it as interesting to read as it was to live through, particularly if you might want to be president of a scientific society one day. As you can see, a president's job in a difficult situation is to take a holistic view and balance competing concerns. It's also a president's job to admit when she's made a mistake. Whether you agree with my actions or not, I hope you'll be part of the ongoing conversation that will chart APS's future as an unflagging advocate for global psychological science based on open, transparent, and valid scientific practices.

Reference

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APS welcomes practical, actionable suggestions for how to broaden open access and encourage international participation. Email your most creative ideas to apsboard@psychologicalscience.org.

Lisa Feldman Barrett, Northeastern University; and **Stephen Porges**, Indiana University, *The New York Times*, November 28, 2019: The Wisdom Your Body Knows.

Marc Brackett, Yale University; and **Peter Salovey**, Yale University, KQED News, November 20, 2019: Why It's Imperative We All Learn to Be 'Emotion Scientists.'

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George Loewenstein, Carnegie Mellon University, NPR, December 2, 2019: In the Heat of the Moment: How Intense Emotions Transform Us.

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WHY THE OLD LOOK DOWN ON THE YOUNG

Generation after generation, one thing you can count on is people complaining about "kids these days" — but recollections of our own youths may not be as reliable as we'd like to think, writes APS Fellow **Alison Gopnik** (University of California, Berkeley). In fact, research by APS Fellow **Jonathan Schooler** (University of California, Santa Barbara) and APS Fellow **Lee Ross** (Stanford University) suggests that this generational strife may arise in part from how we alter memories of our past selves to match our present priorities.

THE WALL STREET JOURNAL | DECEMBER 5, 2019

Arthur Markman, University of Texas at Austin; **Joseph LeDoux**, New York University; and **Daniel Willingham**, University of Virginia, December 16, 2019: 4 Common but Harmful Myths About How Your Brain Works.

Dan P. McAdams, Northwestern University, *The Atlantic*: After Trump, Will Politics Get Better or Worse?

David Moscovitch, University of Waterloo, Canada; and **Stefan Hofmann**, Boston University, NPR, December 14, 2019: Holiday Parties Make You Squirm? Here's How to Conquer Social Anxiety.

Kristina Olson, University of Washington, *The Seattle Times*, December 9, 2019: Groundbreaking UW Study: Transgender Kids' Gender Identity Is as Strong as That of Cisgender Children.

Ty Tashiro, Author, *The New York Times*, December 11, 2019: What to Do About an Overtalker.

Simine Vazire, University of California, Davis, NPR, December 13, 2019: Can a Research Accelerator Solve the Psychology Replication Crisis?

Jamil Zaki, Stanford University, *The Washington Post*, December 1, 2019: In This Angry and Stressed-Out Time, Research Says We Can Learn to Be Kinder.

APS SPENCE AWARDS ANNOUNCED

Eight psychological scientists have been selected as the recipients of the 2020 APS Janet Taylor Spence Award. The recipients are **Dylan Gee** (Yale University), who studies the neural mechanisms underlying emotion, anxiety, and stress-related disorders; **Samuel Gershman** (Harvard University), who studies computational modeling and reinforcement learning; **Hyowon Gweon** (Stanford University), who studies social learning and causal inferences; **Kathryn Humphreys** (Vanderbilt University), who studies the effects of early adver-

sity, foster care, and institutional care; **Luke Hyde** (University of Michigan), who studies the developmental psychopathology of antisocial behavior in youth; **Nour Kteily** (Northwestern University), who studies how dehumanization contributes to in group/out group; **Amitai Shenhav** (Brown University), who studies computational neuroscience, decision-making, and neuroeconomics; and **Jennifer Trueblood** (Vanderbilt University), who studies how context influences risk/reward decision making.

Named after APS's first elected President, the Spence Award recognizes early-career researchers who have made transformative contributions to the field of psychological science, such as establishing new paradigms within a subject area or advancing research that cuts across fields of study. The 2020 Spence Award recipients will be profiled in an upcoming issue of the *APS Observer* and will be recognized at the 32nd APS Annual Convention in Chicago, May 21–24, 2020. ●

FIVE APS FELLOWS ELECTED TO SEP

A Guggenheim Fellow and a co-founder of an influential psychological theory are among five APS Fellows newly elected to the Society of Experimental Psychologists (SEP), one of the most prestigious honorary societies in scientific psychology. Founded in 1904, SEP admits about 6 new members annually from among the leading experimentalists in North America

APS Fellows **Diane Beck**, **Charles Brainerd**, **Steve Sloman**, **Joshua Greene**, and **Fei Xu**, along with three other psychological scientists, have been selected as 2020 SEP Fellows. In addition, Vanderbilt University researcher **Jennifer Trueblood**, named an APS Rising Star in 2015 and a 2020 APS Janet Taylor Spence Award recipient (see article above), is receiving the SEP Early Investigator Award.

Beck, a psychology professor and head of the Attention and Perception Lab at the University of Illinois, studies the cognitive processes and neural structures that enable and limit our visual representations of the world. Her lab uses a variety of approaches, including

functional magnetic resonance imaging, behavioral methods, and transcranial magnetic stimulation.

Brainerd, a professor in Cornell University's College of Human Ecology, studies human memory and decision-making, statistics and mathematical modeling, cognitive neuroscience, learning, intelligence, cognitive development, false memory, learning disability, and child abuse. He is best known for developing, with APS Fellow **Valerie F. Reyna**, the fuzzy-trace theory — a general model of how memory influences reasoning and how reasoning influences memory.

Greene, a professor of psychology at Harvard University, studies the automatic and controlled processes that support moral judgement and decision-making. His lab uses a combination of behavioral experiments and functional neuroimaging to investigate the role of this dual-process framework in religious belief, cooperation, and conflict resolution, among numerous other phenomena.

Sloman, a professor of cognitive, linguistic, and psychological sciences at

Brown University, studies how our habits of thought influence the way we see the world, and how the way we believe the world works influences our evaluations of and reactions to events. He is the author, with psychological scientist Philip Fernbach, of the 2017 book *The Knowledge Illusion, Why We Never Think Alone*.

A psychology professor at the University of California, Berkeley, Xu studies cognitive and language development from infancy to middle childhood, using behavioral experiments and computational models to understand how young children learn so fast and so well. Xu was named a Guggenheim Fellow in 2018.

Trueblood uses a joint experimental and computational modeling approach to study human judgment, decision-making, reasoning, and memory. She investigates how people make decisions when faced with multiple alternatives; how dynamically changing information affects decision processes; how people reason about complex causal events; and how different perspectives, contexts, and frames can interfere with decision-making and memory. ●

INTERRACIAL CONTACT IN MEDICAL SCHOOL PREDICTS LESS RACIAL BIAS

We trust doctors to have our best interests at heart, but physicians are just as capable of prejudice as anyone else, and these biases have been found to significantly reduce the quality of care an individual may receive. But research in *Psychological Science* suggests that increasing opportunities for interracial contact with other practitioners during medical school may help reduce physicians' racial bias.

“Given the critical importance of these medical encounters (e.g., determining the course of treatment for cancer; Penner et al., 2016), even limited reductions in physicians' anti-Black bias have the potential to improve the health of and, potentially, save the lives of a significant number of Black people,” according to Ivuoma N. Onyeador, APS Fellow **John Dovidio** (both of Yale University), and colleagues. (Onyeador et al., 2020, p. 28).

To investigate the relationship between interracial contact and physician bias, Onyeador and colleagues followed 3,134 physicians in training who were White, Asian, Native American, and of unknown ethnicity throughout 6 years of medical school and residency training. The physicians, who were led to believe they had been recruited for a study on changes in medical students' quality of life, were surveyed on both their explicit and implicit racial attitudes at three time points — during their first and fourth years of medical school and during their second year of residency.

For the explicit, conscious attitudes measure, they reported how warm or favorably they felt toward Black and White people on a 101-point scale. For the implicit, unconscious attitudes measure, they completed a standard Implicit Association Test (IAT), which measures whether people respond more quickly to Black or White words and

images when Black and White have been associated with “good” or “bad” words. The students were required to associate images and words as either Black/good and White/bad, or Black/bad and White/good. Their average response times and error rates for each of the four pairings were then used to compute a measure of their implicit racial bias. Participants whose average response time for the Black/good pairing was significantly longer than their response time for White/good, for example, could be said to have an implicit preference for White people.

Participants were also surveyed on the quality of their contact with Black people before medical school — that is, how favorable they perceived their interactions to have been with this group — as well as during medical school and residency — that is, how favorable their interactions were with Black medical students, faculty, physicians, and administrative staff. Additionally, participants reported on the racial climate of their medical school, including whether they had observed instances of racial bias by faculty and whether students were encouraged to learn from instances of unintentional bias. They also estimated how many hours of diversity training they had participated in during this time.

Using these 6 years of longitudinal data, Onyeador and colleagues found that the only factor that positively influenced medical students' explicit and implicit attitudes about race during their residency was the perceived favorability of their interactions with Black people before and during medical school. Students who described their medical school as fostering respect for cultural differences also reported more positive explicit attitudes.

The effect was small but consistent and could meaningfully impact the

quality of care Black individuals receive in medical settings, Onyeador and colleagues explain.

Estimated hours of diversity training, however, were found to have no relationship to medical students' racial attitudes during their residency — potentially because of the backlash that these programs can elicit in unwilling participants, the researchers write. Diversity training is an \$8 billion industry, Onyeador and colleagues note, but research suggests that while this training may help physicians to achieve cultural competency, its effects on racial bias itself are limited.

“Although the effects of experimental intervention to reduce implicit bias rarely last beyond 24 hours, long-term personal and educational experiences can have an enduring impact,” the researchers conclude.

Students who reported more positive explicit racial attitudes at the beginning of medical school were also more likely to report more favorable contact with Black people during medical school and residency, suggesting a cyclical relationship between these factors.

