

THE OPEN-ACCESS MODEL
OF JOURNAL PUBLISHING

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Observer

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Working Around the Distance

COVID-19 has changed everything about how we live and work as a global society. Psychological scientists share how they're adjusting to teaching, researching, and connecting online.

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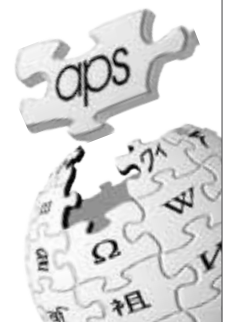
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5 *Presidential Column*

The Open-Access Model of Journal Publishing

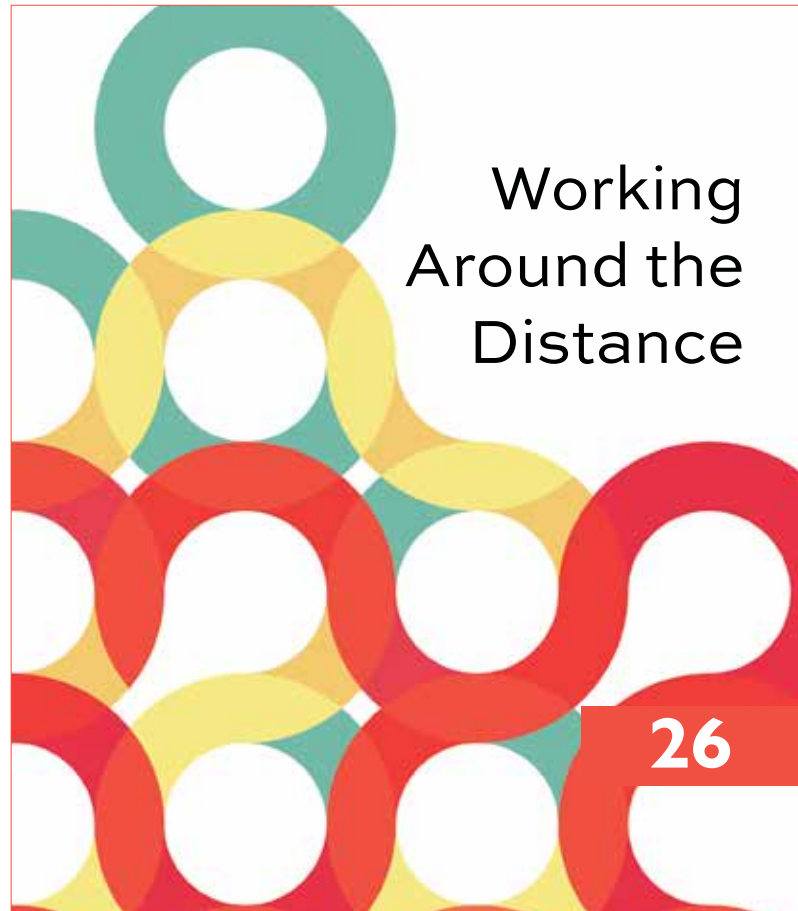
APS President **Shinobu Kitayama** explores the benefits and ideals of the open-access model, the two main prototypes of open-access journals, and the very real costs and other challenges associated with producing them.

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34 **The Brain From Inside Out: 2020 Kavli Keynote Address Shines Light on Cognition**

In the virtual 2020 Fred Kavli Keynote Address, New York University's **György Buzsáki** challenges the idea that our brains are “blank slates” at birth. He instead proposes that our newborn brains are filled with largely random patterns, which he refers to as an “inside-out” framework.



Working Around the Distance

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Six months into the COVID-19 pandemic, a new set of practices has begun to take shape in how psychological scientists teach and conduct research. A global survey of the field reveals the scope of the impact, along with strategies being used to overcome the considerable challenges associated with moving research and learning from in-person laboratory settings and classrooms to online platforms.

37 **Uniquely Human: Understanding Our Cultural Evolution**

What happened in the evolution of *Homo sapiens* that made our species stand out in comparison to other hominids? Several theories point to our unique capacity to teach and learn from others as an evolutionary turning point in human history.

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“You go from competing [for grant funding] with people who are in grad school to competing with ... famous researchers who have huge centers and an amazing body of work and accomplishments.”

—Kelsie Forbush, *Careers Up Close*, Page 48

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New! Careers Up Close

This new department tracks the career paths and motivations of accomplished young psychological scientists. **Page 48**



APS Past President Gordon H. Bower (1932–2020)

A Charter Member of APS, Bower served as President from 1991 to 1993 and was a longtime psychology professor at Stanford University. *(June 24; full tribute to appear in the October Observer)*



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Research into a class of actions known as economically vulnerable behaviors finds that recipients of generous first offers may become too trusting for their own good. *(July 1)*



Your Loss, My Gain? Sharing Economy May Widen Wealth Gap

“Contract trading”—in which contract pricing replaces traditional wage setting—lowers freelance contractors’ perceived value and actual earnings alike, even when their actual work product is identical to that of traditional employees. *(May 1)*



Health and Happiness Depend on Each Other, Science Says

New research adds to the growing body of evidence that happiness not only feels good but is good for your physical health. In-person as well as online psychological interventions work. *(July 22)*



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New research proposes lifestyle, social, and psychological factors may increase the risk of contracting COVID-19. *(July 9)*

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THE OPEN-ACCESS MODEL OF JOURNAL PUBLISHING

By Shinobu Kitayama
 APS President

Over the past few decades, there has been a trend toward open access (OA) as a new academic publication model. Most journals in psychology, especially those published by APS and the American Psychological Association, have not adopted this model. However, there may come a time when that changes. The newest APS journal, *Advances in Methods and Practices in Psychological Science* (AMPPS), will turn OA in 2021. I want to take this opportunity to discuss what OA is, how it works, and what it might entail.

The more I think about OA, the more intrigued I am by its many facets. Some facets pertain to the nature of the collective human activity we call “science.” Some raise the question of what it is about OA that motivates people to publish research. And some others dive straight into the heart of fairness and equity concerns.

What Is Open Access?

OA is a relatively new, nontraditional model of academic publication. The idea is democratic. It embodies a moral commitment to making knowledge available to everyone. Thus, the content of OA journals is available free of charge to anyone who wants to read and use it. This open availability is probably the most significant departure from traditional journal models, which

require readers to subscribe to access content.

Early proponents of OA include Mahatma Gandhi, who famously attached a copyright blurb, “No Rights Reserved,” to a British translation of one of his books. However, the OA movement gained traction only after the Internet became widely available. In effect, OA is an effort to make academic papers available for free in cyberspace. Therefore, it is a stepchild of the Internet age, born out of a democratic impulse to make knowledge accessible to anyone who wants it.

There is no dispute that the idea of OA is supreme. It’s like a dream. However, many dreams are pulled back by economic reality, and OA is not immune to this reality check. The publication of scholarly articles entails substantial costs, including editorial staff, peer-review and typesetting technology, and the systems needed to archive articles for future generations. Traditionally, these costs have been passed on to subscribers, including university libraries.

The idealistic prospect of OA makes it easy to forget that someone must still cover the cost. In the early years of OA, especially in Western Europe, the OA model was heavily subsidized by public institutions and private foundations. OA journals without such generous funding must look for other means to recover costs. That is where the article processing charge (APC) comes in. It is sometimes called the publication fee, and it is charged to authors.

A cursory review shows that APCs are most common in the natural and biological sciences (Kozak & Hartley, 2013). However, many psychological scientists publish their work in OA journals, and many of those journals charge sizable APCs (for some examples, see Springer Nature, 2020). Therefore, although OA is great from the perspective of readers, it poses some dilemmas for research scientists.



APS President **Shinobu Kitayama** is the Robert B. Zajonc Collegiate Professor of Psychology at the University of Michigan. Originally from Japan, he taught at the University of Oregon and Kyoto University before joining the Michigan faculty in 2003. He studies cultural variations in mental processes. Currently, he serves as editor in chief of the *Journal of Personality and Social Psychology: Attitudes and Social Cognition*. He is a recipient of a Fulbright Fellowship, a Guggenheim Fellowship, the Society of Experimental Social Psychology Scientific Impact Award, the Alexander von Humboldt Research Award, and the Society for Personality and Social Psychology Career Contribution Award. He is an elected member of the American Academy of Arts and Sciences. Kitayama can be contacted at skitayama@psychologicalscience.org.

The idealistic prospect of OA makes it easy to forget that someone must still cover the cost. That is where the article processing charge (APC) comes in.

Two Niches

OA journals appear to have filled two niches left open by traditional, subscription-based journals. Let me try to clarify what those niches are by describing two prototypes for journals. For a lack of good descriptors, I'll call them "cutting-edge" and "nontraditional." Like all prototypes, they are Platonic ideals—abstractions that never exist in pure forms. In other words, almost all journals fall somewhere in between. Moreover, neither prototype is inherently better than the other. Both address issues surrounding traditional journals.

Cutting-edge research. An increasing number of journals cater to "cutting-edge" research. Typical in this

A New Era for Open Access

In an online panel recorded in August, Shinobu Kitayama had an in-depth conversation about the open access model with four researchers from the United Kingdom, Japan, Australia, and the United States. View it with this article at psychologicalscience.org/observer.

group are OA journals bearing the name "Nature," with *Nature Communications* the most relevant to psychological scientists. The parent journal, *Nature*, is subscription-based and available in paper copies. *Nature Communications* is online only and fully OA.

Nature carries tremendous prestige, which its OA journals have inherited, helping them to attract a large number of submissions from all areas of science—medicine, engineering, chemistry, physics, and, of course, psychology, among others. Their editors process submissions with efficiency, turning down most of them (> 90%; see, e.g., Journals Friend, 2018).

The research that survives this highly selective, competitive review process will be cited frequently, which is why journals bearing the "Nature" brand, including *Nature Communications*, carry impact factors in the vicinity of 12. Impact factors reflect a journal's average number of citations per paper, per year. (The impact factor is controversial and could be considered a social construction, but it has very real consequences; see Merton, 1995, and "Time to Remodel the Journal Impact Factor," 2016.) Although 12 is much lower than the impact factor for *Nature* (> 40), it is still *very* high in comparison to the impact factors for empirical psychology journals. (The highest of those, 6.34, belongs to the *Journal of Personality and Social Psychology*, which has a rejection rate around 85%. As an editor of this journal, I wonder what this huge gap in impact factor might mean. A full response could require another column. But one plausible answer would point to the prestige factor under discussion.) Both *Nature Communications* and *Science Advances* (the OA sibling of *Science*, another highly prestigious subscription-based journal) charge an APC of around \$5,000.

From a researcher's point of view, it is important to get your work published as quickly as possible in the best possible outlet—as reflected, among other things, by its impact factor. Your career is built on having your findings published in reputable outlets. The speed of publication is particularly crucial in the competitive world of cutting-edge science, where the value of a new finding diminishes rapidly if its publication is delayed. Top researchers who have enough grant funding may not find APCs to be as big of a problem as they are to other researchers. And publishing in a high-impact journal could help secure more funding, which would pay for more APCs in the future.

I have two reactions to this system. First, I cannot help but think of sociologist Max Weber's (1930) description of the capitalist system as an "iron cage" in which people's lives are defined by the drive to make money. Top scientists are on an eternal treadmill, striving to get grant funding only to publish more—not unlike rats in a Skinner box (a model system of capitalism).

Second, however, I find that the entrepreneurial spirit inherent in this system resonates with me. Productivity in research becomes an integral part of your identity. Competition with similarly minded scientists excites you. Often, that competition can lead to collaboration, and when it does, it is an affirming experience. You devote your life to science even more, hoping that someday you will make discoveries, build groundbreaking theories, and perhaps change the world for the better. That spirit of innovation, expanding influence, and competitive collaboration with fellow scientists can cultivate passion, motivation, and meaning in life. And OA journals linked to scientific prestige have become part and parcel of that dynamic.

Nontraditional research. The second prototype is represented by the *Frontiers* family of OA journals, which publish on a wider range of topics, often challenging the traditional frameworks of various fields. A major criterion for publication here is not novelty, as in the first category, but methodological soundness. I think this model represents a great experiment, and there is a lot of merit to it. Consider that many journals, especially OA journals that fit the first pro-

prototype, emphasize novelty and impact. That orientation may prioritize new and surprising findings at the expense of solid methodology. (In *Nature* and *Science*, for example, detailed methods are relegated to supplementary information, which very few are likely to read.) Thus, OA journals that publish all methodologically sound work may serve as a significant antidote.

As one *Frontiers* editor noted in 2016, the *Frontiers* journals “publish (almost) everything” (Phillips, 2016). Indeed, the average rejection rate across all *Frontiers* journals in that year was quite low: only 25% (*Frontiers Science News*, 2016). The impact factor of *Frontiers in Psychology* (2.32) is understandably lower than that of the *Nature* and *Science* OA siblings, but it is respectable (*Frontiers in Psychology*, 2017). Not surprisingly, *Frontiers* journals have flourished. The APC for a full-length article in *Frontiers in Psychology* is \$2,950 (Frontiers, n.d.).

I have mixed feelings about the emphasis on methodological soundness as opposed to impact. Let me be clear: Research claiming a surprising finding with crappy methods is terrible. As I discussed in my last column, many scholars have worked hard on journal reform over the past 10 years. But I do not believe that impeccable methods alone can create research that significantly contributes to scientific knowledge. Like yin and yang, the criteria pushed by the two prototypes are different but complementary: Together, new, exciting ideas and rigorous, innovative methods produce excellent research. Conversely, ignoring one could compromise our science.

The real value of the second group of OA journals may be that they make room for excellent research that does not fit traditional journals, which often have very conservative review criteria. In particular, these OA journals recruit a wider range of editors and reviewers across many countries. For example, in 2019, 20% of editors and 34% of authors at *Frontiers* journals were in Asia, South America, or Africa (Frontiers,

2019). Moreover, *Frontiers* papers are downloaded in high frequencies in many developing countries.

Why does this matter? Science is based on objective, verifiable data—but there is nothing objective about reporting, interpreting, and “packaging” the data in articles. The endeavor is deeply cultural, and it tends to favor scholars with Western cultural backgrounds and Western training. This fact presents a major hurdle in internationalizing psychological science. Here, *Frontiers* and other OA journals (e.g., *PLOS ONE*) have played a significant role.

Pros and Cons

I can see why OA journals have flourished. The most important reason, in my mind, is that OA journals have a vested interest in publishing articles. Some of the highest-impact journals (those that fit the first prototype) have very high rejection rates, but they are very interested in publishing the “highest-impact” papers possible. From a business point of view, that is the only way for them to survive. The same consideration applies to journals that fit the second prototype. In their case, the rejection rate is usually not as high, which probably makes their bottom line easier to meet through APCs.

Compared with either prototype, subscription-based journals do not have the same degree of motivation to publish papers. Such journals are reliant on subscriptions rather than submissions. In the OA system, there is a blatantly clear bottom line. The admonition to “publish or perish” is now being extended to OA journals.

These characteristics of OA journals are not necessarily bad for researchers. As long as the researchers pay the price (i.e., the APC), they get what they want, whether that is publication in a higher-impact journal, a journal with a lower rejection rate, or (for those outside of North America and Western Europe) a journal that crosses cultural boundaries.