These findings highlight the potential for interracial contact to reduce bias in adulthood, as well as the need for more evidence-based evaluation of diversity training programs, the researchers write. ●

Reference

Onyeador, I. N., Wittlin, N. M., Burke, S. E., Dovidio, J. F., Perry, S. P., Hardeman, R. R., . . . van Ryn, M. (2020). The value of interracial contact for reducing anti-Black bias among non-Black physicians: A cognitive Habits and Growth Evaluation (CHANGE) Study report. *Psychological Science*, *31*, 18–30. <https://doi.org/10.1177/0956797619879139>

FOR NARCISSISTS, SOCIAL STATUS OVERSHADOWS ALL

Social status shapes the lives of even the most humble among us. In group settings, people with greater wealth, intellect, and physical prowess tend to occupy the top of the social hierarchy, basking in the respect and influence this position affords them. But while humans are fundamentally motivated to boost their social status to some degree, narcissistic individuals are driven to climb the social ladder at all costs. A review of the research by **Stathis Grapsas** (Tilburg University, the Netherlands) and colleagues in *Perspectives in Psychological Science* may provide an explanation for how and why.

“Narcissists are driven by a dominant status motive, meaning that it overshadows other motives, such as the motive for affiliation,” the authors write.

According to the researchers’ status pursuit in narcissism Status Pursuit in Narcissism (SPIN) model, narcissism — a personality trait characterized by a heightened sense of self-importance and entitlement to special treatment — is the result of individual differences in the regulatory processes and behaviors surrounding the pursuit of social status.

Because of the dynamic nature of social hierarchies, the motive for social status can only be satisfied briefly, the researchers explain. This means that even high-status individuals must continually take actions to maintain or improve their position — and through it, their access to resources, social influence, and mating opportunities.

“If individuals engage in these status-pursuing processes repeatedly, then these processes might crystallize into [personality] traits over time,” the researchers explain. Unlike the average person, however, a narcissistic individual’s drive to pursue social status

isn’t tempered by the need to maintain close relationships.

This plays out through a process consisting of situational selection, vigilance, appraisal, and response execution. Narcissists tend to select social situations in which they are likely to increase their status, the researchers write, paying vigilant attention to the social cues that indicate the status of others. They then use this information to appraise which of two strategies is most likely to increase their status: self-promotion or other-derogation.

Narcissistic individuals often go out of their way to showcase their talents and abilities as a way of increasing their own status, the researchers explain. When a narcissist perceives someone as a threat to their social success, however, they may instead choose to employ a more combative set of behaviors, such as insults and intimidation, as a way of decreasing their supposed opponents’ social standing.

Narcissists’ attempts to worm their way up the social hierarchy without regard for the feelings of others can also result in serious fallout — even for their own lasting well-being. To examine how narcissistic individuals mismanage these social dilemmas, APS Fellow **W. Keith Campbell**, **Amy B. Brunell**, and colleagues tasked 232 university students with running a fictitious forestry company. Students were informed that they represented one of four forestry companies operating in this area, and that while they could harvest up to 10 hectares of forest per year, the remaining foliage would grow back at a rate of just 10% per year. Each set of four participants then privately reported how much they wanted to harvest over 25 rounds, or until the forest was depleted.

Participants who scored higher on the Narcissistic Personality Inventory (which asked individuals to rate the truth of statements such as “If I ruled the world it would be a much better place”) reported a higher desire for profit, and groups of participants who scored higher for narcissism on average were found to deplete the forest more quickly in the pursuit of short-term profit.

“Narcissism provided a benefit to the self, but at a long-term cost to other individuals and to the commons,” Campbell and colleagues write.

In addition to neglecting the needs of others, individuals high in narcissism — commonly considered one of the “dark triad” of personality traits, alongside Machiavellianism and psychopathy — are often arrogant, quarrelsome, and exploitative. Just because someone has a highly narcissistic personality, however, does not necessarily mean that they would meet the criteria to be formally diagnosed with narcissistic personality disorder, a distinct clinical condition not explored in this body of research, Grapsas stresses.

“Narcissism manifests itself as a stable and consistent cluster of behaviors in pursuit of social status,” he and his colleagues conclude. “Individual differences in status pursuit are at the heart of individual differences in narcissism.” ◉

See this article with related references at [psychologicalscience.org](https://www.psychologicalscience.org).

In "Observations," the names of APS Fellows and current APS members are denoted by boldface type.

AIMING TO "CHANGE THE CULTURE," NIH REPORT TARGETS SEXUAL HARASSMENT IN SCIENCE

One of the world's largest funders of psychological science is taking new steps to curb sexual harassment in science.

This past December, a working group comprising university scientists, industry representatives, and National Institutes of Health (NIH) leaders presented to NIH Director Francis Collins and the NIH Advisory Committee to the Director (ACD) a report recommending policies that might stop sexual harassment in science. Titled "Changing the Culture to End Sexual Harassment," the 66-page report's broad series of recommendations to NIH leadership are also of potential interest to members of the wider scientific community, including psychological scientists.

The new report includes recommendations centered on four overarching themes. The first theme, "Increase Transparency and Accountability in Reporting of Professional Misconduct, Especially Sexual Harassment," recommends that NIH treat professional misconduct, including sexual harassment, as seriously as research misconduct and establish ways that NIH-funded individuals can report sexual harassment to NIH. It further recommends that NIH establish standard operating procedures and formal mechanisms of accountability when findings of misconduct are identified.

The second theme, "Establish Mechanisms for Restorative Justice," urges NIH to create new incentives and funding opportunities to help protect and restore careers of those who have been affected by sexual harassment. It also advises that NIH work with universities and other institutions to



develop safe harbors for those who have suffered from professional misconduct. It recommends that institutions provide psychological support services from outside the institution to those who have been harmed.

The third theme, "Ensure Safe, Diverse, and Inclusive Research and Training Environments," advises that NIH develop specific expectations and requirements for maintaining safe training and research environments. It further recommends that NIH-funded institutions require that grantees receive anti-sexual harassment training.

The fourth theme, "Create System-wide Change to Ensure Safe, Diverse, and Inclusive Research Environments," asks NIH to develop mechanisms that help promote diversity and inclusion. This theme includes such recommen-

dations as ensuring that grant review and funding decisions are free of bias. The report calls for further research and evaluation of anti-harassment, cognitive bias, and bystander intervention training.

The working group's recommendations received a positive reception from NIH Director Collins. He thanked the group for its work and noted that NIH was already working

View a copy of the full, detailed report on the NIH website at acd.od.nih.gov/documents/presentations/12122019ChangingCulture_Report.pdf. A nine-page executive summary is also available.

“Science thrives in safe, diverse, and inclusive research environments, and sexual harassment goes against the very core of what NIH and the institutions we fund represent.”

—NIH Director Francis Collins in a December 12, 2019, statement

to implement some of provided recommendations.

“Today, after months of intense meetings that included discussions and listening sessions with individuals

targeted by sexual harassment, the working group delivered their report to the ACD,” said Collins in a written statement following the presentation.

“The ACD advised me to accept it. I am supportive of these solid recommendations. NIH will make every effort to adhere to the vision of the working group by seeking to implement the recommendations provided,” Collins continued.

As NIH works to strengthen its policies against sexual harassment, it joins the National Science Foundation, which in 2018 announced its own steps toward ending harassment in science. NSF’s policies, lauded as forward-thinking at the time they were issued, among other things require organizations that receive grants from NSF to report findings of sexual harassment to NSF. The funding agency policies allow it to remove investigators from grants, reduce award funding, or end grants as a result of the information that is reported.

NIH policy changes will come at a time when the broad scientific community is looking to eliminate the problem

and impacts of sexual harassment. NIH’s own data speak to the degree to which individuals in the scientific community experience harassment. At the same meeting, NIH senior leadership presented the results of a workforce survey that took place at NIH in early 2019; nearly half of all NIH workers responded to the survey. According to the results of the survey, one in five respondents had experienced at least one incident of sexual harassment in the past year, and women from vulnerable populations — those who were trainees, younger, sexual and/or gender minorities, or with disabilities — were especially likely to report harassment.

As policies designed to end sexual harassment emerge from NIH or any other science funder, APS will continue to communicate updates with the psychological science community. ●

— Andy DeSoto,
APS Director of Government Relations

Keep up with federal research, funding, and policy for psychological scientists at psychologicalscience.org/policy.

WHITE HOUSE REQUESTS INPUT ON DATA REPOSITORIES

Advise the Office of Science and Technology Policy on managing and sharing data

The White House Office of Science and Technology Policy (OSTP) is looking to hear from the public on what characteristics make data repositories useful for managing and sharing data, and psychological scientists should consider submitting their opinions.

OSTP has developed a draft document that identifies desirable charac-

teristics of repositories for managing and sharing data resulting from federally funded research. This short list of draft characteristics addresses such issues as long-term sustainability and security of data storage, opportunity for reuse of data, and also proposes a set of special considerations for repositories that store human data.

Given that many psychological scientists are at the forefront of data sharing and working with data repositories, APS encourages interested members to submit a response following the instructions here: federalregister.gov/d/2020-00689. Responses should be submitted by March 6, 2020. ●

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AND SAVE**

APS 2020 At a Glance

THURSDAY, MAY 21

- Skill Building Workshops
- APS-STP Teaching Institute
- Clinical Science Forum
- Fred Kavli Keynote Address
- Opening Reception
- APSSC Student Social

SATURDAY, MAY 23

- Exhibit Hall Open - stop by the APS Booth
- Poster Sessions
- Bring the Family Address
- Award Programs
- Cross-Cutting Theme Program
- Invited Talks, Addresses, and Symposia
- Saturday Keynote Address
- Saturday Night Reception

FRIDAY, MAY 22

- Exhibit Hall Open- stop by the APS Booth!
- Poster Sessions
- Award Programs
- Cross-Cutting Theme Programs
- "Naked Truth" Student Events
- Symposia
- Presidential Symposium
- Friday Night Reception

SUNDAY, MAY 24

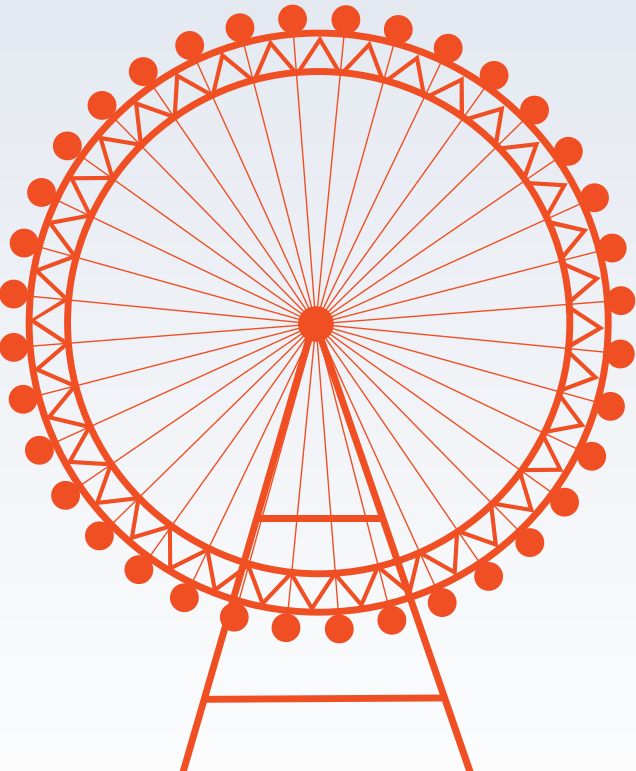
- Symposium Sunday
- Poster Sessions
- Skill Building Workshops

CROSS-CUTTING THEME PROGRAMS

These programs cut across psychological science's disciplines, feature high profile speakers, and create networking opportunities for a broad audience.

- Global and Cross-Cultural Projects in Psychological and Brain Science (Friday)
- Risk and Resilience During Emerging Adulthood (Friday)
- Biological Embedding of Early Life Adversity (Saturday)

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32nd APS Annual Convention

FEATURED SPEAKERS



Fred Kavli Keynote Address
Ways to Think About the Brain and Cognition

György Buzsáki

New York University, School of Medicine

Buzsáki is known for many breakthrough “firsts.” His most influential work, the two-stage model of memory trace consolidation, revealed precisely how new information is reinforced while we sleep. His groundbreaking findings and advances in methodologies have earned him a host of honors, including the prestigious Brain Prize in 2011.



Presidential Symposium
Visceral Politics

Lisa Feldman Barrett (Chair)

Northeastern University

APS President Lisa Feldman Barrett shifted the paradigm when she found evidence that emotions are constructed, in the moment, from a combination of environmental context, bodily sensory information, and our past experiences. She was honored with the prestigious Guggenheim Fellowship in 2019.



Saturday Keynote Address

Jennifer L. Eberhardt

Stanford University

Eberhardt, author of *Biased: Uncovering the Hidden Prejudice That Shapes What We See, Think, and Do*, examines racial bias and its consequences, particularly the ways in which bias expresses itself outside of our conscious awareness. In 2014 she received the illustrious MacArthur Fellowship – often referred to as the “Genius Grant.”

Eberhardt will sign copies of her book at the APS Booth in the Exhibit Hall.



Bring the Family Address
Becoming Human: How (and How Early) Do Infants Link Language and Cognition?

Sandra R. Waxman

Northwestern University

Waxman explores how we form some of our most profoundly fundamental concepts, such as what it means to be alive. She received the renowned Guggenheim Fellowship in 2007.

Sinan K. Aral

Massachusetts Institute of Technology

Eran Halperin

The Hebrew University of Jerusalem, Israel

Manos Tsakiris

Royal Holloway, University of London, United Kingdom

Jeanne L. Tsai

Stanford University

Hanna Rosin (Discussant)

NPR

Alix Spiegel (Discussant)

NPR

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Award Programs

JAMES MCKEEN CATTELL FELLOW AWARD ADDRESSES

The APS James McKeen Cattell Fellow Award recognizes APS members for a lifetime of outstanding contributions to the area of applied psychological research. Each recipient will deliver an Award Address at APS 2020.



The Interpersonal Theory of Suicidal Behavior

Thomas E. Joiner

Florida State University



Promoting Positive Youth Development: Plasticity, Specificity, Non-Ergodicity, and Contributing to Social Justice Among Global Youth

Richard M. Lerner

Tufts University

WILLIAM JAMES FELLOW AWARD ADDRESSES

The APS William James Fellow Award honors APS members for their lifetime of significant intellectual contributions to the basic science of psychology. Each recipient will deliver an Award Address at APS 2020.



Neural Mechanisms of Memory and Imagery

Neil Burgess

University College London, United Kingdom



Mindsets: Adventures, Obstacles, Surprises, and Lessons

Carol S. Dweck

Stanford University



The Essential Child: What Children Can Teach Us About the Human Mind

Susan A. Gelman

University of Michigan



Foundations of Social Cognition: Self-Other Mapping and the 'Like-Me' Hypothesis

Andrew N. Meltzoff

University of Washington



APS 2020

APS MENTOR AWARDS AND PANEL DISCUSSION ON MENTORING

The APS Mentor Award recognizes psychology researchers and educators who have shaped the future directions of science by fostering the careers of students and colleagues. The 2020 APS Mentor Award recipients will reflect on their experiences mentoring emerging scientists during this panel discussion. This symposium will also include an awards presentation.



Toni C. Antonucci
University of Michigan



Elizabeth Ligon Bjork
Robert A. Bjork
University of California, Los Angeles



Photo by Bruce Gilbert

E. Tory Higgins
Columbia University

APS JANET TAYLOR SPENCE AWARD SYMPOSIUM

The APS Janet Taylor Spence Award recognizes APS members who have made transformative early career contributions to psychological science. This symposium will include an awards presentation and will feature talks by the 2020 Spence Award recipients:

Dylan Gee
Yale University

Luke Hyde
University of Michigan

Samuel Gershman
Harvard University

Nour Kteily
Northwestern University

Hyowon Gweon
Stanford University

Amitai Shenhav
Brown University

Kathryn Humphreys
Vanderbilt University

Jennifer Trueblood
Vanderbilt University

Chair: **Leah Somerville**, *Harvard University*, 2014 Spence Award Recipient



What if every introductory psychology textbook is wrong about the role of the most basic and fundamental components of psychological science? For decades, textbooks have taught that there is a clear line between perception — how we see, hear, touch, taste, and smell — and higher-level cognitive processes that allow us to integrate and interpret our senses. Yet emerging interdisciplinary research is showing that the delineation between perception and cognition may be much blurrier than previously thought. Top-down cognitive processes appear to influence even the most basic components of perception, affecting how and what we see. New findings also show that our so-called low-level perceptual processes such as smell may actually be much smarter than previously thought. Discerning exactly what is top-down or bottom-up may be far more complicated than scientists once believed.

By Alexandra Michel

Neuroimaging Mixing Bowl

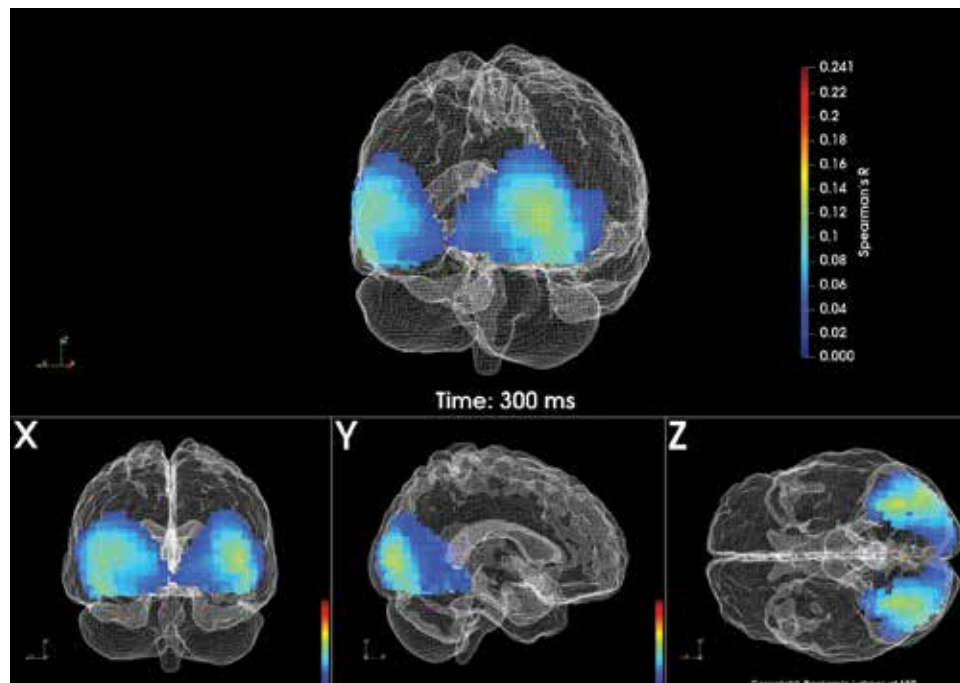
New advances in neuroimaging technology are allowing researchers to observe perceptual processes such as vision and touch in real time as subjects view images, listen to audio, or run their fingers over tactile objects.

Functional MRI (fMRI) measures changes in blood flow in the brain, allowing researchers to observe the specific regions and structures of the brain that are active during a task. However, fMRI operates on a time scale that is far slower than the millisecond-by-millisecond speed of the brain. Another imaging technology, magnetoencephalography (MEG), utilizes sensors around a participant's scalp to measure activity in the brain. MEG allows nearly real-time recording of extremely fast brain activity, but lacks the precision of fMRI for pinpointing which structures in the brain are active.

APS Fellow Aude Oliva, a senior research scientist in computer vision, neuroscience, and human-computer interaction at the MIT Computer Science and Artificial Intelligence Laboratory, is working on a promising new method of combining fMRI and MEG data to allow researchers to observe both when and where visual perception occurs in the brain. The main issue with combining fMRI and MEG, Oliva explained, is that the two methods provide different types of data from different types of sensors.