One huge disadvantage of the OA system is that it favors the rich and privileged. It is easy to publish your work if you are well funded. For researchers who are not, including those in developing countries, the fees may be impossibly high. As the field works to diversify its researchers and research topics, many OA journals have opted to offer full or partial waivers of APCs. However, if journals fully meet that need by granting waivers to students, junior researchers, and scholars from developing countries, then they will have to set their official APC at an even higher rate to offset the expense. The situation is analogous to the skyrocketing tuition at many American universities. Like those universities, the OA community will have to grapple with balancing social idealism and financial reality. ➡

One huge disadvantage of the OA system is that it favors the rich and privileged. The situation is analogous to the skyrocketing tuition at many American universities. Like those universities, the OA community will have to grapple with balancing social idealism and financial reality.

I am privileged in many ways: I am an active researcher at one of top research universities in North America. But I am frightened by the thought that many journals in my field might turn OA in the future. That might not happen, but if it did, many researchers might find it very challenging to maintain their labs. How many researchers could afford paying \$3,000 to \$5,000 for every publication, especially if their labs are large, with many students and postdocs—all of them seeking to publish as many papers as possible every year?

Final Thoughts

In this column, I have shared my reflections on OA—an emerging business model of journal publishing. I believe that OA has clear advantages for many researchers who are not well served by traditional journals. At the same time, a significant change in funding must take place to yield a financially sustainable, long-term blueprint before OA can be endorsed as a sensible option for all the researchers, teachers, and graduate students in the APS community. APS is testing the waters with *AMPPS*, its first foray into the OA world. In addition, hybrid models will give us experience with OA that will help guide the evolution of our journals in ways that make sense financially while providing maximum opportunities to publish and access a wide variety of research articles.

This column only scratches the surface of the complex issues surrounding OA. In all likelihood, I missed other issues and considerations. For example, I did not discuss library budgets—a major component of subscription-based journals' financial viability. Nor did I discuss institutional mandates of OA by funding agencies, which so far have mostly been limited to countries in the European Union. I therefore want to close this column with an invitation to share your thoughts on this issue. **Please comment on this article online** (psychologicalscience.org/observer/open-access) **or via email** (apsobserver@psychologicalscience.org). •

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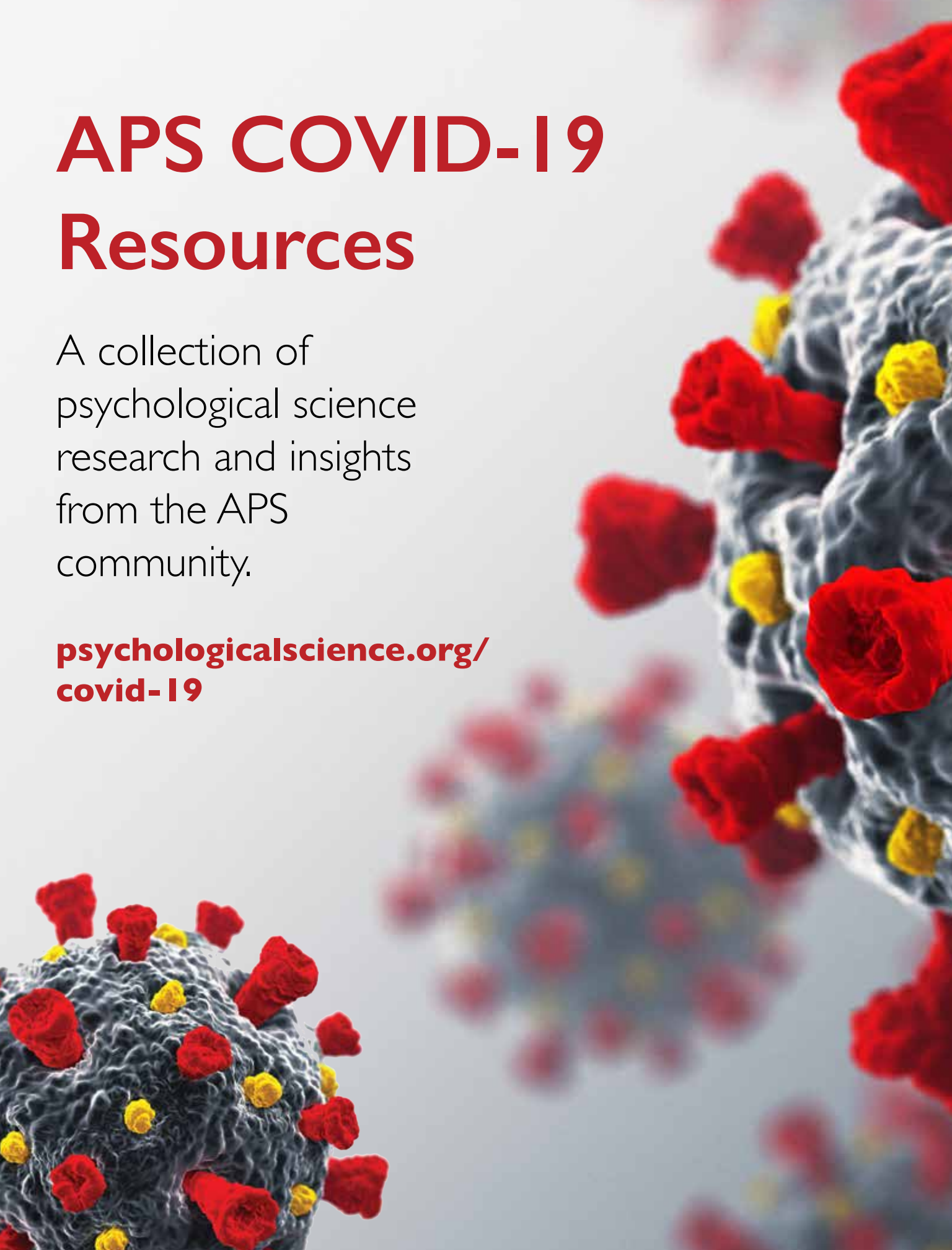
“While the state of our union remains uncertain, there is hope, and there are answers yet to be discovered. Reinvigorating our science and engineering capabilities can help our nation address the crisis we face today, while better preparing our nation for the future.”

—U.S. Rep. **John Yarmuth** (D-KY), at a July 8, 2020, Congressional hearing on the federal role in research and development

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PROTESTS OVER KILLINGS OF BLACK PEOPLE COULD ERODE RACISM, RESEARCHER SAYS

The ongoing nationwide protests against police brutality, combined with the worsening racial disparities brought about by COVID-19, may be “the perfect storm” for advancing the public understanding of how to combat racism in the United States, according to APS Fellow James Jones (University of Delaware). While research by APS Fellow and President-Elect Jennifer Eberhardt (Stanford University) suggests that keeping race front of mind can trigger racial stereotypes linked with hostility and violence, APS Fellow Sam Gaertner (University of Delaware) has found that bringing different groups of people together as one can help foster more positive relationships.

SCIENCE MAGAZINE | JUNE 4

Steven J. Heine, University of British Columbia, Canada, *Slate*, July 16, 2020: Does a Pie Chart Change Who You Are?

Gregory Herek, University of California, Davis, *LGBTQ Nation*, June 26, 2020: Five Years Ago, Love Won. Here's How Research Helped Make That Progress Possible.

Ursula Hess, Humboldt University, Germany, CNN, June 15, 2020: Do Masks Mask Our Emotions? Not Necessarily, Says One Expert.

Stephen Kosslyn, Foundry College, *The New York Times*, July 19, 2020: Gordon Bower, Inventive Memory Researcher, Is Dead at 87.

David Rettinger, University of Mary Washington, *Inside Higher Ed*, July 22, 2020: Best Way to Stop Cheating in Online Courses? ‘Teach Better.’

Jennifer Richeson, Yale University, *The Atlantic*, September, 2020: Americans Are Determined to Believe in Black Progress.

Rebecca Saxe, Massachusetts Institute of Technology, *Scientific American*, May 19, 2020: Forced Social Isolation Causes Neural Craving Similar to Hunger.

Jay Van Bavel, New York University, CBS, July 5, 2020: Masking America's Fears: How Do We Get People to Take COVID-19 Seriously?

More APS Members in the
Media online at

[psychologicalscience.org/
MembersInTheNews](https://psychologicalscience.org/MembersInTheNews)

Selected responses to previous coverage



APS Past President Gordon H. Bower, 1932–2020

(published online June 24)

What a pleasure it was to meet and then work with Gordon during the early days of APS. As an applied organizational scientist, I had read some of his work and knew of his leadership in research.

On the sidelines of his first Board meeting, it was a delight to get acquainted and then hear his recollections about his career choice, including a baseball game played against my home team at Bowling Green State University.

—Milton Hakel, professor emeritus, Bowling Green State University

I answered my office phone one day at a small college no one ever heard of, and a booming bass voice said “Hello, this is Gordon Bower.” I nearly fainted. Dr. Bower was the pinnacle of scientific genius, in my opinion, and I never thought I’d be important enough to talk with him. He asked my permission to use my recent memory book for students in his graduate seminar, explaining how much he liked the work. We emailed back and forth thereafter, but I will never forget that day he called and chatted with me like an old friend. “Hello, this is Gordon Bower.” Rest in peace, sir.

—Janet L. Jones, professor emerita, Fort Lewis College



Cognition and Perception: Is There Really a Distinction?

(February 2020)

I taught the introductory psychology course at Berkeley for almost 40 years (see <https://www.ocf.berkeley.edu/~jfkilstrom/IntroductionWeb/index.htm>), using high-end texts like Gleitman, and I never saw one that explicitly stated, or even implied, that perception was independent of cognition. True, every introductory text I know gives perception its own chapter (and the best ones give sensation its own chapter, as well), but this is just because we know more about cognition than about other areas of psychology, like motivation and emotion, and so the material has to be broken up into manageable bites. Cognitive psychology is about knowledge, and the British empiricists taught that knowledge is acquired through experience and reflections on experience. That means that cognition begins with perception. Wundt may have made a distinction between “lower” and “higher” mental processes, but in my reading that was mainly for methodological reasons—depending on whether the stimulus was physically present in the environment.

Helmholtz certainly thought that perception depended on cognition—that’s where “unconscious inferences” come from. And post-Helmholtz, there is the whole “constructivist”

tradition in perception, including such figures as Richard Gregory, Julian Hochberg, and Irvin Rock, who argued that perception is intelligent mental activity involving the interaction of bottom-up and top-down processing. Now, things may be changing these days. J.J. Gibson’s (1979) theory of direct perception asserts that all the information needed for perception is provided by the stimulus, and (as A. Michel points out) Firestone and Scholl (2016) have argued that there’s no evidence for the involvement of top-down processes in perception. But these are recent, revolutionary statements, intended to constrain if not overthrow Helmholtzian constructivism. It’s just not true that psychologists have believed this all along, leading perception to be treated as independent of cognition. What psychologists have believed all along was that perception provides the experiential basis of cognition, and cognition enables perceptual construction. As Neisser (1976) wrote, perception is where cognition and reality meet.

—John F. Kihlstrom, professor emeritus, Berkeley University

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Recent highlights from APS journals

Education and Cognitive Functioning Across the Life Span

Martin Lövdén, Laura Fratiglioni, M. Maria Glymour, Ulman Lindenberger, and Elliot M. Tucker-Drob

Although education appears to affect cognitive ability, it does not necessarily attenuate the declines in cognition associated with aging. Rather, education can influence elderly people's cognitive functioning by contributing to the enhanced cognitive skills that emerge in their early adulthood and persist into their older age. Lövdén and colleagues present a review of the literature on education's associations with levels of and changes in cognitive functioning related to aging and dementia. Overall, education appears to promote cognitive functioning in old age, "but not because it simply attenuates cognitive decline. Instead, educational attainment is associated with advantages in cognitive functioning in early adulthood that are, at least partly, preserved into old age.

Psychological Science in the Public Interest

<http://journals.sagepub.com/doi/full/10.1177/152910062096576>



PSYCHOLOGICAL SCIENCE

Fighting COVID-19 Misinformation on Social Media: Experimental Evidence for a Scalable Accuracy-Nudge Intervention

Gordon Pennycook, Jonathon McPhetres, Yunhao Zhang, Jackson G. Lu, and David G. Rand

Nudging people to think about the accuracy of news headlines might be a simple way to improve their choices about what to share on social media. When directly asked about the accuracy of COVID-19-related news, participants were better at discriminating between true and false than when asked simply to decide whether to share it. Similarly, having participants judge the accuracy of non-COVID-19-related headlines increased their discernment about the accuracy of COVID-19-related articles

and the quality of their subsequent intentions to share them.

<https://journals.sagepub.com/doi/full/10.1177/0956797620939054>

On Intersectionality: How Complex Patterns of Discrimination Can Emerge From Simple Stereotypes

Neil Hester, Keith Payne, Jazmin Brown-Iannuzzi, and Kurt Gray

Black men are disproportionately stopped by police to a degree that cannot be explained by the simple or additive effects of being Black and male. What explains this pattern of discrimination? In a set of simulations, Hester and colleagues found that combining simple stereotypes with threshold models of behavior (e.g., "if someone's threat level seems higher than X, stop that person")

can explain the patterns of complex discrimination found in gender-by-race and gender-by-age discrimination in police stops. These simulations suggest that some complex behaviors can arise from relatively simple cognitions.

<https://journals.sagepub.com/doi/full/10.1177/0956797620929979>

CLINICAL PSYCHOLOGICAL SCIENCE

A Meta-Analysis of the Relationship Between Sleep Problems and Loneliness

Melanie A. Hom, Carol Chu, Megan L. Rogers, and Thomas E. Joiner

Hom and colleagues analyzed 84 articles and found small-to-medium and medium associations between perceptions of loneliness and specific sleep complaints, such as insomnia, nightmares, and poor sleep efficiency and

quality. Further analyses of longitudinal studies suggest that the relationship between sleep problems and loneliness is bidirectional. The authors propose that future research is needed to identify the mechanisms that underlie the relationship between sleep problems and loneliness and how they influence one another over time.

<https://journals.sagepub.com/doi/full/10.1177/2167702620922969>

Helping or Harming? The Effect of Trigger Warnings on Individuals With Trauma Histories

Payton J. Jones, Benjamin W. Bellet, and Richard J. McNally

Trigger warnings provide notification about forthcoming content that may cause distress, but they may have no benefits and even cause adverse side effects in trauma survivors, this research suggests. People who had experienced trauma (e.g., serious injury, sexual violence) in the past and received trigger warnings before reading distressing passages were equally affected by the passages as those who had not received trigger warnings. Moreover, trigger warnings reinforced participants' belief that their trauma was a central part of their identity.