“Current [noninvasive] brain imaging techniques in isolation cannot resolve the brain's spatio-temporal dynamics, because they provide either high spatial or temporal resolution but not both,” Oliva and colleagues Radoslaw Martin Cichy (Freie Universitat Berlin)

This article is based in part on an Integrative Science Symposium at the 2019 International Convention of Psychological Science (ICPS) in Paris. Learn about ICPS 2021 in Brussels at psychologicalscience.org/conventions/icps.



MIT research scientist **Aude Oliva** is working on a new method of combining functional MRI and magnetoencephalography data that lets researchers observe both when and where visual perception occurs in the brain.

and Dimitrios Pantazis (Massachusetts Institute of Technology) wrote in a 2016 paper published in *Cerebral Cortex*.

The new method that Oliva references provides researchers with the ability to observe visual processing at the speed of milliseconds and the resolution of a millimeter.

In one study, Oliva and colleagues created a massive database of visual perception neuroimaging by having 16 participants complete identical tasks in both an fMRI and an MEG machine. This unique data set allowed the research team to build a matrix comparing spatial data from fMRI and the temporal data from MEG.

“We use representational geometry, which is this notion of looking at how similar two or more stimuli are in the space of your data,” Oliva explained.

Findings from this study provide new insights on how the most basic components of visual perception, like shape or color, lead to higher-level cognitive processes related to categorization and memory. In a 2014 paper published in *Nature Neuroscience*, Oliva and colleagues found that the flow of brain activity from seeing the object to recognizing and classifying it as either a plant or animal all occurred with blistering speed — just 160 milliseconds.

Though Oliva noted that these experiments cannot distinguish between bottom-up and top-down processing, there were some surprising findings. Some brain areas expected to become active relatively late in visual object recognition became active much earlier than anticipated.

This novel neuroimaging approach allows researchers to create spatio-temporal maps of the human brain that also include the duration of neural representations that can help to guide theory and model architecture, Oliva noted.

Distinguishing Between Seeing and Thinking

Recently, a large body of published research has shown that our “higher order” cognitive processes such as beliefs, desires, and motivations can



exert significant top-down influences on basic perceptual processes, altering our basic visual perception. However, Yale University psychology professor and APS Fellow Brian Scholl insists that perception can proceed without any direct influence from cognition.

Scholl leads the Yale Perception and Cognition Laboratory, where he explores questions about how perception, memory, and learning interact to produce our experience of the world. In a bold 2016 paper coauthored with Chaz Firestone (John Hopkins University), he wrote: “None of these hundreds of studies — either individually or collectively — provides compelling evidence for true top-down effects on perception.” Scholl and Firestone said that basic visual perception is in fact much smarter than most researchers believe.

“We try to demonstrate how this is not just a matter of semantics, but these are straightforward empirical questions,” Scholl said at an Integrative Science Symposium at the 2019 International Convention of Psychological Science.

According to Scholl, causal history is just one example of a phenomenon that is widely considered paradigmatic of higher-level thinking but that really has a basis in low-level visual perception. For example, if you see a cookie with a bite taken out of it, you implicitly understand that the original shape of the cookie has been altered by events in the past, he said.

In a study published in *Psychological Science*, Scholl and lead author Yi-Chia Chen (Yale University) used an elegantly simple series of animations of square shapes that had “bites” taken out of them. When the initial square had missing pieces that inferred a causal history, like a cookie missing a bite shape rather than missing a triangle, participants perceived the change in shape as gradual even when the animation showed an instantaneous change.

“When we draw the distinction between seeing and thinking, we can realize that perhaps the roots of this kind of representation may lie in low-level visual perception,” Scholl explained.

In another series of experiments, Scholl and Firestone used intuitive physics to show that people could tell within just 100 milliseconds whether a tower of blocks was unstable and about to fall over.

“When you look at a phenomenon, at a stimulus like this, I find that I see physics seemingly in an instant. You just have a visceral sense that doesn’t seem to require much thought, for example, for how stable that pile of plates is, whether it’s going to fall, perhaps how quickly it’s going to fall, what direction it’s going to fall,” Scholl said.

A Joint in Nature

New research on the top-down influence of cognition on perception has led to new questions from scientists about whether there truly is a “joint in nature” between cognition and perception.

“Now in philosophy, just as in psychology, there is a long history of regarding cognition and perception as basically the same thing,” said Ned Block, a professor of philosophy, psychology, and neural science at New York University.

Block pointed to evidence from perceptual science that supports a distinct joint between perception and cognition. The solitary wasp, a species of wasp that does not live in hives, is one example of evidence for pure perception in biology, he said. Though the wasps have excellent visual perception abilities, that perception is noncognitive and nonconscious.

When it comes to the question of defining where perception ends and cognition begins in humans, Block points to the work of Anna Franklin, a professor of visual perception and cognition at the University of Sussex. Franklin has conducted extensive research on infants’ color perception.

Although the colors of the rainbow are a continuous band of wavelengths, humans perceive color categorically — we break the continuous spectrum up into blocks of distinctive color groups. Using studies of eye movement and gaze, Franklin and colleagues found that infants can perceive color categories by the age of 4 to 6 months. Yet a body of research suggests that infants don’t begin to develop concepts of color until they’re around a year old.

Block cited a 1980 child speech and language study from APS Fellow Mabel Rice (University of Kansas) in which children as old as 3 took more than 1,000 learning trials over several weeks to learn the words “red” and “green.”



Yale psychology professor **Brian Scholl** says causal history is an example of a phenomenon based in low-level visual perception, rather than the higher-level thinking widely attributed to it.

Even Charles Darwin noted that children seem to have a difficult time learning words for color: “[I] was startled by observing that they seemed quite incapable of affixing the right names to the colours in coloured engravings, although I tried repeatedly to teach them. I distinctly remember declaring that they were colour blind,” Darwin wrote about his children in 1877.

“The idea is that 6- to 11-month-old infants have color perception without color concepts and this shows that color perception can be nonconceptual,” Block said. “And I think the simplest view is that all perception is nonconceptual.”



NYU professor **Ned Block**: “I think the simplest view is that all perception is nonconceptual.”

Smart Sensory Neurons

John McGann’s work uses cutting-edge optical techniques to explore the neurobiology of sensory cognition in smell. McGann, a professor of psychology at Rutgers University, uses the olfactory system as a model to investigate neural processing of sensory stimuli.

In a recent series of experiments, McGann was interested in looking at cognitive processing at the earliest stages of perception — at the level of sensory neurons themselves.

For this research, McGann’s lab used genetically engineered mice. A little window was implanted in each mouse’s skull over the olfactory bulb where the brain processes scent, allowing researchers to see the mouse’s brain light up in reaction to odors.

“Not metaphorically light up; they literally light up and you can see it through the microscope,” McGann explained.

The genetically engineered mice were exposed to a specific smell at the same time they experienced a painful shock. Not only did mice start showing typical fear-response behaviors after getting a whiff of the shock-associated odor, but the pattern of activation in olfactory bulb neurons was visible; exposure to the fear-associated odor led to substantially more neurotransmitters being released from the olfactory sen-

sory neurons compared with baseline levels before exposure to the painful shocks.

“So essentially, it was like the information coming into the brain from the nose already had the memory of bad things incorporated into it,” McGann said in a *Science* podcast interview.

In another experiment, mice were exposed to about a dozen rounds of a series of lights and audio tones before an odor. On trials in which researchers skipped over the anticipated audio tone, olfactory sensory nerves’ response to the odor was much smaller. This was unexpected because olfactory sensory neurons activate so early in sensory processing — they are physically contacting the odor as it enters the nasal mucosa, McGann explained.

“So how could the olfactory sensory neurons know all this stuff about shocks and lights and tones?” he asked.

These axons are surrounded by a population of interneurons at the location where they enter the brain, theoretically connecting these regions to many other areas of the brain. So even though the central nucleus of the amygdala doesn’t connect to the olfactory system, McGann and colleague Cynthia Fast (APOPO, a nonprofit in Tanzania) found that the amygdala is still part of a circuit where the nerve terminals in the nasal mucosa are connected through a series of interneurons.

“This means that maybe there’s no such thing as a purely ‘bottom-up’ odor representation in the mouse brain because this is the entry to the mouse brain,” McGann elaborated.

Learning What to Ignore

Thoughts of learning and decision-making tasks may conjure images of a rat learning whether to push a lever on the basis of a light turning on or off. But this is not at all what decision-making in the real world actually looks like, according to Yael Niv, a professor at the Princeton Neuroscience Institute at Princeton University. Just think about a mundane real-world task such as crossing the street. There are oncoming cars, parked cars, other pedestrians, crosswalks, and the countdown of a streetlight.

If our task is to cross the street, we might attend to the speed and distance of oncoming cars while ignoring their colors. Alternatively, if we’re trying to hail a taxi in New York City, we need to pay attention to spot the telltale yellow used by taxis. But how do we learn how to sort out the factors that are relevant or irrelevant in such a cluttered scene? ➡

“All of learning is generalization because you never actually cross the same street twice in the same exact configuration, so no two events are ever exactly the same,” Niv explained. “The question that we ask in my lab is ‘how do we learn a representation of the environment for each task that will support efficient learning and efficient decision-making?’”

In order to better understand how we learn what to ignore, Niv’s lab has used a task called the dimensions task. Participants in an fMRI scanner are shown sets of stimuli with different dimensions (i.e., color, shape, texture). To earn a reward, they must learn which item to select out of the set. Features from only one relevant dimension — assigned by the researchers — determine the probability of reward. The rub is that participants are not told ahead of time what dimension is relevant and what target feature will get them the reward.

“So this is kind of like crossing the street in the sense that you can ignore a bunch of stuff and concentrate only on one dimension — either color, or shape, or texture. The question is how does the human brain learn this,” Niv explained.

Niv then uses this trial-by-trial choice data to develop computational models that reflect participants’ learning and decision-making strategies. In 10 years of working with this task, the Niv lab has determined that participants don’t appear to be using simple reinforcement learning, Bayesian inference, or simple hypothesis testing, she said. Instead, the best model uses what they call *feature reinforcement learning plus decay*: After each trial, the value of each of the chosen features is updated and adjusted to reflect any prediction errors, while all other values are decayed toward zero, to mimic less attention to those.

“What I’m trying to understand is how cognition shapes what we attend to and how we decide what to attend to,” Niv explained. “What we have shown so far is that attention constrains what we learn about, and we consider this a feature, not a bug; by constraining learn-

The question that we ask in my lab is "how do we learn a representation of the environment for each task that will support efficient learning and efficient decision-making?"

—Yael Niv, Princeton Neuroscience Institute

ing to only the dimensions that are relevant to the task, we can learn to cross the street in 10 trials and not in 10,000 trials.” ●

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EXPANDING THE REALM OF EMOTION AND MEMORY

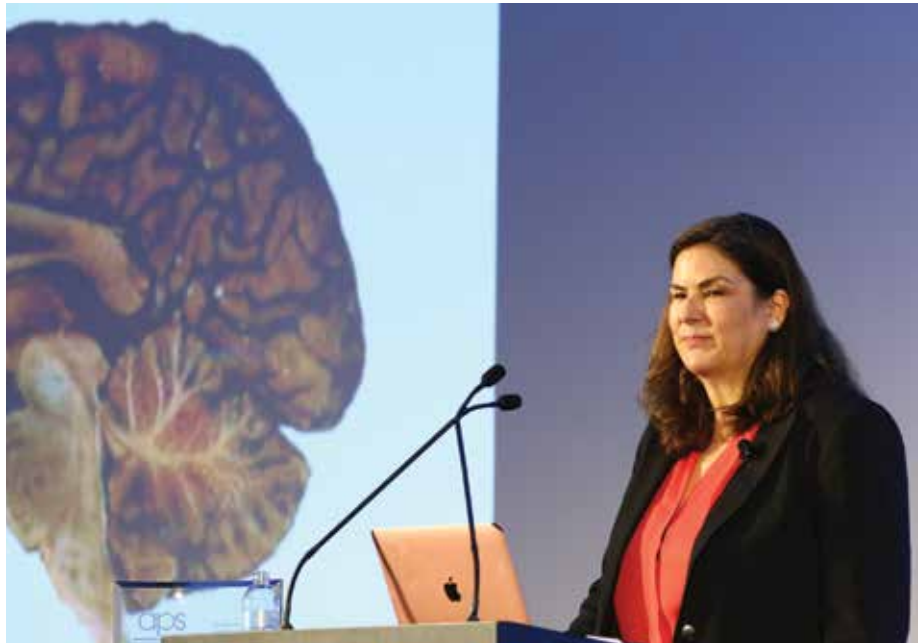
In an evolving career of multidisciplinary research, William James Fellow Elizabeth Phelps has never stopped listening to the data.

Elite athletes, like renowned scientists, often funnel their enormous talents into narrow areas of specialization. Elizabeth Phelps chose the opposite approach. While an undergraduate at Ohio Wesleyan University, she lettered four times in volleyball, ran on the 400- and 1,600-meter relay teams, and was a three-time All-American in the heptathlon, a track-and-field contest combining seven events including long jump, high jump, hurdles, and javelin throw.

More than 30 years later, as an internationally acclaimed researcher and professor of psychology and neural science, Phelps may be best known for her findings about how humans acquire and control threat or fear memories, as well as our ability to rewrite and block fear memories without drugs, bringing significant implications for the treatment of anxiety- and stress-related disorders. But her multidisciplinary body of research has also shed light on the neural systems underlying emotion's influence on episodic memory, connecting those basic mechanisms to decision-making and economics, and probed matters including implicit race bias and perceptual experience.

Phelps's friend BJ Casey, a psychology professor at Yale and APS Fellow, touched on these broad contributions in introducing Phelps for the William James Fellow Award Address at the 31st APS Annual Convention last spring in Washington, DC.

"Her work impacts almost every domain within psychology — affective, cognitive, social, clinical, and also many different disciplines that extend well into neuroscience, law, economics,



Now the Pershing Square Professor of Human Neuroscience at Harvard, **Elizabeth Phelps** became interested in psychology as an undergraduate. "It felt . . . like philosophy with answers."

sociology, and psychiatry," said Casey. Phelps herself credits the influence of many mentors for her wide-ranging interests, along with her simple love of the science. Referring back to her undergraduate years, "I was initially interested in philosophy," Phelps said during her award address. "I liked thinking about human nature. But at the end of these philosophy classes, I would be like, 'What's the answer?' And that's what got me into psychology. It felt to me, a little bit, like philosophy with answers."

An APS Past President, Phelps joined the faculty of Harvard University in 2019 as the Pershing Square Professor of Human Neuroscience. She previously taught at Yale and New York University; has authored or coauthored dozens of peer-reviewed papers, in addition to presenting dozens of abstracts at professional meetings; has received numerous other awards and honors for her work; and is a member of the American Academy of Arts and Sciences and a fellow of the American Association for the Advancement of Science.

An Expanded View of Science

Among Phelps's formative early mentors, the first was APS Fellow Harry Bahrick, a psychology professor at Ohio Wesleyan who introduced the



Phelps's long list of mentors includes APS William James Fellows Michael Gazzaniga, Marcia Johnson, and Joseph LeDoux.

concept of *permastore*—the notion that if you remember something after five years, you essentially remember it for the rest of your life. In a 2007 article in the *Observer*, Bahrck (an APS Fellow and recipient of a 2018 APS Mentor Award) described escaping Vienna with his family from the Nazis before settling in Baltimore, joining the army, and later returning to university for his “first love” of psychology.

“I think I was trying to understand what made people do the god-awful things they did in the country that I’d left,” he said. “Once I took psychology courses, I saw that there was a scientific approach to answering these questions.”

Bahrck’s curiosity influenced Phelps profoundly. She changed her major, ultimately receiving the university’s Outstanding Scholastic Achievement in Psychology Award. And she continued to work with Bahrck after graduating. As a graduate student at Princeton, she coauthored an article with him on how people retained Spanish vocabulary over a period of 8 years. The two concluded that “educators need to identify effective encoding conditions and to make certain that students independently retrieve target information at intervals that are as long as 1 month, over a period of several years, instead of the more typical intervals of 1 to 2 days over periods of from 10 to 15 weeks.”

While at Princeton, where she received her PhD in psychology (specializing in cognition and cognitive neuroscience), Phelps studied memory in amnesic patients, exploring the impact of different types of deficits

on recognition and recall. Her graduate mentors were William Hirst (New School for Social Research) and APS William James Fellow Marcia Johnson (Yale University), a recipient of a 2019 APS Mentor Award, among the most prominent and influential women in memory and brain research. Johnson “taught me to look for and listen to the story my data was telling me,” Phelps said. Regardless of whether the data seemed publishable and was even particularly interesting, “the data is telling a story. That’s something I’ve taken with me throughout my career.”

An early example of finding such a story took place in the early 1990s, a period when Phelps staggered research positions at Dartmouth Medical School, the New School for Social Research, and the Center for Neural Science at New York University (NYU). A project at NYU revisited a 1967 study that exposed rats to the music of Mozart and Schoenberg, finding evidence of exposure learning only for Mozart.

“They hypothesized that perhaps Schoenberg made it too complex,” Phelps said. Her study sought to further measure rats’ preference for sound. To do this, she brought rats upstairs to the lab one by one, in the middle of the night, and exposed them to a single tone at a time.

“We discovered there is no mere-exposure effect in rats,” she said. “And it’s not so robust in humans, either.”

Her time at Dartmouth may have been even more influential. Despite disliking the university’s New Hampshire location, she loved the work and in particular the research of APS William James Fellow and past president Michael Gazzaniga (University of California, Santa Barbara). “The godfather of cognitive neuroscience,” as she described him, was an inspiration on other levels as well. “He has an expansive, fun view of science . . . and understood that life’s too short” for her to limit either her research or her personal happiness, she said. The two continued to work together after she moved to New York.

In the period that followed, Phelps sharpened her focus on emotion and memory, weaving in new knowledge she gained from neuroscience training and neurological models. Among other things, she began what has become a 25-year collaboration with neuroscientist APS William James Fellow Joseph LeDoux (New York University), including studies of the amygdala’s role in fear conditioning, fear acquisition, and fear extinction. She joined the faculty of Yale in 1992, producing research including a study using taboo words that measured skin-conductance response in patients with amygdalar lesions (alongside healthy control subjects). Consistent with previous work by APS William James Fellow and APS Past President James McGaugh (University of California, Irvine), her new evidence suggested that the amygdala plays a role in modulating emotions.

Further explorations of the amygdala’s role followed. In a 2000 study with Yale’s Adam Anderson, Phelps studied the impact of amygdala damage on how we appraise social signals of emotion, primarily those of fear. Working with



Watch Phelps’s award address at psychologicalscience.org/observer/phelps.

a 54-year-old woman with amygdala damage, the two confirmed that the human amygdala is necessary for the physical expression of a learned aversive response in fear conditioning. “We propose that the facial display of emotion is not mediated by the amygdala because it is not an acquired capacity,” the authors wrote.

Phelps returned to NYU in 1999, and during her years there, she produced extensive and wide-ranging research extending to collaborative social neuroscience research on race and implicit attitudes, emotion and decision-making, and much more. But it was her continued research with LeDoux, in a study of the extinction of memory and its potential for treating people with PTSD, phobias, and anxiety disorders, that garnered the most attention. In an interview with NPR’s Ira Flatow, she described taking advantage of new knowledge that memory reconsolidation — the period after a memory is retrieved and stored again — “presents a second opportunity where the memory is vulnerable. It’s fragile. It can be disrupted.” Memory reconsolidation, the research showed, could offer new ways to treat anxiety disorders without drugs.