<https://journals.sagepub.com/doi/full/10.1177/2167702620921341>

CURRENT DIRECTIONS IN PSYCHOLOGICAL SCIENCE

The Psychology of Intolerance: Unpacking Diverse Understandings of Intolerance

Maykel Verkuyten, Levi Adelman, and Kumar Yogeeswaran

Verkuyten and colleagues compare and contrast three different understandings of intolerance, along with the different implications for how we react to intolerance. They discuss the affective state, psychological process, and behavioral outcomes of (a) prejudicial intolerance based on closed-mindedness and antipathy toward a group of people; (b)

intuitive intolerance involving unreflective disapproval of out-group practices or beliefs; and (c) deliberative intolerance involving interference with out-group practices or beliefs that are considered to violate one's values. Verkuyten and colleagues suggest that attention to these diverse understandings of tolerance can enhance psychology's contribution to the development of intergroup relations.

<https://journals.sagepub.com/doi/full/10.1177/0963721420924763>

Children's Language Skills Can Be Improved: Lessons From Psychological Science for Educational Policy

Charles Hulme, Margaret J. Snowling, Gillian West, Arne Lervåg, and Monica Melby-Lervåg

Hulme and colleagues review recent research indicating that some language interventions may improve children's oral language skills as well as their reading comprehension. The effects of language interventions aimed at improving children's vocabulary and narrative skills, among others, are not large, but they are significant, especially when the interventions are high quality and implemented in small groups rather than in whole classrooms. Although the authors recognize the need for further research examining the long-term effects of these interventions, they highlight the implications of these findings for education, as poor language skills likely create educational disadvantages.

<https://journals.sagepub.com/doi/full/10.1177/0963721420923684>

PERSPECTIVES ON PSYCHOLOGICAL SCIENCE

Training Learning Strategies to Promote Self-Regulation and Transfer: The Knowledge, Belief, Commitment, and Planning Framework

Mark A. McDaniel and Gilles O. Einstein

Students tend to use study strategies that do not result in more learning.

Why not train them to use more effective learning strategies? McDaniel and Einstein propose the knowledge, belief, commitment, and planning (KBCP) framework to guide strategy training and foster the use of effective learning strategies. Using the KBCP framework, training must: (a) provide knowledge about the strategies, (b) foster beliefs that the strategy works, (c) create commitment to using the strategy, and (d) help with the planning of strategy implementation.

<https://journals.sagepub.com/doi/full/10.1177/1745691620920723>

ADVANCES IN METHODS AND PRACTICES IN PSYCHOLOGICAL SCIENCE

Rock the MIC: The Matrix of Implied Causation, a Tool for Experimental Design and Model Checking

Timothy R. Brick and Drew H. Bailey

Brick and Bailey introduce the matrix of implied causation (MIC) as a tool for easily understanding and reporting a model's implications for the causal relationships between variables. MICs can help to directly examine causal implications in path modeling, including structural equation modeling. The authors use examples from the literature to illustrate the use of MICs in model checking and experimental design and argue that when researchers use models with causal implications, they should also use MICs to help to differentiate among models with otherwise similar fit. ●

<https://journals.sagepub.com/doi/full/10.1177/2515245920922775>

See all APS journals at
[psychologicalscience.org/
publications](https://psychologicalscience.org/publications)

ADDING VALUE AND SOLVING PROBLEMS: VIRTUAL NETWORKING FOR SCIENTISTS



Job hunting for early-career psychological scientists can be difficult in the best of economies. A pandemic like COVID-19, which has shelved hiring plans and cancelled in-person conferences and events where so much networking would have occurred, has only magnified the challenge. Paradoxically, these constraints may also represent windows of opportunity that resourceful scientists are uniquely qualified to open.

“Networking is all about community—it’s about how I might help you, be a resource for you, inject value into your organization,” according to Alaina G. Levine, a STEM career consultant who writes and speaks for scientific audiences. In the APS webinar *Virtual Networking: How to Network and Find Collaborators From Afar*, she laid out techniques and strategies for making

connections remotely, identifying pain points, and building collaborations with people who might become (or introduce you to) your future colleagues. “If we’re going to advance our science, we need new collaborators, new perspectives,” she said. The trick is getting the right people to see that potential in you.

First step: Send a targeted email that quickly establishes the parallels between your respective areas of expertise and requests a 15-minute Zoom/Skype/Whatsapp call to explore how you might be able to help them. Better yet, send several of these emails.

Consider the example of one young scientist Levine knows. Seeking a postdoc in a specialized field where he had limited experience, he conducted a literature search for professors working in that field who were using techniques

he had some knowledge of. One of the professors who took a meeting with this young scientist went on to create a postdoc specifically for him, after a series of conversations that helped the young scientist identify his future colleague’s pain points and elucidate the ways in which he would be able to help.

Here are a few more tips on how to identify those prospects, and what to say when contacting them:

- **Form your list using informed sources.** Ask colleagues, advisors, and friends for recommendations. Review conference agendas and programs, including virtual presentations. Look through membership directories. Read journals and papers. Scour your social networks. Volunteer on committees and task forces.
- In your actual message, **begin by demonstrating empathy and genuine interest** in the recipient’s health and well-being, especially in light of the current realities. “I hope this email finds you and your colleagues healthy and safe.”
- **Pinpoint the mutual interest.** “I read about your work on X and see parallels to some work I’m doing in X + 1.”
- **Clarify that you’re putting their needs (and the community’s needs) first.** “I’m wondering if I might serve as a resource or be of assistance.”
- **Be patient and respectful**—don’t expect a response right away, or at all—and be prepared to circle back in a few weeks or months with a second effort. ●

CAREERS OUTSIDE OF ACADEMIA: HOW TO LAND AND NAVIGATE

Academia is only one option for a career as a psychological scientist. The key to finding a fulfilling career in a field such as technology, business, or nonprofit work? Identify your passions and use them to craft your path forward, according to Melissa Smith, a senior user experience researcher for Google. In the APS webinar *Careers Outside of Academia*, Smith and four other psychological scientists who have chosen careers outside of academia shared helpful experiences and tips.

Adapting Skills and Communication Styles

To facilitate her job search, **Iona Scully**, who studies human factors at the engineering and science consulting firm Exponent, found ways to gain experience with skills she didn't get as much exposure to while working toward her PhD, such as budgeting, managing, and working in groups. Smith focused on ensuring she spoke the same “language” when speaking with recruiters and translating her CV into a resume. Mike Winograd, a consultant who works with clients in healthcare, tech, and financial services at ZS, worked with a specialist at his school to develop his resume. Smith used her internships to narrow her focus by learning what she *didn't* want to do.

Hotaka Maeda, a psychometrician at the National Board of Medical Examiners, noted the importance of keeping work at the PhD level but simplifying communications. Similarly, Smith noted that her work involves “50% research and 50% communication.... Demonstrating that you can communicate technical ideas to people not familiar with research is very important.” To that end, she added, presentations can matter more than written publications. Another challenge can be adapting to the pace of industry,



where “things are faster,” said Smith, so “you have to exponentially speed up.”

While Winograd said he has no plans to return to academia, Scully and Smith are keeping their options open. They suggested that as long as you keep publishing or remain involved in academia (such as by guest lecturing, keeping an academic network, and interacting with other academics), you might be welcomed back into academia.

Steps Toward Non-Academic Careers

Hoping to land a job outside academia? The five psychological scientists who participated in this webinar suggested the following:

- Leverage the skills you acquired in graduate school to applied settings.
- Take any course that interests you and find what you're passionate about.
- Learn to communicate technical ideas with simplicity so broader audiences can understand. Teaching and presenting at conferences can help.

- Take internships and other opportunities to develop your skills.
- Be humble and manage your expectations. No one owes you just because you have a doctorate.
- Be more precise regarding what you call yourself—for example “psychological scientist” instead of “psychologist.”
- Translate your CV into a resume, with the help of a specialist, if needed.
- Network! Get involved with groups and organizations in your community; speak to exhibitors at conferences (even at virtual conferences); meet as many people as you can. You'll never know how those people might impact your opportunities. ●

APS Student and Early-Career Webinar Series

Watch recordings of these and other webinars, and register for upcoming webinars at psychologicalscience.org/webinars.

FEDERAL AGENTS OF CHANGE: BEHAVIORAL INSIGHTS POWER EVIDENCE-BASED EFFORTS TO IMPROVE GOVERNMENT

Antipsychotics such as quetiapine are often prescribed for reasons not supported by clinical evidence, inflating health care costs and potentially exposing patients to harm. In 2018, a partnership among the Office of Evaluation Sciences (OES), the Center for Program Integrity (CPI) at the Centers for Medicare and Medicaid Services, and academic researchers resulted in an 11.1% decrease in the average days of quetiapine supplied by the top 5% of general-care prescribers. There was no corresponding evidence of patient harm.

It's projects like this—low-cost, potentially high-impact collaborations based on large-scale data sets and tested under real-world conditions—that are the hallmarks of OES. Based at the U.S. General Services Administration, this small team of interdisciplinary experts (mostly from behavioral and social sciences, and many trained as psychologists) works across government to apply behavioral insights, make concrete recommendations for how to improve government, and evaluate impact using administrative data. In a free APS webinar on July 29th, three such experts outlined how OES works and how psychological scientists can help apply research insights to government programs and policies.

Five Core Principles

OES's broad portfolio reflects its mission to “deliver a better government

for the public by enabling agencies to build and use evidence to continually learn what works.” Since 2015, it has completed more than 70 randomized evaluations that have led to outcomes including higher enrollment in retirement savings plans, lower costs for government operations, widened educational opportunities, and, as demonstrated by the reduction in quetiapine prescriptions, improved public health outcomes.

“We generally work at the touchpoint between individuals and government programs,” said Russ Burnett, a cognitive psychologist and OES methods lead. “We try to reduce friction at that touchpoint by applying what research has revealed about how people make decisions and the things that influence how they act.”

While there's no typical OES project, all adhere to the five core principles of OES evaluation policy:

- **Independence:** OES retains control over project selection and the publication of results.
 - **Ethical practice:** OES safeguards the dignity, rights, safety, and privacy of participants and stakeholders in evaluations. Evaluations comply with the spirit and letter of regulations and other relevant requirements.
- The statistical power inherent in large data clusters brings many advantages in OES's randomized trials. “We're often drawing from an agency's existing population—for example, existing residents of public housing, Veterans Affairs facilities, or potential beneficiaries,” explained **Rebecca Johnson**, an OES academic affiliate and assistant professor in quantitative social science at Dartmouth College. “So we often know a fair amount about their demographics and/or past behavior.”
- There are challenges too. “Compared to lab experiments, our data sets often look messy because we rely on administrative data,” said Burnett. “There are more possible outcomes, more possible covariates to include in our analyses.”
- Learn about fellowships and other opportunities at oes.gsa.gov/opps; those interested in becoming academic affiliates are invited to share their interests by emailing oes@gsa.gov.
- OES collaborations, evaluation policy, templates, and more: oes.gsa.gov
 - APS's Government Research, Funding, and Policy initiatives: psychologicalscience.org/policy
- **Rigor:** OES designs evaluations to generate the strongest possible evidence to answer priority questions and support decisions. Every analysis also undergoes an internal replication process to ensure the work is reproducible.
 - **Relevance:** OES chooses projects based on policy priorities and potential impact.
 - **Transparency:** OES publicly commits to its analysis plans before working with data—where possible specifying variables such as statistical models and tests, cases to be excluded from analysis, and how missing data will be handled.

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

NEW GRANT CATEGORIES SUPPORT ANTIRACIST CURRICULA AND ONLINE LEARNING



In recent months, the APS Teaching Fund Committee has pivoted to quickly address challenges facing teachers of psychological science—both by establishing a new grant category to encourage the development of antiracist curricula and by undertaking a Microgrants Initiative that is helping educators meet the challenge of unexpectedly moving courses online because of the COVID-19 pandemic.

Grants for antiracist curricula will be available twice per year as Small Grants up to \$5,000. This category of grants is designed to support “projects that aim to eliminate racial bias in on-line psychological science curricula and incorporate principles of racial justice into the teaching of psychological science content.”

Other categories eligible for Teaching Fund Small Grant funding include

meetings and conferences, scholarship of teaching and learning, and technology and websites. The fall proposal deadline is October 1.

The new antiracist grants come at a time of tremendous social upheaval in response to concerns over police brutality against Black people and align with APS’s broader commitment to end systemic racism and advance equity and justice, according to **Laurie Hunter**, chair of the APS Teaching Fund Steering Committee.

“Diversity and inclusion is an issue of critical importance in our world today,” said Hunter, a psychology lecturer at Christopher Newport University. “Encouraging students to embrace and to appreciate our differences and understand we are all part of the human race is crucial to higher education.”

The Microgrants for Online Learning program provided grants of up to \$1,000 in several categories—including the antiracist curricula category—to support online learning in the wake of the current pandemic. Fifty-six individuals and teams applied for the program, with an average funding request of \$960. Of these, the APS Teaching Fund Committee selected 25 projects for funding, including:

- Interactive Instructional Videos for Teaching Developmental Psychology
- Improv as an Online Teaching Method to Promote Student Engagement and Adjustment in an Introductory Psychology Course
- The Psychology of Eye Contact and Screen Presence in Synchronous Video Conferencing in Undergraduate Instruction: Protocols for Student Engagement and Motivation
- Addressing Systemic Racism in Clinical Psychology and Related Programs

See page 30 to learn more about the online learning microgrants.

The APS Fund for Teaching and Public Understanding of Psychological Science was established with the generous support of the David and Carol Myers Foundation.

Learn more about the APS Teaching Fund at psychologicalscience.org/members/teaching/fund.

See more Observations at psychologicalscience.org/obsonline.

PSYCHOLOGICAL RESEARCH: RACIAL BIASES IN THE PEER-REVIEW AND PUBLISHING ENTERPRISE

Ongoing demonstrations across the United States are focusing long-overdue attention on the issue of race in society. The underpinnings of racial inequity are found within all economic classes, in educational institutions, throughout industry and government, and across the scientific and research community. This is as true for psychological science as it is for the physical and biological sciences.

Solving this deep-seated problem first requires acknowledging how pervasive institutional racism has become and how entrenched systems are perpetuating—even unknowingly—racial disparities in research.

In an article published in *Perspectives on Psychological Science*, **Steven Roberts** of Stanford University and colleagues delve into this timely issue by closely examining the racial dimensions of what they consider to be top-tier cognitive, developmental, and social psychology journals. As a matter of disclosure, no journals published by APS (publisher of *Perspectives*) were included in this analysis, though the implications of their findings are relevant to the entire psychological-science community.

“The reason for this critical look at psychological science is that our field is unique among all the STEM fields,” said Roberts. “We have both the tools and the research methodologies to understand why and how race influences the way people think, develop, and behave. It is critical, therefore, to recognize any racial biases in psychology publishing so they do not influence, however inadvertently, the foundational research of our field.”

To tackle this daunting task, Roberts and his team reviewed more than

26,000 empirical articles published between 1974 and 2018. Across these journals, the authors studied two key factors. First, they wanted to know how often psychological science acknowledges the impact of race on psychology. Second, they investigated the actual makeup of the entire publishing enterprise, from editor to author to participant, to determine whether the people involved in generating and publishing this research were part of the STEM fields’ racial disparity problems.

The results suggest that there is a hierarchy in psychology research that determines who and what gets published. “We are not saying anyone has bad intentions,” said Roberts. “It’s a systemic problem across many fields, and psychological science is no exception.”

The key findings include the following major points.