After 20 years at NYU, Phelps left for Harvard, where her lab research uses a range of scientific methodologies, including behavioral studies, physiological measurements, hormone assays, fMRI, and brain-lesion studies. She had yet to begin the new position when she spoke at the APS convention last year, but looking back as well as ahead, she referred to dozens of individuals who have been central to her

Marcia Johnson, one of Phelps’s mentors, “taught me to look for and listen to the story my data was telling me,” Phelps said. Regardless of whether the data seemed publishable and was even particularly interesting, “the data is telling a story. That’s something I’ve taken with me throughout my career.”

work, including mentors, collaborators, and students and post-docs. “Science is a team sport,” she said. “Meet my team.” ◊

— **Leah Thayer**
APS Senior Director of Communications

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The APS William James Fellow Award honors APS members for their lifetime of significant intellectual contributions to the basic science of psychology. Learn more about the APS Awards Program, including the 2020 recipients, at psychologicalscience.org/awards.

QUOTE OF NOTE

“Some aspects of memory actually get better as we age. For instance, our ability to extract patterns and regularities, and to make accurate predictions improves over time because we’ve had more experience.... If you’re going to get an X-ray, you want a 70-year-old radiologist reading it, not a 30-year-old one.”

—**Daniel Levitan**, *The New York Times*, January 12, 2020

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REMARKABLE RESILIENCY

George Bonanno on PTSD, grief, and depression

Whether illness, disaster, or death of a loved one, most of us go through at least one traumatic event in our lifetimes. The dramatic nature of these experiences has driven psychological scientists to focus on the damage these challenges can cause, particularly in the areas of posttraumatic stress disorder (PTSD), prolonged grief disorder, and major depressive disorder, according to researcher George A. Bonanno — but there's more to the picture.

"I would argue we can't really understand psychopathology if we don't understand the rest of the responses, the normative response," said Bonanno, a professor of clinical psychology at Teacher's College, Columbia University, during his James McKean Cattell Fellow Award Address at the 31st APS Annual Convention last spring in Washington, DC.

Resiliency in the face of traumatic events is often assumed to be rare, to the point that those who don't have a marked reaction to loss or suffering may even be said to be lying to themselves, or otherwise repressing their emotions, Bonanno explained. In reality, people are often remarkably resilient.

In a *Psychological Science* survey of 2,752 New Yorkers, Bonanno and colleagues found that 65% of participants reported one or no symptoms of PTSD 6 months after the September 11, 2001, attack on the World Trade Center. Furthermore, more than half of those who were involved with the 9/11 rescue effort or were in or near the World Trade Center during the attack also reacted with relative resilience, reporting few or no symptoms of PTSD.

A meta-analysis by Bonanno and colleagues of 54 studies on individuals' well-being in the wake of potentially



Research by Columbia clinical psychology professor **George Bonanno** establishes that resilience "is kind of an animal response [that] might be built in."

traumatizing events, including injury, bereavement, natural disaster, and combat experience, confirmed these results: 65% of people showed a trajectory of few or no symptoms of psychopathology related to the event.

"That resilience trajectory is not only most common, it's the majority," Bonanno said.

Similar trajectories are present in animal models as well, Bonanno noted. Rats who have been shocked while listening to a tone continue to exhibit freezing behavior in response to the sound, even when it is no longer accompanied by pain, he explained. But while rats appear to acquire fear at a relatively consistent rate, Bonanno and colleagues found significant variability in how long it can take for this fear to be extinguished. In a set of 58 rats, 57% stopped reacting to the tone after just a few trials without a shock, 32% exhibited a slower rate of extinction, and 10% maintained their fear response after upwards of 20 trials.

"These are rats in a cage being shocked, not humans going about their lives being exposed to potentially traumatic stressors, but they're showing the same kind of heterogeneity, and that really suggests that this is kind of an animal response — that this might be built in," Bonanno said.

Diagnosis by Committee

The diagnostic criteria that designate what does and does not qualify as PTSD is itself somewhat arbitrary, Bonanno granted. Citing work by his former student, Isaac Galatzer-Levy (New York University), he ➔

We tend to think of symptoms as pieces of a disease; "you have symptoms of PTSD, so you've got a little PTSD." But that's completely inaccurate because symptoms are just problems.

—George Bonanno

noted that the diagnostic criteria for PTSD in *DSM-5* allow for 636,120 possible combinations — a tremendous variability within the same disorder. This issue arises in part from the fact that the diagnostic criteria for PTSD are minimally scientific, Bonanno said. These categories are often determined by committee, where arguments and opinions can sometimes overpower empirical evidence.

The binary idea that an individual either does or does not have PTSD is also based on an artificially imposed cutoff line, Bonanno said. While conceptualization of PTSD as something you either do or do not have has led to significant advancements and interventions, it can also limit psychological science's understanding of how individuals respond to trauma, he continued. "If two people don't have a psychiatric disorder, it still doesn't mean they're equally healthy."

Health is more than just the absence of disease, he continued. There's a spectrum of responses within the "non-PTSD" category, and while some resilient individuals who have been through a traumatic event appear about as healthy as the average person, that doesn't mean they're completely symptom-free.

"We tend to think of symptoms as pieces of a disease; 'you have symptoms of PTSD, so you've got a little PTSD.' But that's completely inaccurate because symptoms are just problems," Bonanno explained. "Most of us have one or two symptoms [of psychopathology] at any given time. When we have a lot of them, then we start to have a bigger problem and we can start talking about mental disorders."

Focusing on individuals who do not experience the years of elevated symptoms and distress that characterize chronic psychopathology can help researchers to better understand the full range of human responses to trauma, improving outcomes for everyone, Bonanno said.

The Roots of Resilience

Recruiting resilient individuals for these studies can be difficult; people who aren't hurting often self-exclude because they assume that researchers only want to work with people who are traumatized.

This is part of what makes prospective studies, which recruit participants prior to potentially traumatizing events, so valuable, Bonanno said. Prospective studies also allow researchers to account for preexisting symptoms and to detect novel patterns that wouldn't otherwise be visible.

In a prospective study of 205 caregivers responsible for their spouses prior to their deaths, for example, Bonanno and colleagues found evidence of preexisting depression in participants who responded to their loss with resilience as well as those who experienced symptoms of chronic grief, suggesting that depression itself was not the dividing line between these groups. Among these, there was also a subgroup of participants whose depression improved after their partner's death — oftentimes, because they had been caregiving for a spouse they didn't like, Bonanno said.

Bonanno and Galatzer-Levy further examined the relationship between depression and trauma through a *Psychological Science* study of 2,147 adults before and after they experienced a heart attack. Leveraging existing data from the National Institute on Aging's Health and Retirement Study, the researchers were able to track each participant's symptoms of depression and levels of optimism over a period of 6 to 10 years beginning in 1994.

During that time, individuals who reported an increase in symptoms of depression after their heart attack were found to have a significantly higher mortality rate than individuals who did not experience an increase in these symptoms. Participants who were already experiencing depression before the heart attack but reported no increase in symptoms did not demonstrate this increase in mortality, however, and some even reported that their symptoms improved.

The study also linked optimism and resilience. Participants who had years earlier taken a brighter view of the future — that is, who reported believing they would live past 75 or leave an inheritance — were less likely to develop



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symptoms of depression in the wake of their heart attack, and they were thus less likely to die.

In a similar study of divorced individuals in *Clinical Psychological Science*, Bonanno, Galatzer-Levy, and Matteo Malgaroli found increased mortality only among participants who became depressed *after* their divorce.

“Becoming depressed after either a major health event or a major social stressor is increasing mortality; it takes its physical toll,” Bonanno said.

This appears to be true whether an individual experiences one or multiple potentially traumatic events, he noted. In a study of 1,395 individuals with lung disease, heart disease, stroke, or cancer, Bonanno and colleagues found that participants who became depressed after their illness demonstrated a similarly increased risk of mortality regardless of how many health events they experienced. In addition, participants who experienced more than one health event were just as likely to react with resilience.

“If people are going to be resilient, they’re going to be resilient if more than one bad event happens,” Bonanno said.

Optimism is just one of numerous factors that can contribute to an individual’s likelihood of remaining resilient in the face of trauma. Resilient individuals often possess greater regulatory flexibility, which helps them to develop and apply a more diverse range of coping strategies, Bonanno said. His lab is beginning to investigate the role of genetics as well.

Is there a gene for resilience itself? Not likely, Bonanno noted, but he and his colleagues are finding that individuals who are more resilient have less of a genetic risk for psychopathology. ●

– **Kim Armstrong**

APS Editorial Coordinator

Bonanno's work has also linked optimism and resilience. In one study, participants who had years earlier taken a brighter view of the future were less likely to develop symptoms of depression in the wake of their heart attack, and were thus less likely to die.

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WHAT TO DO WITH DIRTY MONEY?

By C. Nathan DeWall

Tasimi, A., & Gross, J. J. (2020).
The dilemma of dirty money.
*Current Directions in Psychological
Science*, 29, 41–46. [https://doi.
org/10.1177/0963721419884315](https://doi.org/10.1177/0963721419884315)

Money is symbolic, wielding its influence largely through the power that others give it. On its own, money is meaningless, representing paper, coins, and spreadsheet information with little inherent value. When national and global economic systems imbue money with meaning, people can spend, save, invest, and donate. But, according to Arber Tasimi and APS Fellow James Gross (2020), people also perform a moral background check on their money to make sure it isn't dirty before spending, even if they don't remember it.

People prefer having money that did not harm anyone before it takes up residence in their bank account. They work harder at jobs that generate “clean money” than “dirty money” (Stellar & Willer, 2012). Money that harms people directly or indirectly becomes morally infected (Tasimi & Gelman, 2017). Just as people avoid sneezed-on money, they keep a distance from morally dirty money (Flusberg & LaPlace, 2019).

Dirty money creates a self-control dilemma because it produces a valuation conflict: Money is good, but money earned by harming others is bad. Drawing on the process model of self-control (Duckworth, Gendler, & Gross, 2014), Tasimi and Gross argue

that people encountering dirty money often strengthen one valuation (e.g. “The company’s morals are awful!”), weaken another (e.g. “Having lots of money isn’t that important to me”), or strengthen one *and* weaken another valuation. This mental balancing act helps people maintain their moral compass.