- First, across the past five decades, articles in psychological journals that highlight race have been rare, and although developmental and social psychology journals have published a growing number of these articles, they have remained virtually nonexistent in cognitive psychology.
- Second, most journals have been edited by White editors, under whom there has been a notable dearth of published articles highlighting race and racism.
- Third, many of the publications that highlight race have been written by White authors, who employed significantly fewer participants of color.

“This overrepresentation cuts through the editor, to the author, to

the research participant,” noted Roberts. “This is all of psychology, and if we are infected with the same bias as everyone else, we definitely need a clean-up.”

Beyond simply illuminating the problem and its serious connotations, Roberts and his colleagues offer several direct recommendations that both journals and authors should adopt to ensure that psychological research benefits from diversity in editing, writing, and participation.

For journals, these recommendations cover a top-down commitment to diversity that includes engaging diverse individuals across all levels of the publication process, applying merit to participant diversity in the review process, releasing public diversity reports annually, and establishing diversity task forces.

Authors, in turn, should detail and justify the racial demographics of their samples, include constraints on generality statements (making it clear the extent to which authors’ conclusions generalize across samples), and include positionality statements showing how the identities of the authors and participants relate to the research topic and the extent to which those identities are represented in the permanent scientific record.

“The present work is not an indictment of psychological scientists,” concluded Roberts, “although it is an indictment of psychological science. As the world becomes increasingly diverse, it will become necessary for our science to become diverse as well.”

See the full article at psychologicalscience.org.

MAPPING THE MOODS OF COVID-19: GLOBAL STUDY POINTS TO TRENDS

By N. Pontus Leander, Jannis Kreienkamp, and Maximilian Agostini

In March 2020, the fast-spreading coronavirus prompted many countries to go into lockdown and to take other behavioral measures to flatten the epidemic curve. Sensing the urgency of the challenge, a collaboration of 100-plus researchers across five continents launched a global study to investigate the psychological implications of this crisis, including the tensions between following government policy and meeting the basic needs of autonomy and social connection. We launched the PsyCorona survey (psycorona.org/data/) on March 19, 2020; by the end of May, more than 60,000 participants had completed the initial, 20-minute survey in 30 languages globally, which included 24 nationally representative samples by age and gender.

Real-Time Country-Level Data

PsyCorona's rapid implementation and global scale affords us the ability to investigate different psychological processes during this critical moment of societal crisis and change. The ongoing scientific mission is to integrate cross-cultural, longitudinal, and integrative data science methods to:

- Evaluate how COVID-19-relevant beliefs, fears, hopes, motivational states, and cultural norms predict adherence to social distancing and other health guidelines;
- Monitor various psychological pressures building in society over time, including frustration and lockdown fatigue, changes in subjective well-being, and shifts in norms, attitudes, and values; and



- Integrate the psychological data with interdisciplinary databases, and use machine learning models to test how our individual-level psychological variables relate to regional epidemiological, policy, and demographic conditions.

Alongside this scientific mission is a crisis-oriented mission to provide information relevant to the present pandemic. Given that the academic publication process can be slow, we sought to provide a more immediate way to access portions of the data. Thus, we built a secure, anonymous, web-based data visualization tool where visitors can easily examine descriptive statistics and associations among study variables. While PsyCorona researchers prepare scientific papers for peer review, visitors are welcome to interact directly with country-level data in a manner consistent with the urgency of the times.

The purpose of this data visualization tool is twofold.

First, it gives our respondents immediate access to the research they participated in by allowing them to interact with the summary data (e.g., Van der Krieke et al., 2016); in effect, it serves as a pilot study for how the behavioral sciences can use data visualization for public engagement. Second, it serves as a resource for researchers, policymakers, and analysts to understand how people are feeling, thinking, and responding to the coronavirus and the extraordinary societal measures taken against it in their country (or across different countries).

As with much of the PsyCorona project, the data visualization tool is still in progress and its final outcome remains to be seen. In the meantime, it offers a glimpse into a possible future of social science that is publicly accessible, responsive to public need, and in which scientific data are communicated in a way that lets users ask their own questions.

See the full article with reference list at psychologicalscience.org.

N. Pontus Leander is an associate professor of psychology, University of Groningen, and is codirector of PsyCorona (psycorona.org). **Jannis Kreienkamp** and **Maximilian Agostini** are PhD students in the Department of Psychology, University of Groningen; they are cofounders of PsyCorona and designed the data visualization tool. An updated look at PsyCorona will appear in the October *Observer*.

Promote Your Virtual Events in the *Observer* Announcements

Submit Events to apsobserver@psychologicalscience.org

Call for Nominations: APS Rising Stars

Deadline: September 30, 2020



The APS Rising Star designation recognizes outstanding psychological scientists in the earliest stages of their post-PhD research careers.

Nominations will be evaluated based on the following criteria:

- Significant publications
- Significant recognitions
- Significant discoveries, methodological innovations, or theoretical or empirical contributions
- Work with potentially broad impact

Eligibility for the 2020 nomination period is limited to individuals who received a PhD between January 1, 2014 and December 31, 2017.

Nominations Process: Each nomination must be supported by two APS Members, one of whom must be an APS Fellow. For information on submitting nominations, please visit: www.psychologicalscience.org/rising-stars

Please consider the diverse and international nature of our field in nominating colleagues. Nominations of members of underrepresented groups in psychological science are encouraged.

AMID BUDGET PROCESS, U.S. HOUSE UNDERLINES VALUE OF BEHAVIORAL SCIENCE

Lawmakers note contributions of NSF, NIH-funded science

This summer, as the U.S. Congress worked to develop the country's budget for fiscal year 2021, behavioral science landed critical mentions among lawmakers' priorities, a reflection of APS's advocacy work with policymakers.

In one such statement, the House appropriations subcommittee that funds the National Science Foundation (NSF) noted the value of NSF's Directorate for Social, Behavioral, and Economic (SBE) Sciences, the central funder of psychological science at the agency. In the explanatory report connected to the appropriations bill, the subcommittee wrote that it "supports SBE and recognizes the fundamental importance of the research it supports," recommending that SBE's budget be protected from disproportionate cuts.

This language is critical, given the directorate's history of being targeted for budget cuts or elimination—outcomes that have not been proposed for some time, thanks to fierce advocacy efforts by APS and others in behavioral science.

In a second success for the field, the subcommittee that supports the National Institutes of Health (NIH) lauded the value of behavioral science and called on NIH to take a close look at its support for psychological science and related sciences.

"Most of the leading public health issues facing our nation—including cancer, addiction, heart disease, mental illness, diabetes, violence, and AIDS—are rooted in individual and social behavior, yet behavioral science

is decentralized across NIH's Institutes and Centers, and the NIH commitment to manage and directly fund this important research is limited," the subcommittee wrote. The report called on NIH to convene an advisory panel of behavioral scientists to provide recommendations on how to better realize health benefits by drawing from the agency's behavioral research.

Congress's support is positive news for psychological science and APS members, and it would not have happened without APS's advocacy efforts on Capitol Hill. In addition to submitting testimony to Congress on these issues, APS visited with many House and Senate offices, speaking on the value of NSF's SBE directorate and describing APS Members' concerns about the status of behavioral science at NIH, especially the agency's expansion of its definition of clinical trials to include basic behavioral research, which APS continues to oppose.

Congress has been receptive to learning about these topics, as illustrated by the excerpts from the appropriations report above.

"The U.S.'s modest support for psychological science research does not match the outsized role behavior plays in health and in other diverse areas such as economic productivity, education, systemic racial inequities, technology, and many others," said APS Executive Director Sarah Brookhart. "We thank the House for recognizing the value of our field in the annual appropriations of NSF and

NIH. This is an important step toward bringing federal support for the study of behavior into proportion with its importance.

"As we await a vaccine or cure for the pandemic, the only tools we have available are behavioral in nature," Brookhart added. "It's clearer than ever that the U.S.'s science agencies should be lending their full support to ensuring a strong and effective psychological science enterprise."

The House appropriations bills and reports are just a part of Congress's budgeting process. As of mid-August, the Senate had not begun its work on these appropriations. Nevertheless, reports from the House carry great weight with federal agencies, and APS will continue to work with NSF and NIH to ensure the report language—and the important message it contains—receives full consideration. ●

— Andy DeSoto

APS Director of Government Relations

See a longer version of this article on APS's Funding & Policy page for passages from the Congressional report language pertaining to behavioral science at NIH and NSF.

APS Student and Early Career Webinar Series

These webinars are free, and recordings will be available following the live events.



June Virtual Networking

July Careers Outside Academia

August Peer Review

September Online Research

October Path to Postdoc

Register and View Recordings:

psychologicalscience.org/webinars

APS STANDS WITH INTERNATIONAL STUDENTS STUDYING IN THE UNITED STATES

ICE policy changes draw fierce opposition from scientific community, are quickly reversed



APS wrote directly to ICE, emphasizing the ongoing threat of COVID-19 and the risk to students' physical and mental health in forcing them to attend in-person classes. APS also joined with the broader scientific community in signing on to two additional letters condemning the move.

This summer, proposed changes to U.S. immigration policies cast widespread uncertainty among international students in the country who had planned to take online courses this fall because of the COVID-19 pandemic. After fierce opposition from the scientific and academic communities, including APS, the government's plans were quickly dropped.

On July 6, U.S. Immigration and Customs Enforcement (ICE) announced that it would end temporary exemptions to online learning requirements as part of the Student and Exchange Visitor Program. That move would have forced international students to take in-person classes at U.S. universities to remain in the

country legally. APS wrote directly to ICE expressing strong opposition to the proposed change, emphasizing the ongoing threat of COVID-19 and the risk to students' physical and mental health in forcing them to attend in-person classes.

The APS letter also referenced National Science Foundation data showing that between 2000 and 2017, more than 4,100 individuals on temporary visas received their PhD in psychology in the United States, highlighting the importance of international students to the advancement of global psychological science and to closing the country's scientific talent gap. Other data show that science and engineering PhD students in the United States on temporary visas

tend to stay at least 5 years after they obtain a degree, continuing to contribute their skills to the workforce.

APS also joined with the broader scientific community in signing on to two additional letters condemning the move. Some universities, including Harvard and the Massachusetts Institute of Technology, even sued the administration.

In response to the opposition, ICE dropped the planned changes to exemptions on July 14, only 8 days after they were announced—a positive outcome for advocates who organized and responded quickly to address the issue.

As the world continues to deal with the effects of COVID-19, fostering a strong scientific workforce in the United States and abroad has become more important than ever. Psychological scientists have much to contribute to our understanding of how behavior can mitigate the effects of COVID-19, and the global nature of the science will continue to be important for shaping best practices and policies moving forward. ●

— Keko Erber

APS Government Relations Associate

See APS's Funding & Policy page for a longer version of this article, including references, as well as APS's letter to the Student and Exchange Visitor Program of U.S. Immigration and Customs Enforcement.

NEW APS BOARD MEMBERS KNOWN FOR WORK ON INEQUALITY, DEVELOPMENT

The APS Board for 2020–2021:

- **Shinobu Kitayama**, University of Michigan (President)
- **Jennifer L. Eberhardt**, Stanford University (President-Elect)
- **Lisa Feldman Barrett**, Northeastern University (Immediate Past President)
- **Richard Ivry**, University of California, Berkeley (Treasurer)
- **Natalie Sebanz**, Central European University (Secretary)
- **Maryanne Garry**, University of Waikato in New Zealand
- **Michele Gelfand**, University of Maryland, College Park
- **Ann M. Kring**, University of California, Berkeley
- **Vonnie C. McLoyd**, University of Michigan
- **Seth Pollak**, University of Wisconsin-Madison
- **Janet F. Werker**, University of British Columbia

Learn about the APS Board, bylaws, history, and more at psychologicalscience.org/about/who-we-are.

Three accomplished psychological scientists and APS Fellows whose research covers race and inequality, brain and behavioral development in children, and language acquisition in infants have joined the APS Board of Directors for 2020–2021. **Jennifer Eberhardt** (Stanford University, President-Elect), **Seth Pollak** (University of Wisconsin-Madison), and **Janet Werker** (University of British Columbia) joined the Board in June for terms lasting through May 2023.

With Eberhardt becoming President-Elect, **Shinobu Kitayama** (University of Michigan) assumes the role of President, and **Lisa Feldman Barrett** (Northeastern University) moves to Immediate Past President.

See this article online for links to related content, including profiles of Kitayama and Feldman Barrett in an introduction of the 2019–2020 APS Board.



Jennifer L. Eberhardt

Stanford University
APS President-Elect 2020–2021

Amid unprecedented inequality and growing polarization around the world, APS President-Elect Jennifer Eberhardt believes the work of APS is more important than ever. A social psychologist who is a professor of psychology and the Morris M. Doyle Centennial Professor of Public Policy at Stanford University, Eberhardt conducts research on race and inequality. Through interdisciplinary collaborations and methods ranging from laboratory studies to novel field experiments, she has revealed the startling and often dispiriting extent to which racial imagery and judgments shape actions and outcomes in our criminal justice system and in our neighborhoods, schools, and workplaces.

Eberhardt is also codirector of Stanford SPARQ (sparq.stanford.edu), an initiative that uses social psychological research to address pressing social problems. She outlined some of its work in a June 2020 TED Talk, “How Racial Bias Works—and How to Disrupt It,” including strategies for getting people to pause and reflect on the evidence of their assumptions before acting. A 2016 project with the City of Oakland, California, for example, pushed police officers to ask themselves a simple question before stopping a driver or pedestrian: “Is this stop intelligence-led, yes or no? In other words, do I have prior information to tie this particular person to a specific crime?” In the year after adding that step, stops of African Americans fell by 43%. And the city’s crime rate continued to fall.

In 2014, Eberhardt was named a John D. and Catherine T. MacArthur Fellow and one of *Foreign Policy*’s 100 Leading Global Thinkers. In 2016, she was elected to the American Academy of Arts and Sciences as well as the National Academy of Sciences. She currently serves on the National Academies’ Committee on Science, Technology, and the Law. She has served on boards including Behavioral, Cognitive, and Sensory Sciences at the National Academy of Sciences, Stanford’s Center for Advanced Study in the Behavioral Sciences, and the Society for Personality and Social Psychology.

Deeply committed to public service and widely quoted in various media outlets, Eberhardt has been invited to speak about her work at the White House, the U.S.

Department of Justice, the California Department of Justice, and the California Supreme Court, among other places. In 2019, she published *Biased: Uncovering the Hidden Prejudice That Shapes What We, See, Think, and Do*, described in the *New York Times Book Review* as an “unexpectedly poignant overview of the research on cognitive biases and stereotypes, especially racial bias in criminal justice.”



Seth Pollak

University of Wisconsin-Madison

APS Board Member
2020–2023

Seth Pollak is the Let-
ters and Sciences Distinguished Professor of Psychology, a professor of neuroscience and public policy, and director of the Child Emotion Research Laboratory at the University of Wisconsin-

Madison, where he is also an affiliate of the Waisman Center and the Institute for Research on Poverty. His research focuses on the influences of environmental risk factors on children’s brain and behavioral development, with a particular focus on emotions and learning.

A fellow of the American Association for the Advancement of Science, Pollak has received sabbatical support from the James McKeen Cattell Fund and the Boyd-McCandless Award for Distinguished Contributions to Child Development. He held an elected position on the Governing Council of the Society for Research in Child Development, where he also chairs the Levin Early Career Award committee. He is a founding Associate Editor of *Affective Science* and was as an editor at *Developmental Review*, *PNAS*, *Emotion*, *Developmental Psychology*, and *Development and Psychopathology*. Besides maintaining an active lab, he serves on the boards and as a volunteer consultant for numerous children’s and science museums and testifies regularly to lawmakers and the public on issues of stress and children’s development.

“I would like to help APS strengthen public understanding of psychological science and increase the use and discussion of empirical psychological science in national and international decision making about policies that affect human well-being,” Pollak said. He believes APS is in a powerful position to address pressing needs worldwide by enhancing scientific communication and driving efforts for diversity among researchers and scientific approaches to ensure a full array of perspectives are brought to bear in improving human welfare.

“I also would like to see APS find new ways to encourage and support early-career scientists so that we can benefit from diversity among our researchers and also increased diversity in our methods and approaches,” he said. “Personally, I derive a lot of purpose and meaning from my work in trying to better

understand how adversity impacts children’s development. My hope is that the rising generation of psychological scientists will not only have the opportunities they deserve to make original contributions to knowledge, but that they will also find a sense of fulfilment in using science to improve human welfare.”



Janet F. Werker

University of British Columbia
APS Board Member
2020–2023

Janet Werker is University Killam Professor and Canada Research Chair in Psychology at the University of British Columbia (UBC), with research appointments at BC Children’s and Women’s Hospital and the Centre for Brain Health. She directs the Infant

Studies Centre and cofounded and directs the UBC Language Sciences Initiative. Her awards include recognition with an APS William James Fellowship, the SSHRC Gold Medal, the Killam research prize, a fellowship in the Royal Society of Canada, and appointment as an officer of the Order of Canada, in addition to fellowship in many scientific societies. In April 2020, she was elected to the National Academy of Sciences.

A past fellow in the Canadian Institute for Advanced Research (CIFAR) Program in Child and Brain Development, Werker is now chair of the Advisory Committee for CIFAR’s Brain, Mind and Consciousness Program. She has served on advisory boards for both local (e.g., Infant Development Program of BC) and international (RIKEN Brain Science Institute, Japan) organizations. She has held and/or led interdisciplinary, international grants from the Human Frontier Science Program, the McDonnell Foundation, and OECD-CERI, and was recently awarded a large SSHRC Partnership Grant. Currently a senior editor for *The Neurobiology of Language* and a Founding Editorial Board Member of *Annual Review of Developmental Psychology*, Werker focuses on the foundations of language acquisition, beginning in early infancy.

In joining the APS Board, Werker hopes to ensure that the vision and contributions of the more specialized communities within psychological science can enrich and be enriched by the broader APS community. With regard to the profession’s impact more widely, “I would like psychological science to be shared at the national and international level, but also at the local and family level to help support parenting practices, culturally sensitive children’s services, and community well-being,” she said. And she’s hopeful about the future. “With new analytical tools, open science and collaborative research endeavors (such as ‘Many Babies’), and an increasing understanding of effective knowledge mobilization, I believe the new generation of psychological scientists are well positioned to increase the profile of and trust in science, and to use such achievements to better the public good.” ●



Working Around the Distance

Some six months after the COVID-19 pandemic shuttered universities and upended lives worldwide, a new set of practices has begun to take shape in psychological scientists' research, teaching, and, for those who are still students, learning. Early this summer, APS surveyed the field to better understand the impact of the pandemic on labs and classrooms, as well as the strategies being used to overcome the challenges associated with moving research and learning from in-person laboratory settings and classrooms to online platforms.

We received 611 responses from students, researchers, and faculty on every continent except Antarctica. The selection of experiences and insights reported here does not present a panacea for all challenges, or even a collection of scientifically supported advice. Rather, it represents a cross-section of personal stories that speak to the enormity of the challenges and potential solutions alike. We are grateful to those who shared, and we hope their insights will provide you with ideas, inspiration, and reassurance.

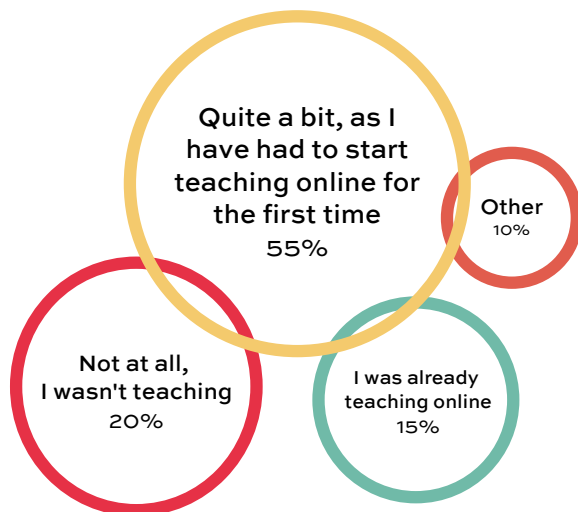
By Ludmila Nunes,
APS Staff Writer

“Anticipate what can go wrong and ensure your grandmother can make sense of what you are asking people to do.”
— Thomas F. Hilton, retired National Institutes of Health program official, offering advice for planning an online experiment

Teaching: Engagement Challenges, Organizational Solutions

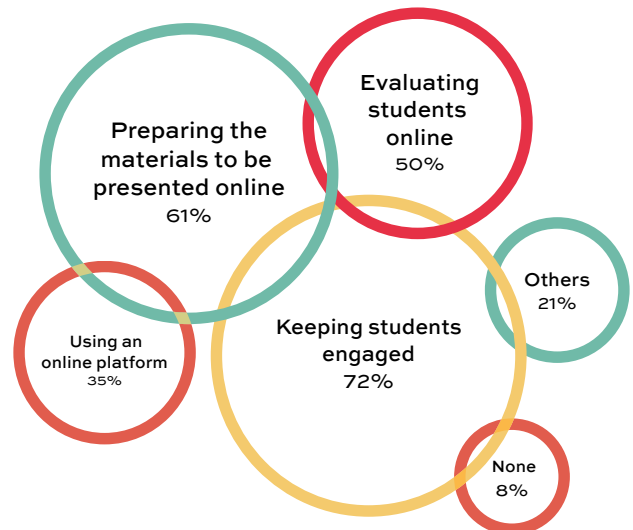
More than half of the survey respondents said COVID-19 affected their teaching “quite a bit” because they had to start teaching online for the first time. They cited difficulties including keeping students engaged, preparing materials for online classes, evaluating students online, and using online platforms.

How has COVID-19 affected your teaching?



Various factors have affected the specific struggles instructors have experienced. Large classes and the applied nature of the content appear to make online teaching more difficult. “I haven’t figured out how to have online class discussion with a class of 86,” said Deb Polk (University of Pittsburgh). “My course is very applied. In class, we talk about situations the students have faced and how to address them. I don’t know how to translate that online.” Steven A. Miller (Rosalind Franklin University of Medicine and Science) identified similar issues, along with the **limitations of technology**. “It’s hard to gauge student comprehension of material using Zoom. Students seem to provide less feedback online, and reading nonverbal cues in the online

What challenges have you encountered in teaching online?



environment is also difficult,” he said. And because he teaches quantitative courses, “I’d really need four or five monitors to do what I’d want, and that’s not feasible: Have (1) students in Zoom, (2) syntax, (3), output, (4) Markdown with equations, notes, etc., and (5) web browser in case an online calculator of anything is needed.”

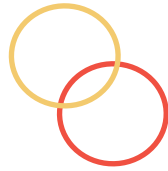
Many instructors identified **technical issues on the part of their students** as well, including simple Internet access in many cases. “I teach at a community college, so students’ ability to access the information and assignments from home is not a given,” wrote Rachel A. Rogers (Community College of Rhode Island). For Patrice Miller (Salem State University), “some students were not able to handle this transition at all, and they essentially disappeared.” She noted that many students at her school are also the first in their families to attend university and/or have “incredible personal or family challenges.”

Grading and online evaluations have been another source of concern for instructors. Many students couldn’t immediately see the examinations posted by Garth Lipps. His school, the University of the West Indies in Mona, Jamaica, also suffered overloaded phone lines, online chat support, and email services. Several respondents noted that **cheating and plagiarizing** have been rife in the switch to online learning.

Despite these and other concerns associated with online teaching, most respondents reported finding at least some resourceful strategies—and a few have even seen a silver lining in the switch. “Students sent inquiries at any time they wanted to ask questions,” wrote Kazuo Mori (Matsumoto University, Japan). Reading and grading students’ work has taken “twice or four times” longer, but that’s “because they revised their essay and resubmitted it again and again, just like we submit our manuscripts to journals. It was very much beneficial to the students. They learned more than before.”

“I had to learn to shut out the overwhelming volume of (well-meaning) advice and cheerleading from teaching ‘experts’ who had an endless list of tools and success stories. I chose just a few elements that felt right for me and my teaching style (instead of trying to be a tech wizard).”

—Elizabeth Spievak,
Bridgewater State University



Many successful transitions have reflected instructors’ **active efforts to educate themselves on online teaching platforms, technologies, and strategies**. Effrosyni Mitsopoulou, a tutor in psychology working in the United Kingdom, took online teaching seminars to learn how to use platforms such as Moodle and Microsoft Teams. Ahu Öztürk (Uludag University, Turkey) said just reading about online teaching helped her a lot. But the most popular way to learn more about online teaching appears to be relying on colleagues who have already taught online or are more technologically savvy.

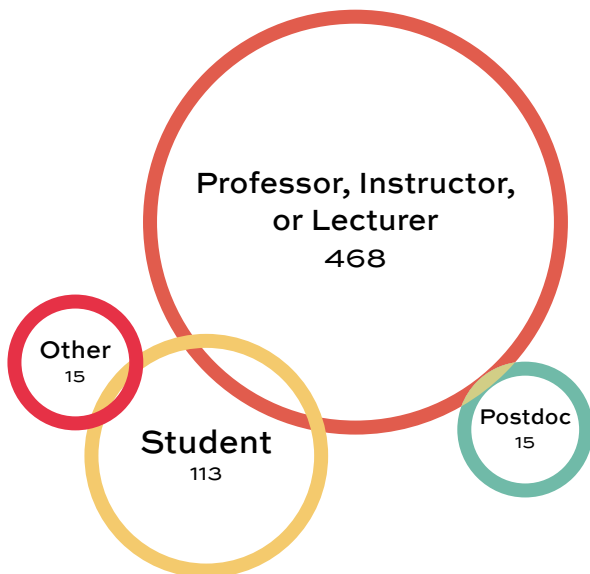
Juan David Leongómez (Universidad El Bosque, Colombia) came up with a clever solution to address the problem of student connectivity and access while taking into account the importance of interaction: asynchronous teaching, or recording and posting videos that students can watch at their convenience, along with **synchronous discussions** about specifics in small groups.

Many respondents cited the difficulty of keeping students organized. Some, including Adam Putnam (Furman University), highlighted the importance of **checking on students** more often

than when teaching in person. Dana Basnight-Brown (United States International University Africa, Kenya) said she uses “more discussion questions during online classes, checking in to see how students are managing the technology.” Amy Learmonth (William Paterson University) has required students to attend office hours online. To facilitate communication with students, Salomé Pinho (University of Coimbra, Portugal) adopted “a discussion forum in order to know the difficulties and opinions of the students.”

Instructors underscored the importance of **structure and organization** for strengthening student engagement. Mark Bardgett (Northern Kentucky University) wrote that he “tried to provide a much more structured learning environment online (e.g., ‘What’s Due This Week’ module) as opposed to the looser daily give-and-take in the classroom” and “tried to remind students on a nearly daily basis about assignments and assessments that were coming up or due.” One respondent noted turning the syllabus calendar into a task checklist that indicated the website each task could be found on. Rachele Tannenbaum (Anne Arundel Community College) provided some practical advice in this regard: “Be very, very organized in how you present material online. For example, give students a calendar, but ALSO use the learning management system calendar, AND post weekly announcements with reminders.” She also suggested organizing course material into modules or folders with a consistent struc-

Tell us a bit more about yourself



Asynchronous Learning With a Teamwork Twist

For Darrell Butler (Ball State University), COVID-19 has provided an excuse to refine an approach he’s used for years. “I decided many years ago to develop a graduate class that would allow students to work asynchronously, except I wanted to allow teamwork for those who were interested.” Instead of a live video platform like Zoom, this class is taught on a website that leverages a discussion board, a gradebook, and resources such as Blackboard and Canvas. “I spent time determining the general goals and specific objectives,” he explained, and then developed weekly assignments. “For example, I wanted graduate students to give professional presentations, and I wanted them to practice good audience behavior (asking good questions and offering socially appropriate comments). I ask students to record their presentations (using YouTube) and post the link to the presentation, a paper copy of the presentation, and any handouts,” preferably in the form of PDF files. “Other students in the class are asked to read their classmates’ papers and/or watch their presentation, then contribute to the discussion board. In addition to the website, I email the students weekly, at least with some feedback on the last assignment they completed.”

ture, having consistent due dates, and adding some “personal presence. . . whether it’s sharing information about yourself, or adding cute memes to announcements, students appreciate knowing that there’s a human behind all those emails.”

Online discussions and polls can also foster engagement. Grazyna Kmita (University of Warsaw, Poland) has been “engaging students in online discussions, listening to their opinions, giving small tasks to prepare, and giving feedback.”

As for specific programs that have helped with teaching online, Sandy Venneman (University of Houston-Victoria) said she “learned how to record examples of statistical calculations using Panopto,” a software platform that facilitates lecture recording, screencasting, video streaming, and video content management. Laura Freberg (California Polytechnic State University, San Luis Obispo) likes a Top Hat beta product called Slate, which allows students to ask questions that either the instructor or a classmate can answer.

In terms of more **practical strategies** to increase learning online, Clementina Hueche Arriagada (Universidad de La Frontera, Chile) recommended beginning classes by asking students how they’re doing (an emotional check-in); keeping classes short (40 minutes max); and not overwhelming students with asynchronous tasks. Emma Ward (Middlesex University, United Kingdom) adopted a “blended approach to foster engagement and variety (i.e., mix of pre-recorded lectures/nuggets and live tutor-led online sessions for small groups).” APS Fellow Dale Dagenbach (Wake Forest University) suggested asking students to submit discussion questions before and after class, and Arturo Hernandez (University of Houston) tries “to incorporate a written assignment and [provide] feedback on it during class time.”

Instructors also mentioned their use of **supplemental resources**. Laurel Camp (Marian University) has relied heavily on YouTube and other videos for inspiration. Christopher Thomas (University of Texas at Tyler) suggested looking at open-access content, which often includes materials that can be adapted for the online environment.

Research: Documenting and Diversifying

The closure of universities has made it very difficult, if not impossible, to conduct psychological research in person. About one-third of survey respondents had to move at least some of their experiments to online platforms, and one-sixth had to completely stop their experiments. For those able to move research online, the biggest challenge has been recruiting participants, followed by programming the experiments and paying or assigning credits to participants. On the positive side, some researchers were already conducting research online, and about a fifth reported encountering no problems while doing online research. Researchers mentioned organization and extensive documentation of the research process—already considered a

good lab practice before the pandemic—as an important strategy for handling online research.