To bring this cutting-edge research into the classroom, ask students to complete one or both of the following activities. The first activity demonstrates how dirty money — money obtained through immoral actions — can influence spending. The second activity shows how standards shift whether money is viewed as dirty or clean. In my experience, students love discussing money and should have no problem discussing these topics. At the same time, the topics deal with morally questionable actions. Remind students that the activities are voluntary.

Activity 1

Ask students to imagine the following scenario:

You are purchasing a car. Your goal is to acquire a vehicle that is reliable, safe, and fuel-efficient. Without a car, you will not be able to attend school. The downside is that you only have \$2,500 saved.

Two family members agree to help. The first family member offers \$5,000 from the proceeds of his payday lending business, which offers loans primarily to low-income households at the national payday loan average interest rate of 391% (InCharge, 2019). The second family member offers \$3,000 from his savings as a public school teacher in a high-crime section of his city. You can choose to accept one, both, or neither gift, but the money can only be used for the vehicle purchase.

Which of the following three cars would you choose?

Option A: 2010 Toyota Prius
Price: \$4,995
Mileage: 188,465

Option B: 2011 Toyota Prius
Price: \$7,250
Mileage: 63,000

Option C: 2008 Toyota Prius
Price: \$2,491
Mileage: 341,141



With a partner, ask students to discuss which option they chose and why. According to Tasimi and Gross (2020), people should choose option B the least because that purchase would have relied on dirty money. How much did students' responses support this line of reasoning related to dirty money? How might their responses have differed if they had received the money without knowing the source of the money? If they had unknowingly purchased the car with dirty money, how much would they want to return the car if they could do so? Instructors can help lead a short class discussion on how students used self-control to manage competing impulses between the positive aspect of having more money from a gift and the negative aspect of having more money for a gift linked to dirty money.

Activity 2

Instructors can ask students to imagine a fictional scenario, in which they have a 5-year-old daughter who needs a lung transplant. The child will die if she does not receive the transplant within 1 year. After 11 months, three companies reach out with offers to help the child.

Company: Helping Children Survive
Mission: Giving children on organ-transplant lists opportunities to survive through providing private medical care and access to global transplant list.
Offer: Immediate access to lung and transplant services
Cost: \$100,000, interest-free 10-year loan

Company: Tobacco Smokers of America

Mission: Selling tobacco products but also helping people in health crises.

Offer: Immediate access to lung and transplant services

Cost: \$100,000, interest-free 10-year loan

Company: Big Tobacco Conglomerate

Mission: Selling tobacco products but also committed to reducing future smoking.

Offer: Immediate access to lung and transplant services

Cost: Free

Using a 7-point scale (1 = *not at all likely*, 7 = *extremely likely*), ask students to report how likely they would be to

- Choose the option from Helping Children Survive?
- Choose the option from Tobacco Smokers of America?
- Choose the option from Big Tobacco Conglomerate?
- Choose to wait and see if a better option comes along?

According to Tasimi and Gross (2020), students will likely show the lowest levels of willingness to accept offers from tobacco companies because doing so would insinuate accepting dirty money. Instructors can guide the class to discuss different aspects of this imaginary scenario, such as whether the need to avoid accepting dirty money is rational or irrational. Would students be willing to pay \$100,000 rather than accept dirty money? Finally, how might responses to this scenario have differed if these questions were asked of American students in 1953, when 47% of American adults smoked cigarettes, including half of physicians (Roper & Roper, 1953)?

The next time your students consider a new job, ask them to consider that the salary might not matter as much as they think. Encourage students to consider how they would manage receiving a high salary working for a company that harmed others directly or indirectly. By encouraging students to engage in this type of moral reasoning, they can avoid the dilemma of dirty money. ●

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- See this article with the complete reference list at psychologicalscience.org.



EDITED BY C. NATHAN DEWALL AND DAVID G. MYERS

"Teaching *Current Directions in Psychological Science*" offers advice and guidance about teaching a particular area of research or topic covered in this peer-reviewed APS bimonthly journal, which features reviews covering all of scientific psychology and its applications. Visit this column online for supplementary components, including classroom activities and demonstrations: psychologicalscience.org/publications/teaching-current-directions.

HUMAN STRENGTHS AMID THE CHALLENGES OF POVERTY

By David G. Myers

Frankenhuis, W. E., & Nettle, D. (2020). The strengths of people in poverty. *Current Directions in Psychological Science*, 29, 16–21. doi:10.1177/0963721419881154

Two questions for your students' reflection — perhaps with private note-taking on opposite sides of a page, followed by class sharing and ideas summarized on the whiteboard:

1. *In what ways do you believe poverty is socially toxic? What problems are associated with home or neighborhood poverty?*

2. *Are there any upsides of poverty? What compensating strengths might be associated with the experience of poverty?*

Psychological science has abundant evidence of the price of poverty. Poverty-related stressors impede cognitive performance (Heberle & Carter, 2015; Mani, Mullainathan, Shafir, & Zhao, 2013). Poverty, often in association with extreme inequality, also predicts an increased risk of

- mental disorders, such as depression (Cree et al., 2018; Pratt & Brody, 2014);
- school failure and suspension (Wilson-Simmons, Jiang, & Aratani, 2017); and
- crime, obesity, and anxiety (Payne, 2017; Wilkinson & Pickett, 2019).

Poverty also predicts lower life expectancy and less happiness. In a

recent Gallup survey, 87% of people earning more than \$100,000 rated their “physical health and mental health” as excellent, in contrast to only 54% of those earning less than \$40,000 (Saad, 2019). Although people vary and many thrive, poverty predicts problems.

Nevertheless, life’s challenges and adversities can have a silver lining. For example, attention-deficit/hyperactivity disorder (ADHD) can entail spontaneity, passion, and energy. Autism spectrum disorder may come with exceptional skills or talents. And those who grow up under adversity — even surviving the Holocaust — may mature into resilient, well-adjusted adults (Helmreich, 1992; Masten, 2001). Short of trauma, hardship can boost mental toughness (Seery, 2011). It can also connect people. In a Child Trends survey of more than 100,000 families, 63% of parents in poor families reported eating together as a family 6 or more days in the previous week, as did only 47% of higher income families (Valladares & Moore, 2009). (This suggests a clicker question: Who do you think eats dinner together more often?)

Moreover, although enduring poverty puts children at risk for some social pathologies, growing up with wealth increases individualism and can put people at risk for substance abuse, eating disorders, anxiety, and depression (Lund & Dearing, 2012; Luthar, Barkin, & Crossman, 2013). Thus, there is a comparative upside of poverty: For many people, coping with adversity diminishes fragility and strengthens resilience (Rutter, 2013).

In addition to these familiar lessons, Willem Frankenhuis (Radboud University) and Daniel Nettle (Newcastle University) noted the wisdom of other psychological responses to poverty.

Consider, for example:

- *Time preferences.* Life choices that may seem “negative,” such as not delaying gratification for greater long-term rewards, may, in the context of poverty, be reasonable. “If current need is high and the future is uncertain,” noted Frankenhuis and Nettle, “it can be beneficial to spend money now rather than save for the future.” What to others may seem self-defeating or pathological — focusing on current threats and opportunities and discounting the future — may be adaptive for someone living in poverty. Food or shelter, as a bird in the hand, beats an uncertain investment in the bush of future education or savings. As one impoverished young offender said, “I’m the smart one because I know that life is short. . . so it’s smart to get yours now” (Brezina, Tekin, & Topalli, 2009).
- *Reproductive decisions.* Frankenhuis and Nettle noted that for affluent people, it pays to accumulate cultural capital, such as an education, before reproducing — but less so for women whose bodies are enduring the stresses

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of poverty, and who benefit from having the support of younger and healthier family and friends, including elders who do not yet need their care. By Nettle's calculation, the most biologically reasonable time for women to begin childbearing is the latest age that she "can, on average, expect to be in good health until [her] oldest grandchild is five." In the poorest neighborhoods, that age is 8 years younger than in the richest.

- *Hidden talents.* Faced with harsh and unpredictable environments, people may become skilled at detecting dangers, shifting between tasks, tracking a rapidly changing environment, and coping with others' negative affect, recent evidence suggests. As the Nobel laureate economist Abhijit Banerjee and his colleagues (2017) found, children raised in poverty who have difficulty with classroom math problems may easily handle equally complex problems while selling goods on the street. Moreover, "social transitioners," who move from poverty into affluence, often benefit from skill sets and communication abilities that bridge the economic strata (Martin & Côté, 2019). An experience of adversity, whether from poverty, discrimination, or a mental disorder, can produce the gift of greater empathy for others who now walk the same journey.

Frankenhuis and Nettle concluded that the behavioral sciences need "a balanced approach" to poverty that integrates both deficits and strengths. Barbara Rogoff and her colleagues (2017) agreed: "A challenge for future research is looking for strengths in all populations and designing learning

situations and assessments in ways that build on and build toward the strengths of all."

And to conclude the class discussion, instructors might return to the opening two questions. How closely did students' expectations match what researchers have gleaned? •

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INFORMAL LABORATORY PRACTICES IN DEVELOPMENTAL PSYCHOLOGY

By Gwendolyn Flesher Price



Gwendolyn Flesher Price
University of California, Los Angeles

We've all heard about the replication crisis in psychology. Proposed reasons range from small effect sizes and confounding variables to improper statistical techniques. Research questions with small effect sizes are challenging to pursue, even with the most rigorously designed studies. Confounding variables not accounted for or discussed in the paper may affect the results and hamper replication attempts (Yong, 2018). Misuse of statistical techniques, or arbitrary analytical decisions not directly related to the original question, may also play a role (Simmons, Nelson, & Simonsohn, 2011). And of course, there's the issue of publication bias, meaning null results don't get published and end up in a file drawer, never to make it into the mainstream conversation. However, there is another important issue that may affect

replication attempts: The informal laboratory practices that don't make it into the published paper.

Informal Laboratory Practices

Informal laboratory practices may influence study design and data collection, but they aren't written in articles or handbooks. These practices are passed on from advisor to student, or between colleagues, and lack of communication about these practices may contribute to researchers' inability to replicate others' results. Researchers at the University of Groningen in the Netherlands interviewed experimental psychology researchers about what informal practices they used, and how they viewed the importance of these practices in research (Brenninkmeijer, Derksen, & Rietzschel, 2019).