The **validity of data** collected online seems to be one of the main problems. APS Fellow Erin Tone (Georgia State University) fears acquiring “junk data” and noted difficulty monitoring participants’ attention and engagement. Jeffrey S. Anastasi (Sam Houston State University) worries about “participants not taking the studies seriously and getting responses that indicate that they aren’t paying attention to the study.” APS Fellow Pamela Smith (University of California, San Diego) reported that “participants seem very distracted (unsurprisingly). **Attention-check failure** rates have been at 30–50%, especially when trying to use the online student pool at my university. This has led us to be very selective in the work we do online.”

Researchers studying infants and children noted specific concerns related to the impossibility of bringing children to their laboratories or even having children perform tasks reliably while at home with their parents. “I work with toddlers, and the most common reason a participant provides unusable data is that parents help,” wrote Amy Learmonth. “I just don’t see how I can do what I want to do online.” Similarly, researchers conducting experiments with animals said the closure of

APS Past President Morton Ann Gernsbacher (University of Wisconsin-Madison) has extensive experience with online teaching. This summer, she even designed an additional online course and supervised a graduate student to teach it. Among other benefits, she believes web-based higher education can:

- Lead to better mastery by enabling more frequent engagement with course materials (distributed learning over time);
- Optimize performance by allowing students to choose to engage with the materials during their best times;
- Deepen memory by supporting assignments that rely on deeper levels of processing (e.g., assignments that require students to connect information, including the extensive information available online);
- Promote critical thinking by giving students access to large quantities of information that they must evaluate and sift through; and
- Enhance writing skills by relying on discussion boards that foster the ability to write for a broader audience, including professors and peers.

See this article online for links to three of Gernsbacher’s open-access psychology courses: Basic Statistics, Research Methods, and Psychological Effects of the Internet. Also find links to *Observer* articles featuring her insights about online learning.

APS Microgrants for Online Learning

In June, in response to the COVID-19 pandemic, APS launched an initiative through its Teaching Fund to facilitate the development and dissemination of best practices for teaching psychological science online. The Microgrants for Online Learning program provided grants of up to \$1,000 to support projects in six general categories, including webinars and virtual meetings, support for individual classes, scholarship of teaching and learning, and antiracist curricula.

Fifty-six individuals and teams applied for the program, with an average funding request of \$960. From those applicants, the APS Teaching Fund Committee selected 25 projects for funding, including the following:

- Interactive Instructional Videos for Teaching Developmental Psychology
- Improv as an Online Teaching Method to Promote Student Engagement and Adjustment in an Introductory Psychology Course
- The Psychology of Eye Contact and Screen Presence in Synchronous, Video Conferencing in Undergraduate Instruction: Protocols for Student Engagement and Motivation
- Addressing Systemic Racism in Clinical Psychology and Related Programs

Learn more about the APS Teaching Fund and other teaching resources from APS at psychologicalscience.org/members/teaching.

animal labs has meant they can access labs only to maintain the animals, not to collect data.

Methodological issues have also surfaced—for example, in research that involves measuring reaction times or requires in-person methods such as eye-tracking. Christine Weinkauff Duranso (University of North Georgia) wrote that her research “requires participants to exercise indoors or outdoors, both of which are clearly limited given the pandemic. School fitness centers are closed, public fitness centers are closed, parks have been closed. . .”

Researchers also mentioned difficulty in **getting funding** for experiments and problems with programming experiments for online platforms. One respondent said she knows a little about coding, but not enough to be truly effective without the assistance of a computer scientist.

To overcome the challenges of conducting online research, researchers deployed some crafty strategies. Madison Miller

“Near-excessive documentation of the progress for each study. Multiple studies, hundreds of emails, multiple participant remuneration plans. ALL of it documented to ensure nothing and no one is missed.”

—Carrie Leonard,
University of Lethbridge, Canada

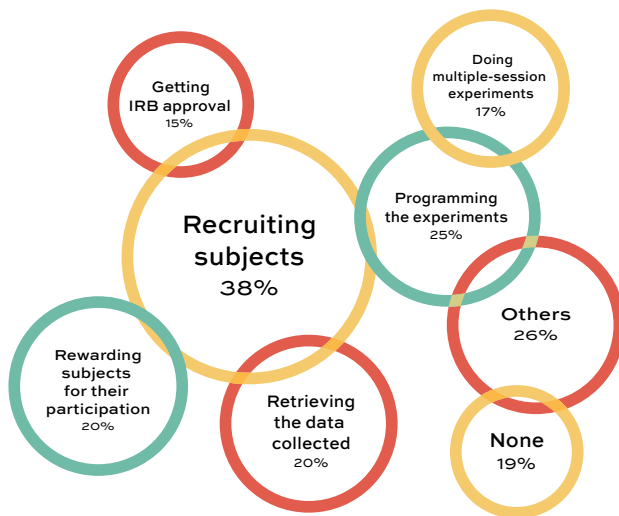
(California State University, Fullerton) has relied on “utilizing social media as a recruitment platform, conducting teleconference interviews, collaborative programs such as Dedoose and Google Drive to effectively communicate and work with other lab mates.” “Zoom meetings have helped extensively,” noted Garth Lipps. “Google Forms allowed us to create a unified data-collection strategy across different countries.”

Another common **strategy has involved adapting the duration, and sometimes the design, of studies**. Emma Geller (University of California, San Diego) collects data through her university’s subject pool and occasionally on Amazon’s Mechanical Turk. “Even with payment/credit, we struggle to get participants to take the study seriously if it lasts a long time. Our most successful studies are under 30 minutes and include material that participants find interesting. . . . My research is focused on the science of learning and instruction, and I have learned the hard way that difficult topics are hard to use in these studies unless there is real incentive/compensation AND there is a researcher in the room while the participant completes the study. . . . Volunteers simply

How has COVID-19 affected your research?



What challenges have you encountered in doing research online?



do not complete studies that take a lot of effort or time.” Min Hooi Yong (Sunway University, Malaysia) said she has changed some parameters of her research to be more suitable to virtual sessions.

Qualtrics and Mechanical Turk emerged as the most popular **programs and platforms for conducting online research**. Respondents also mentioned using Prolific, which recruits participants from different countries; REDCap, a secure data-collection tool that allows users to build and manage online surveys and databases; and Gorilla, which makes it easier for researchers to create complex experiments and collect data, especially because it allows users to easily control presentation and response times.

Finally, many respondents noted successful **collaborations** with people already experienced in conducting research online. APS Fellow Alice Cronin-Golomb (Boston University) highlighted the benefits of joining with others in her lab to learn and adapt to the challenges. “Some wanted the opportunity to learn to develop online research studies because we study clinical populations who have trouble with in-person studies anyway. It’s the method of the future.”

Rebecca Farmer Huselid (Hunter College, City University of New York) said she “will post web studies in more places than usual” because her subject pool was closed down, and she has had to **be more creative** to find volunteers in the community instead of counting on students. This change can be seen as another possible benefit of the new need to do research online: By stepping outside of purely academic settings, researchers might engage in research with more ecological validity, yielding results that generalize to a more diverse population.

Learning: Missed Connections and Zoom Fatigue

Students have also been deeply affected by pandemic-related changes. Of the roughly 113 students who responded to APS’s survey, 71% said COVID-19 changed their classes quite a bit because they had to shift to online classes.

A major concern among students has been the **reduction or elimination of interaction with peers**. “The main drawback to an online course experience is the missing solidarity of being adjacent to peers during demanding work,” wrote Tracy Lamar-Ray (Harvard University). “Proximity fosters innate support.”

Students also cited concerns about what they perceive as the **excessive duration of online classes**. “There is this ‘Zoom fatigue’ where it becomes very difficult to watch and listen to a lecture after a certain period of time,” wrote Madeline J. Bruce (Saint Louis University). “I think more so due to the stress of COVID-19 and having a routine shift, I’ve had a hard time prioritizing and mapping out what I need to do.”

One student we heard from was Rachele Kromash (East Tennessee State University), a first-year clinical psychology graduate student and part of the Crime, Addiction, Re-Entry (CARE) Lab supervised by Kelly E. Moore. The program, which investigates the barriers facing individuals that are reintegrating into their communities after incarceration, is very applied, Kromash said, and the lab is still figuring out the details of how to administer group therapy virtually.

Plans for in-person interviews also had to be tabled, forcing Kromash’s lab to shift them online. But she was optimistic, speculating that “we might have a more diverse sample.”

As other students mentioned, the rapid transition to online learning also limited how much content Kromash’s professors have been able to cover in class. Moving to an online platform has changed the nature of class discussions and limited people’s participation, particularly in more applied classes, she added. She suggested that other students affected by the pandemic **seek out learning opportunities** elsewhere. At the beginning of the pandemic, for example, she signed up to take free statistics courses. “And, remember, you’re not the only one in this situation,” Kromash said. She’s found it helpful to speak with others in fields like nursing, who may be even more profoundly affected by the shift away from in-person training. ●

We want to hear from you. Continue the conversation online by sharing how the move to online research and education has affected you. Comment on this article at psychologicalscience.org/observer/working-around. Or email us at apsobserver@psychologicalscience.org.

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THE BRAIN FROM INSIDE OUT: 2020 KAVLI KEYNOTE ADDRESS SHINES LIGHT ON COGNITION

By Charles Blue, APS Staff Writer

One of the most profound yet least intuitive advances in science over the past century is Albert Einstein's general theory of relativity, which—among other things—defines how space and time are woven together into the fundamental fabric of the cosmos: spacetime. This seemingly esoteric theory has surprisingly direct influence over our everyday lives, from enabling GPS navigation to helping maintain global communication networks.

Remarkably, the idea of spacetime also has an insightful corollary in neuroscience, as explored in APS's 2020 Fred Kavli Keynote Address, presented by György Buzsáki of New York University. In his talk, delivered virtually because of the cancellation of the 2020 APS An-

nual Convention, Buzsáki challenged the prevailing idea that “time” and “space” are encoded in the brain in separate representations or “coordinates.” Instead, he postulated that neural activity can be described as a succession of events along a space-time continuum.

Buzsáki's central idea is that, rather than having brains that are blank slates at birth, we are born with brains that organize themselves to induce highly structured robust yet flexible patterns. He refers to this as an “inside-out” framework in which the brain comes with a preconfigured and self-organized dynamic that constrains how it acts and how it views the world. In the brain's nonegalitarian organization, preexisting nonsense brain patterns become meaningful through action-based experience.

To explore this, Buzsáki addressed three interconnected questions:

- How did we inherit our neuroscience framework?
- How did cognitive mechanisms emerge?
- What is the alternative to the current dominating “blank slate” model?

Buzsáki began his talk by revisiting what he proposed is the birth of modern psychology: the 1890 publication of *The Principles of Psychology* by William James. Buzsáki noted that the vocabulary we now use to describe psychology lives within

the titles of the chapters in this seminal book. Examples include chapters like “Memory,” “Sensation,” and “Imagination.” These same concepts live today within the established “input-output” model of the brain.

How Did We Inherit Today’s Neuroscience Framework?

According to the input-output model, the brain learns about the features of the world (inputs), which it then turns into outputs through some sort of intermediary or “black box” function that produces consciousness, decision-making, and free will.

Buzsáki’s main point is to propose an alternative model—the inside-out model—which starts with the idea that the brain is a self-organized system. In this new model, the brain’s main job is to predict the consequences of its action and what is useful for the survival of the body. Starting with existing internally organized patterns, the brain then generates outputs. These outputs, in turn, go on to influence the inputs we receive from the outside world: our perceptions.

In contrast to the input-output model, which goes from specific to general, the inside-out model starts from “good enough” generalizations that become detailed through experience. Buzsáki explained this idea with the simple example of observing a rose.

In the input-output framework (also referred to as the “outside-in” framework), the brain has no grounding for how an object like a rose is related to the rest of the outside world. An inside-out framework, however, provides this needed grounding for cognition by comparing the rose to some action the body “sends out,” like picking up and moving the rose. Whenever the brain sends out an action, it informs the rest of the brain by comparing the changes it perceives in the outside world.

“So my big claim is that this action is the source of grounding, and this is what can give rise to the meaning of many of the perceptions we have,” Buzsáki said.

How is it possible that from a simple brain, we are able to generate a very complex computation that we call cognition?

How Did Cognitive Mechanisms Emerge?

The answer to this question, according to Buzsáki, is that cognition is nothing more than internalized action. In a simple brain model with very few neuronal connections, it is possible to evaluate the environment and predict possible future outcomes with a simple input-output mechanism, but in a very limited manner.

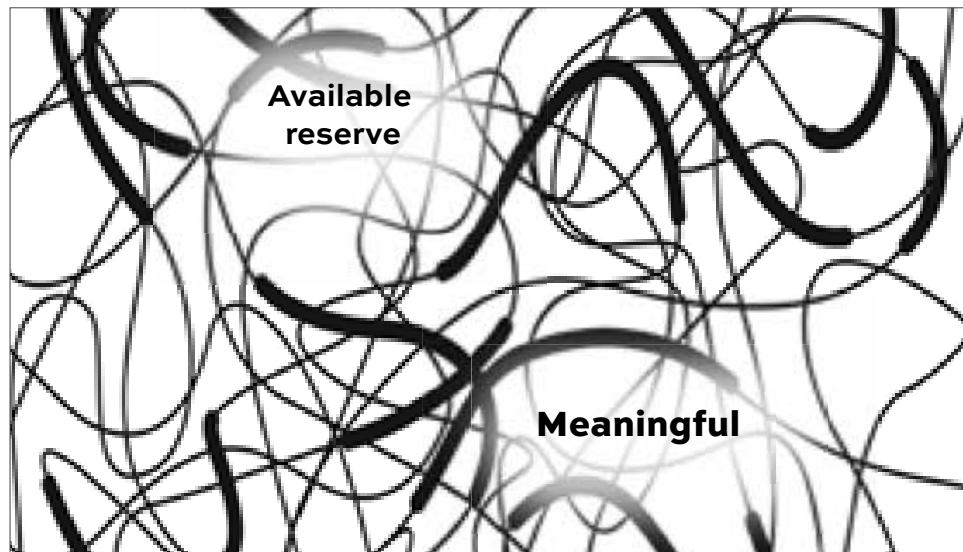
In a more evolved brain, however, the networks become so complex that even without an outside environment, neuronal connections can extrapolate and interpolate. “The brain learns to predict in a much more complex environment and at a much longer time scale,” noted Buzsáki.

Over time, the brain evolves, learns, and becomes capable of no longer needing to interact with the environment to predict outcomes. This enables us to consider “what if” scenarios in which we imagine the consequences of hypothetical actions without acting them out in the real world.

A concrete example of this idea is shown in some of Buzsáki’s earlier work on memory and navigation, which describes two distinct ways of navigating in an environment. The first mode is purely internalized, as when one walks through a completely dark, unfamiliar room. The longer you do this, Buzsáki noted, the more errors accumulate. That is why we need another anchor, which we get when we open our eyes and use landmark, or map-based, navigation.

This same system for navigation is used to create memory in the brain, which we can think of as cognitive navigation. It can also be used to predict the future through imagination and planning. “We are using exactly the same hardware and neuromechanisms as we use in navigation, except we are no longer relying on external landmarks or feedback from the body,” Buzsáki explained.

Just as there are two types of spatial navigation, there are two types of memory that Buzsáki identifies: episodic (self-referenced) and semantic (allocentric). Episodic memory is what, where, and when something happened to someone personally. Semantic memory is when something happens to someone else, ➔



In his talk, Buzsáki discounts the possibility of a blank-slate model, instead proposing that brains come with a preconfigured dynamic and a realm of possible neuronal sequences.

See Buzsáki's presentation, along with other videos and recaps of the APS Fred Kavli Keynote Series, at psychologicalscience.org/kavli-keynote-series.

or similar events happen many times to the same person but in different contexts. The outside package (specific elements of the experience) is lost, and semantic memory is what is left.

In earlier models of cognition, these foundations of time and space are related to different parts of the brain. In Buzsáki's inside-out model, however, the mental processing of time and space began to merge—a fact that has caused a lot of trouble, as there already existed a definition of episodic memory that establishes the “what” that happened in relation to where it happened and when.

In the outside-in model, recombining these different elements from different parts of the brain is how we create memory. Buzsáki noted that this is similar to Newtonian classical physics, because space is a container and time is an arrow, which gives every experience a time stamp.

This is contrasted, however, with the inside-out model, which has a closer analogy in modern Einsteinian physics. As noted by Carlo Rovelli in 2016: “There is no longer space which ‘contains’ the world, and there is not time ‘in which’ events occur.”

Buzsáki pointed out that neurons firing in a sequence related to the environment are an outside-in mental process. But this type of linear, step-by-step processing doesn't allow for predictive or imaginative inside-out dynamics. “These self-generated, internally generated sequences are the foundations our cognitive ability,” he observed.

To illustrate his point, Buzsáki discussed a study comparing the firing of

neurons in an animal's brain before it makes a choice to move left or right toward a reward. The data from this study show that the recorded neuron patterns could predict, with nearly 90% accuracy, the choice that the animal would make.

The take-home message from this experiment is that every single cell in the hippocampus can function as a place cell or a time cell. Thus, calling neurons in the hippocampus either place cells or time cells is irrelevant to the brain, Buzsáki contended. “What matters is how the downstream reader mechanisms classify hippocampal messages.”

This would mean that episodic memory may need to be redefined, because navigation in both physical and mental space is a succession of events. And the hippocampus is a general-purpose sequence generator that encodes content-limited ordinal structure, suggesting that the hippocampus functions as the brain's “librarian” or “search engine.”

What Is the Alternative to the Blank-Slate Model?

Buzsáki opened his final point by suggesting that the current model of the brain in neuroscience is akin to a blank-slate model, in which the complexity of the brain “should scale with the amount of experiences you have.” In other words, the brain evolves from very simple to very complex after many years of learning. In this system, the brain starts out with random, egalitarian connections.

The model advocated by Buzsáki, however, is a “skewed,” or nonegalitarian, arrangement of neurons that organize themselves in preformed networks in the brain. With these intrinsic networks, the brain is able to generate an enormous number of sequence patterns without any prior experiences. These connections have a wide range of synaptic weights, firing rates, and population synchrony. Taking his cue from mathematics and the accumulating data, Buzsáki compared the skewed and blank-slate distribution-of-neuron models to logarithmic and linear functions, respectively.

The logarithmic distribution that Buzsáki proposes is the brain's attempt to reconcile conflicting demands among elements of cognition, including dynamic range, stability, plasticity, and redundancy, among many others.

“They are all competing with each other,” observed Buzsáki, “and nature's answer to many of these problems is typically diversity.” He demonstrated this idea by showing that, when dealing with a scenario involving many options, like an animal in a seven-arm radial maze, if one neuron fires after selecting one path, the odds are very low that it will fire in another. Some smaller number of neurons, however, fire in every single case.

This suggests that some of these neurons are generalizers, whereas the majority are very specific. But, in an illustration comparing the specific (or downstream) to the general synapses, Buzsáki showed that the generalizers have more extensive connections and fire much faster. So, even though they represent a small fraction of the brain, they can account for about half of the performance in brain processes.

In an experiment that examined learning in animals, Buzsáki and his team found that low-firing neurons are related more to learning; they are plastic and respond readily to specific situations. The minority of fast-firing neurons, however, are more rigid and function as the brain's “good enough” immediate guess.

This helps us understand how we learn. In the blank-slate model, we start with a simple brain, like blank pages, and we fill in the details. Discarding this possibility, Buzsáki instead concludes that brains come with a preconfigured dynamic and a realm of possible neuronal sequences.

“In this framework, the brain doesn't change a lot with new experience,” Buzsáki said. “We can learn any amount of novel things without changing our brain dynamic. This is not possible in the tabula rasa, blank-slate model.” ◉



Experimental archaeology provides researchers with a window into the cognitive processes and cultural practices of ancient humans through experiencing the tools and materials used in their daily lives. Here, one such archaeologist is shown sewing leather with an eyed needle similar to those in use more than 30,000 years ago.

PHOTO BY RUDOLF WALTER

UNIQUELY HUMAN: UNDERSTANDING OUR CULTURAL EVOLUTION

By Alexandra Michel

Humans are not unique as a species in our ability to use tools or form complex social groups. So what happened in the evolution of *Homo sapiens* that made our species stand out in comparison to other hominids? Several theories point to our unique ability to develop culture via social learning—the capacity to teach and learn from others—as an evolutionary turning point in human history.

Gene-Culture Coevolution

When Marcus Feldman started his PhD in biology at Stanford in 1971, there was a debate raging over the publications of Arthur Jensen and William Shockley, scientists who contended that differences in IQ measurements between racial groups were almost entirely based on genetics.

Feldman, now a professor of biology at Stanford University, described how this racist debate over the mechanisms of IQ heritability led him to become interested in seeing whether cultural transmission might also play a role in shaping the characteristics of human populations. He and his longtime collaborator Luigi Luca Cavalli-Sforza, a population geneticist at the Stanford University School of Medicine, began to investigate whether behavioral processes like social learning might exert as great an influence on human evolution as genetics.

“The two of us sat down to try to see whether cultural transmission, as opposed to genetic transmission, could explain our high heritability,” Feldman said in an Integrative Science Symposium at the 2019 International Convention of Psychological Science (ICPS) in Paris.

Feldman and Cavalli-Sforza, described as founders of the field of cultural evolutionary research and gene-culture coevolution, began applying quantitative mathematical models from the field of population genetics to understand how a combination of genetics, culture, and behavior contributes to shaping human evolution.

In 1981, the two published a land-

mark book, *Cultural Transmission and Evolution: A Quantitative Approach*, paving the way for the new field of quantitative cultural evolutionary theory. Their book laid out a framework for how the transmission of nongenetic, socially learned traits across individuals and groups can impact human diversity in ways similar to genetic transmission.

In the 1990s, Cavalli-Sforza started the Human Genome Diversity Project, a collaborative international project designed to study the richness of human genetic diversity. As part of this project, he, Feldman, and dozens of collaborators compiled the Human Genome Diversity Cell Line Panel, a resource of uniquely diverse genetic information collected from more than 1,000 individuals across 52 global populations representing most of the world’s major geographic regions.

Although Feldman regrets that the team was not able to collect a more complete and representative panel of samples, the project has provided an unprecedented opportunity to study human evolution and genetic diversity.

The analyses resulting from this body of work have provided an enormous number of cross-disciplinary insights into fields ranging from archaeology and anthropology to epidemiology and linguistics.

In one example of the impact of a cultural phenomenon on population genetics, Feldman described how marriage customs and taboos can influence the frequency of genetic diseases. When the cultural practice of marriage between blood relations is more common, very rare alleles associated with genetic diseases became more frequent within a population, Feldman observed.

“That is a cultural choice [that] dictates the pattern of the DNA variation,” Feldman explained.

Since the publication of Feldman’s work on the Human Genome Diversity Cell Line Panel in *Science* in 2002, these types of DNA studies have become increasingly common. However, Feldman cautions researchers to be wary of how DNA variation can be misused.

“We now have a very heavy hammer, which is the ability to find DNA variation everywhere we look—in humans in particular—and associate it with phenotypes. And it’s being done all the time, 20 or 30 articles a day,” Feldman warned. “I think it’s necessary for psychologists, as well as other social scientists, to look carefully and critically at the inferences that are being made about complex human traits, especially behaviors.”

Excavating Culture

Although we have no remnants of behavioral data from our early human ancestors, we do have archeological artifacts dating back as far as 3.3 million years. Cognitive archaeology researchers like Miriam Haidle use these physical objects to trace the cognitive and cultural evolution of humans and other hominids. Haidle is the scientific coordinator of the Role of Culture in Early Expansions of Humans project at the Heidelberg Academy of Sciences and Humanities at Senckenberg Research Institute in Frankfurt, Germany.

When closely studied, stone tools and other material artifacts can provide researchers with a rich window into the cognitive capabilities, as well as the cultural practices, of our prehistoric ancestors. For example, the ability to shape stones through flaking, or to turn a small tree into a tool for hunting, can reveal a whole scope of cognitive processes, such as causal reasoning.

In a 2015 paper published in the *Journal of Anthropological Science*, Haidle and a diverse group of coauthors ranging from archaeologists to psychological scientists described how culture emerges through the development of three dimensions.

To start, there is a necessary biological dimension, including how biological factors such as genes, anatomy, and physiology both enable and restrict behav-

ior. Human hands, for example, allow different forms of cultural development than the flippers of a dolphin or the wings of a bat. There is also a dimension of individual development that encompasses a given individual's capacity, skills, and experiences. Finally, there is the historical-social dimension, which is particularly important for the development of culture. This dimension includes knowledge and skills that are shared socially.

Although there is evidence that some other animal species are capable of rudimentary aspects of culture, such as using basic tools, the historical-social dimension is uniquely well developed in humans. In fact, at some point in our evolutionary history, the biological dimensions—our genetically heritable traits—became less important, and the historical-social dimension increased dramatically in importance, Haidle explained at the ICPS symposium.

“There is an increase of the social and material engagement, and this is very important because you cannot learn everything on your own,” she said.

The production of clothing is an example of the importance of social learning in cultural expansion. Making the simplest clothing, just a piece of leather wrapped around the body, requires only a few tools to scrape, soften, and cut the hide. Even in this simple setting, raw material procurement, tool production, and application require various skills and knowledge that have to be learned and maintained. Producing more complex clothing requires not only more steps—making holes in the hide, tanning the hide, and threading pieces of the hide together—but also more specialized tools, combinations of practices, and thus knowledge and skills.

Tailored clothing sewn with eyed needles has existed for at least 30,000 years, representing further advances in materials and tools, along with practices to acquire and get trained in using them. The development of such increasingly complex performances is interdependent with the development

of transmittance capacities of knowledge and skills, Haidle said. In cultural species, individuals do not invent behaviors over and over again; information is shared within and between groups and passed on to new generations. And “in humans, the intensification of social interactions and the expansion of a socially formed physical environment resulted in new transfer trajectories and the unfolding of new performances.”

Self-Conscious Learners

Henrike Moll, an associate professor of psychology at the University of Southern California, studies the cultural transmission of knowledge: How do we pass information from one person to another and from one generation to the next?

Children are actually self-conscious learners, rather than blank slates or passive sponges that simply absorb whatever information happens to be present in their environment, Moll argues.

“I believe that we have good evidence to think that children understand their need to learn. You can observe this very early on in children when they show so-called social referencing,” she said at ICPS. “They look up at other people in order to better understand what they should be doing in an ambiguous or ambivalent situation.”

Although other animals are capable of social learning, humans are uniquely adept at this skill. Part of Moll's current research examines which mechanisms make human social learning so successful.

“We believe that there are different kinds of social learning mechanisms that are unique, and one of the most fascinating ones is the case of teaching,” she explained.

In a paper published in the *Review of Philosophy and Psychology* in 2018, Moll described a series of experiments that demonstrated how children's problem-solving abilities benefit from teaching far more than they benefit from simply observing someone else solve a similar problem.

When asked to get a peanut out of a tall thin plastic tube using nothing but water, almost all 4-year-olds failed to realize they could use the water as a tool. When shown a video demonstrating puppets completing a similar task, children still largely failed to improve their problem-solving. However, when the same video was shown before the task with a teaching framing (“Look, I →



Producing tools like this 300,000-year-old wooden spear from Schöningen, Germany, requires individuals and groups to learn and maintain complex combinations of knowledge and skills, demonstrating the importance of social learning in cultural expansion, explains cognitive archaeologist Miriam Haidle. (Photo: P. Farr, Niedersächsisches Landesamt für Denkmalpflege.)

want to show you something!”), most children succeeded.

Not only do children seek out opportunities for teaching, but they also seem to understand that teaching serves to spread knowledge of a certain kind—namely, general knowledge.

In a series of experiments that are currently under review, Moll and colleagues found that even 4-year-olds have an innate understanding of the value of teaching and how to choose information most conducive to teaching others.

In the study, children were initially taught some new facts about an animal. The facts always included one generic fact that applied to the entire species (“Hummingbirds can fly backward”) and one episodic fact specific to an individual animal (“This hummingbird is flying backward”).

When children were asked to teach what they’d learned about animals to a pretend classroom, Moll and colleagues observed a pattern: The children consistently recounted generic rather than episodic information.

They seemed to inherently understand that conveying generic facts, which everyone can benefit from, is a key component of teaching. Episodic facts, on the other hand, tend to concern only specific people or situations.

Moll and her team of researchers think that this is because children understand that the goal of teaching is to acquire—and possibly further propagate—knowledge that is general and objective.

The Epidemiology of Representations

APS Fellow Dan Sperber, a social and cognitive scientist at the Institut Jean Nicod in Paris, has developed several influential theories that draw from his interdisciplinary background in anthropology, linguistics, philosophy, and psychology.

In his ICPS presentation, Sperber used the flow of water in a river as a metaphor for understanding the

transmission of culture and information. In such a flow, patterns emerge that are fairly stable even though the water is continuously changing.

Likewise, most discernable patterns in the flow of cultural information are highly local and transient, yet some are widespread and stable over time, Sperber explained.

Ultimately, he said, culture emerges from microscale interactions between individuals—either dyads or just a few people living in a certain place. But sometimes these local, transient interactions lead to a very long and stable chain of transmission that can influence entire populations.

“Culture is not a thing nor a collection or system of things,” Sperber said. “It is a property that mental representations, behaviors, and artifacts possess to a variable degree.”

Sperber has developed a framework, the *epidemiology of representations*, to describe the distribution and flow of mental representations within populations. Like an infectious disease, the macro-level phenomena of culture are ultimately spread through the day-to-day interactions of individuals.

And, like the vectors of an epidemic, the mental representations that make up culture can mutate and shift over the course of person-to-person transmission.

“In the environment, the behavior or artifacts or objects that help convey information undergo lots of processes which may modify the information,” Sperber said.