Brenninkmeijer et al. (2019) identified informal practices used in studies with adults. However, they did not interview developmental researchers. The informal research practices used when working with children can be vastly different from those used with adults. Infant methods are constrained by attention, parent schedules, and physical ability. Methods used with adolescents can have similar constraints at differing levels (e.g., attention and parent schedules) and some unique ones as well (e.g., mischievous behavior on study tasks). These differences inherent in developmental research affect the informal practices used and are dependent on the developmental period.

Professionalism: Schools, Parents, and Participants

When conducting research with children, collecting data means interacting with the participants, their parents, and their schools. Being professional and friendly is important to consider with parents and school staff. This is an ethical necessity, but it also aids in sparking parents' and teachers' interest in research surrounding their children's development, leading to higher participation rates. With the children themselves, balancing professionalism and friendliness must change with development. As the age of the participant rises, so must the researcher's professionalism to keep the participants focused on the task.

Whether professionalism affects the data itself is up for debate; however, it is important for a lab's reputation. Allaying caretakers' anxieties is important for developmental researchers. This can be achieved by allowing parents to supervise their child's participation, providing US Food and Drug Administration (FDA) facts pages on MRI safety, and being open and honest about the study and procedures. Developmental scientists rely on repeated visits to schools, museums, and other public spaces to collect data. Whether professionalism practices influence data is unclear, but they certainly influence future data collection in those spaces. In any case, these practices are not specified in research articles, and are chosen largely on the basis of intuition, leading to different practices between research groups. ➡

Gwendolyn Flesher Price is a PhD student in developmental psychology at the University of California, Los Angeles. Her research examines language development and how it is affected by the use of comparison and contrast, the spacing effect, and variability in the language-learning environment. She can be reached at gprice@ucla.edu.

Production of Good Developmental Data

Creating a task for children involves consideration of children's attentional abilities and interests. It is important to keep tasks short, the task length gradually increasing with development. When this is not considered—and even occasionally when it is—participants will quit the study early because of inattention and boredom regardless of age. Preschoolers may quit a study by walking away; similarly, teenagers may essentially quit a study by randomly selecting buttons to move the task forward.

As with adult studies, the study script is important for the clarity of a task, but with children, it also needs to be fun. Scripts do best when they create a narrative around a game-like task. For example, when leading children into an eye tracker, some researchers will pretend as though they're taking the children into a spaceship to capture their interest. Similar methods also must be used with teenagers with game-like tasks, scaling up complexity to account for their increasing cognitive abilities and maturity.



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Open Science in a Developmental Context

When discussing informal scientific practices and how they might contribute to the replication crisis, open science naturally comes to mind. OS includes ideas such as preregistering experiments, making your data and analysis code public, and having open-access journals (Gezelter, 2009). The informal practices discussed here aren't things we elaborate on in journal articles, but they could be affecting our results and exacerbating the replication crisis. Explicitly stating all informal practices is not possible because many are things we might not even think about. Whether we should begin to include them or study them in an empirical manner are options open to researchers.

Replication attempts may be affected by differing informal practices between labs; consequently, the replication crisis will not be quickly resolved. Aside from the file drawer problem, and the emphasis on novel publications for securing a good postdoctoral position or tenure, replication is a particularly difficult issue because of the pace of data collection. As in data collection from clinical or other hard-to-reach populations, developmental data collection takes a lot of time, which puts pressure on researchers who may already be overburdened. One solution is increased collaboration to take the strain off any one researcher. An example of this is the ManyBabies Project (Bergmann et al., 2016). Collaboration of this kind allows not only for faster data collection but also for increased sample variability in terms of geographic location. This isn't the end of the issue, but it is the beginning of the solution.

Many pieces of developmental psychology make OS practices difficult, but there are still many that can be done. Making data public might be difficult, but other practices, such as disseminating research, can and should always be done. Making science accessible to the public, such as in blogs or news articles and through outreach to schools and educational events can teach people what scientists are learning and foster a more open relationship between researchers and the community. Adopting these practices also gives us structure and transparency between the scientific community and the public, which is needed to ensure we are conducting the most rigorous scientific studies we can. Open science is not an all-or-nothing game; it is instead a philosophy to follow that encourages us to do everything we can to conduct rigorous research.

Informal practices in developmental psychology, and in psychology in general, are a pervasive and relatively untouched potential contributor to the replication crisis. Printing complete study scripts, describing study environments, and detailing data-collection procedures in appendices or on a preregistration page may help to ameliorate some of the confounds that come from differing informal research practices. Brenninkmeijer (2019) and colleagues have published an important first step into making these informal laboratory practices explicit and known. Now, it is up to us as researchers to make sure we continue to be as open and transparent as possible to help stem the tide of the replication crisis. ●

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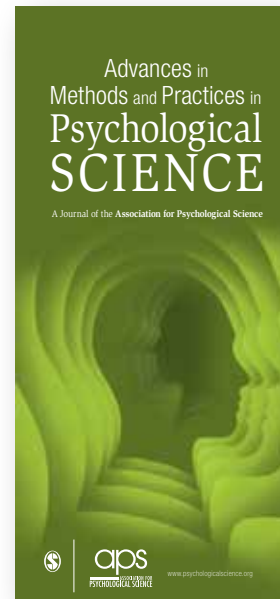
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2020 RAND Summer Institute

The 27th Annual RAND Summer Institute will be held July 6–9, 2020, in Santa Monica, CA.

The RAND Summer Institute will consist of two conferences addressing critical issues facing our aging population: Mini-Medical School for Social Scientists; and a workshop on the Demography, Economics, Psychology, and Epidemiology of Aging. Interested researchers can apply for financial support covering travel and accommodations.

Application Deadline: March 16, 2020

Visit RAND's website for more information and the application form: rand.org/well-being/social-and-behavioral-policy/centers/aging/rsi.html.

Multinomial Processing Tree Modeling Workshop

A Multinomial Processing Tree (MPT) Modeling preconference workshop will run March 21 to March 22, 2020 at the 62nd Conference of Experimental Psychologists in Jena, Germany.

The 2-day workshop will provide a systematic and application-oriented overview of the basics and the most recent developments in MPT modeling.

For more information, visit teap2020.dryfta.com/79-program/87-pre-conference-workshop.

This workshop is supported by the William K. & Katherine W. Estes Fund, a fund jointly overseen by APS and the Psychonomic Society to support summer schools and workshops offering training in mathematical and computational modeling.

NIMHD Health Disparities Research

The Washington, DC area course supports research career development of early-career minority health/health disparities research scientists.

The application portal is open February 3, 2020 to March 9, 2020

For more information, visit nimhd.nih.gov/programs/edu-training/hd-research-institute/.

NIH Grants for Studying Emotional Well-Being

The National Institutes of Health (NIH) has announced new grant funding for research networks focusing on emotional well-being. These networks should focus on positive health outcomes across the lifespan, such as how to prevent and treat conditions of mental health symptoms, burnout, and stress in at-risk populations.

Letters of intent deadline: March 22, 2020

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For more information, visit psychologicalscience.org/policy/nih-grants-for-studying-emotional-well-being.html.

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cere-emotionconferences.org

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Mark Rosekind
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AWAKE AT THE WHEEL

APS Fellow **Mark Rosekind**, chief safety innovation officer at Zoox and former head of the National Highway Traffic Safety Administration, is using psychological science to make roads a safer space for drivers and pedestrians alike.

What first drew you to the study of human fatigue?

While a sophomore psychology major at Stanford, I took a course entitled “Sleep and Dreams” taught by Dr. William Dement, who was part of the team that discovered REM sleep (rapid-eye-movement sleep) in the 1950s. An incredible course and passionate professor provided an opportunity to become a teaching assistant for the course and a research assistant on sleep projects. Throughout graduate school, my postdoc, and my initial positions at Stanford and NASA, my interests evolved to focus on sleep and human fatigue in real-world operational environments. This knowledge also can enhance the daily lives of the rest of us who may be sleep-deprived by work, travel, new babies, and other life challenges.

How did you find yourself applying your science during your career as a safety regulator?

Though it was rare to have a scientist as the head of the National Highway Traffic Safety Administration (NHTSA), it was an incredible advantage when con-

fronting the agency’s safety, regulatory, and enforcement challenges. NHTSA generates tremendous amounts of data, and as a scientist it was natural to work with that information to advance the agency’s efforts. As a psychological scientist, another advantage was being able to apply knowledge about cognition, behavior change, emotion, and decision-making to the difficult task of promoting road safety and the political challenges of Washington, DC.

What is the accomplishment you’re most proud of from your tenure at NHTSA?

There are three accomplishments. First, we initiated a major overhaul of how defects and recalls are addressed, with more rigor and assertiveness (e.g., Takata airbag recall). Second, we obtained commitments from 20 automakers to make automatic emergency braking (AEB) standard equipment on 99% of new cars by 2022. This gets AEB into virtually all cars at least 5 years faster than would a regulatory path. Third, we issued the first Federal Automated Vehicles Policy that provided a foundation for the future of mobility with autonomous vehicles (AV).

Tell us about the role psychological science is playing in the development of safe autonomous vehicles.

NHTSA data show that 94% of crashes are related to a human choice or error. Understanding these human sources of error (e.g., decision-making, attention, reaction time) provides specific direction for solving problems of autonomous driving. Understanding emotions, values, decision-making, perception, experience, and factors that shape behavior will be critical in developing trust in the safety of AVs.

How soon do you predict that autonomous vehicles will be a staple on roadways?

Widespread availability of AVs will emerge over the coming 20 to 30 years, though self-driving vehicles are already in testing and demonstration pilot programs. For context, last year 36,560 lives were lost on US roadways (100 people every day) along with 2.7 million injuries in 6.5 million crashes. New technology innovations, including AVs, offer the most significant opportunity in 100 years to save lives and prevent injuries and crashes on our roads. ●



Read the full interview online at psychologicalscience.org/observer/awake-at-the-wheel.

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