However, these mutations are not random. He argues that the stability of cultural phenomena is due to a tendency of these mental representations to gravitate to “cultural attractors.” As mental representations are transmitted between individuals, they are not exactly copied or reproduced. Instead, they are transformed by the cognitive functions of each individual processing and reconstructing the information.

“Take the example of your friend cooking a wonderful apple pie,” Sperber explained. “Your goal is not to reproduce the exact movements and so on, or even the exact apple pie. Your goal is to help yourself produce a better apple pie.”

Humans are constantly reconstructing the information we’re exposed to, selecting what is relevant or generalizable from the original representation, and attempting to improve on it.

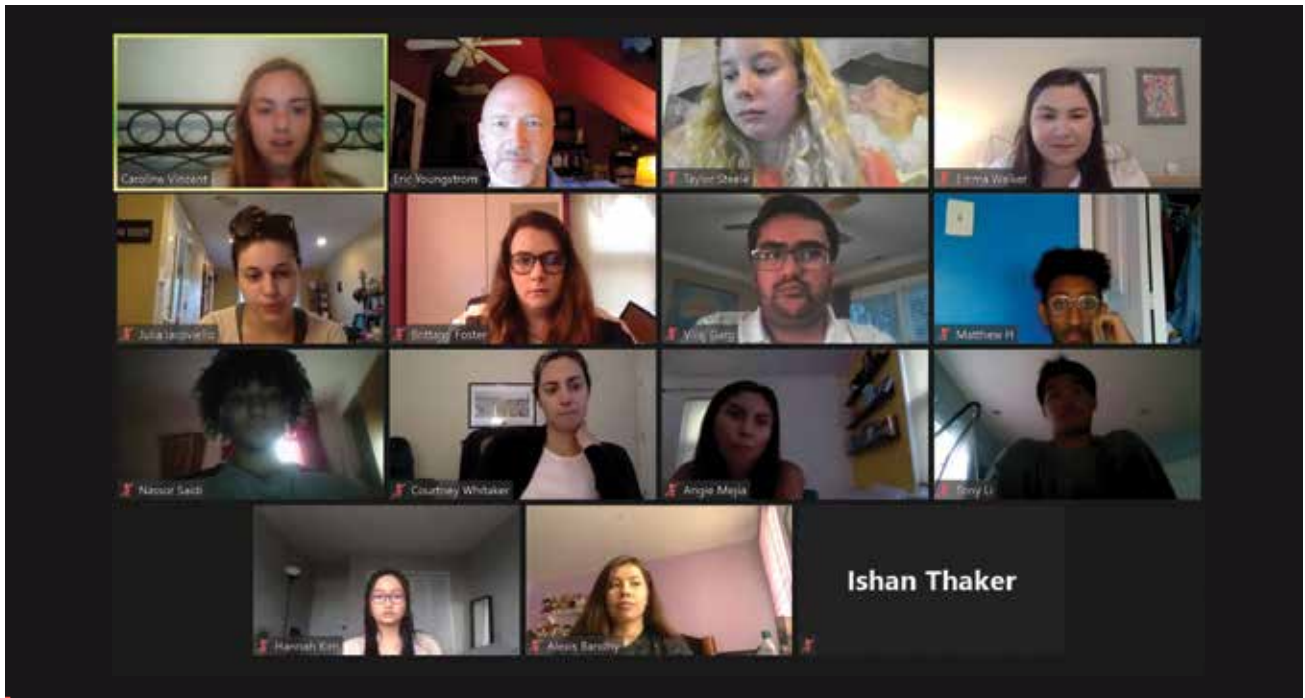
“You’re going to extract whatever, if anything, is relevant to you as you interpret it on the basis of your own interests and ideas,” Sperber noted. “And that’s what communication does quite systematically.”

In order to explain culture from an evolutionary perspective, we must also have adequately complex representations of human psychology and cognition. ●

Alexandra Michel is a freelance writer based in Baltimore.

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Members of the UNC-Chapel Hill HGAPS chapter on a recent video call with HGAPS cofounder and CEO Eric Youngstrom, top row, second from left. The organization recently received an APS microgrant for a project that uses a comprehensive self-audit system to assess the status of diversity, equity, and inclusion initiatives as well as to track antiracism progress across training programs in clinical psychology and related mental health training programs.

COVID-19 CREATED A CRISIS—AND AN OPPORTUNITY TO GIVE AWAY PSYCHOLOGICAL SCIENCE

Student-led organization uses crowdsourcing to improve the quality of psychology-related information online

By Eric Youngstrom and Anna Van Meter

The year 2020 has been one of remarkable upheaval, with forces reshaping economies, systems of care, and education, as well as our daily lives. The psychology community has quickly responded to these myriad challenges and changes, sharing resources, information, and support while also working rapidly to study the social impact of these shifts.

Helping Give Away Psychological Science (hgaps.org), a student organization founded in 2016 at the University of North Carolina (UNC) at Chapel Hill, has been steadily advancing its mission to help “the best information about psychological science reach the people who would benefit” by improving the quality of psychology-related information online. The group has focused primarily on Wikipedia and its sister site, Wikiversity, to achieve this. As the world’s fifth-most-visited site, Wikipedia can reach an audience far greater than even the most highly cited academic journal, and its content is free and more accessible to psychologists and allied professionals working in the community.



Eric Youngstrom is a professor of psychology and neuroscience at the University of North Carolina at Chapel Hill. He is also cofounder and CEO of hgaps.org.

Anna Van Meter is an assistant professor in the Institute of Behavioral Science at the Feinstein Institutes for Medical Research. She leads the Investigating Mood Pathology: Assessment, Course, Treatment (IMPACT) lab at the Zucker Hillside Hospital.

Given the rapidly changing nature of COVID-19, being able to update pages to reflect current knowledge and best practices is crucial. Wikiversity allows contrasting findings to be described and new results added almost in real time.

Updating Wikiversity as New Best Practices Emerged

When stay-at-home orders went into effect and campuses and workplaces were shuttered because of COVID-19, HGAPS members built on their past experience creating pages and infographics on Wikiversity to rapidly deploy resources during and after the California wildfires, multiple hurricanes, and the shooting at Marjory Stoneman Douglas High School. Students and faculty at UNC and other universities with active HGAPS chapters started meeting via Zoom to identify the psychology-related resources we could provide. We began by developing a page of resources centered on evidence-based principles and practices (e.g., getting enough sleep, exercising, practicing mindfulness) to help people cope with COVID-19 and other epidemics. We then created new pages on Wikiversity that targeted more specific needs, such as Telepsychology, which offers a comprehensive guide to providing psychological services virtually, and a companion page, Telepsychology Guide for Patients. One page we developed, about how people with bipolar disorder may be particularly affected by the stay-at-home orders and social distancing, is now under review for publication in the *WikiJournal of Medicine*.

Originally developed to help people share didactic information, including lectures, exercises, and technical articles, Wikiversity is well suited for sharing psychological science. Like Wikipedia, Wikiversity is free, with robust tools for version control, history, and discussion and well-developed metrics and tracking tools. A key benefit is that its editing community is more receptive to articles about the details of the science, including the psychometrics of assessment tools, reviews of primary research, and nuances about moderators and factors that might change findings. In contrast, Wikipedia pages, especially on topics that overlap with medicine or politics, attract editors whose content expertise is outside of psychology, which makes it harder to ensure the content hews closely to evidence-based guidelines. Wikipedia works hard to avoid bias in its content, and although this makes sense on its face, one consequence is that its editors tend not to consider peer-reviewed research studies as good sources because a single study could have a misleading result. Instead, Wikipedia editors favor systematic reviews and meta-analyses as sources of evidence. When an up-to-date review or meta-analysis is not available, the content on Wikipedia may be out-of-date.


Given the rapidly changing nature of the COVID-19 pandemic—as with other crises for which HGAPS has provided resources—being able to update pages to reflect current knowledge and best practices is crucial. Wikiversity enables this by allowing contrasting findings to be described and new results to be added almost in real time. For example, in the early days of the stay-at-home orders, we updated the HGAPS Telepsychology and Coping with Coronavirus pages more than once a day as we learned more about the specific challenges people were facing and worked to create and consolidate the most relevant resources. Because so many psychologists leapt into action to help others in the early phase of the pandemic, there was a wealth of information for us to collect and disseminate. We also have encouraged others to edit the pages themselves (anyone can edit Wikipedia or Wikiversity!) or to add contributions to an open Google Doc, from which future updates will be pulled.

Drawing From Collective Knowledge

HGAPS's COVID-19 resources and other contributions are prime examples of how crowdsourcing can help our communities. HGAPS drew psychological science-based content from the collective knowledge of the psychologists and other experts in our network. Members then organized and edited the content so that it could easily benefit other psychologists, educators, and individuals affected by the pandemic and associated social policies. As of mid-August, the Telepsychology page had been viewed almost 20,000 times, and the Coping with Coronavirus page more than 10,000. The platform makes it possible to reach—and help—a lot of people.

Today, COVID-19 remains a hugely disruptive and damaging force, and as new challenges and resources are identified, HGAPS will continue to update (or develop) relevant pages. For example, we are now developing a page of resources to help students and faculty with the transition to socially distant campus life this fall. We have also turned our attention to new areas, including a page of resources to help address structural racism in mental health programs.

HGAPS is a student-led, 501(c)(3) organization aiming to build project-focused teams and new university-based chapters. Content experts are vital; sharing expertise and advising students working in their content areas creates partnerships that teach while reaching much larger audiences. (See a full list of HGAPS's work to date at hgaps.org/impact-and-tools.html.) There are many ways to get involved, such as by sharing Creative Commons-licensed figures and handouts, building a team focused on a specific topic or page, starting your own chapter, or just providing helpful tidbits for an existing page. Contact us at bit.ly/HGAPSinterest with your interests and ideas. ●



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EDUCATION MATTERS: MAKING THE MIND'S MUSCLES

By David G. Myers

Bunge, S. A., & Leib, E. R. (2020). How does education hone reasoning ability? *Current Directions in Psychological Science*, 29(2), 167–173. <https://doi.org/10.1177/0963721419898818>

As athletic coaches and trainers understand, training matters. Skill practice, weight training, and aerobic conditioning transfer to enhanced performance on the field or the court.

Does educational training similarly help students learn, reason, and solve problems?

You could ask your students:

- Has schooling changed the way you think and how well you think?
- Is your mind different, or somehow more adept, as a result of your high school or college experience?
- How would you think differently if, like so many, you had ended your schooling in your early teens?

The expectation that education imparts more than facts—that it hones cognitive skills—dates back to Plato, who believed that math training could strengthen reasoning about politics and ethics. Others assume that a liberal education that trains students in reasoning, languages, and values develops their general mental faculties and prepares them to engage issues of civic life, ethics, and meaning.

Studies by cognitive science researchers, including Silvia A. Bunge and Elena R. Leib (2020), reveal that Plato was right: Education strengthens the muscles of the mind. Schooling's boost to reasoning transfers to improved performance on aptitude tests, higher scholastic achievement, and more successful practical problem-solving. Consider:

- *The start of schooling.* Between ages 5 and 7, children begin formal schooling, whereupon their cognitive abilities surge—especially for those with birthdays close to the cutoff for entry into school, who may be significantly younger than their peers.
- *The summer slide.* Especially for children from socioeconomically disadvantaged backgrounds, measured aptitude backslides when education ends or lapses, such as over the long summer holidays (Ceci & Gilstrap, 2000).
- *Statistics education.* As Richard Nisbett (2015) and others have shown, statistics courses that address everyday problems of logic and social judgment enable people to reason more wisely about everyday events. With such training, social science students (more than natural science and humanities students) have been found to improve their statistical reasoning during their undergraduate education.
- *Reasoning courses strengthen reasoning.* As Bunge and Leib document, results from 74 studies with children, adolescents, and college students show that teaching reasoning skills produces lasting increases in reasoning ability.

There are limits to the schooling effect. For example, commercial “brain-training” games appear to produce limited transfer to unrelated mental and memory tasks (Simons et al., 2016). Yet Bunge and Leib's research documents that reason *can* be trained. Pre-law students given 70 hours of explicit reasoning instruction and practice (as part of their LSAT test preparation) displayed improved general reasoning performance, with associated changes in brain network connections.

Moreover, the researchers' harvesting of data from nearly 200,000 people taking a cognitive test battery (administered by Lumosity) revealed a noteworthy result: With advanced higher education, cognitive abilities continue to develop. When schooling continues, the typical late adolescent peak in an aggregate “grand index” of cognitive-performance tests shifts to a later age (Guerra-Carrillo, Katovich, & Bunge, 2017, Figure 1).

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

These findings suggest additional questions for class discussion:

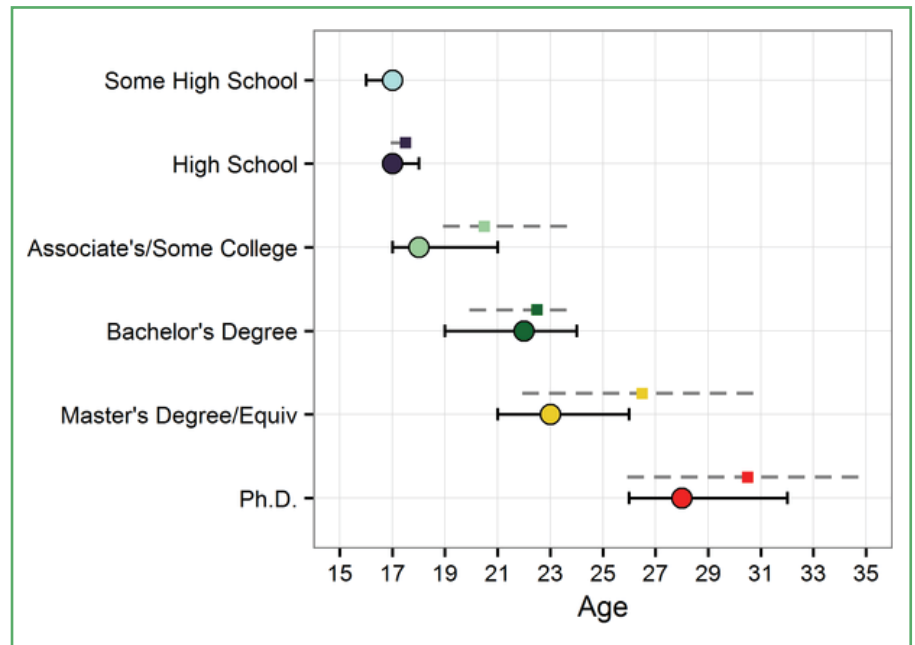
- If your study habits languished during the 2020 pandemic sheltering in place, did you (like disadvantaged children experiencing a “summer slump” in their learning) sense your mind atrophying—just a bit?
- Have you learned ways of thinking in one class (or in your major) that you have applied in other contexts?
- How do you anticipate—or hope—your completed college experience will have changed you?
- Have you experienced more development of your cognitive abilities because you participated in courses that focused on reasoning?
- Have you found yourself better off for having taken a challenging class that you did not enjoy at the time?

Reflecting on such questions might serve as a brief “wise intervention” that strengthens students’ growth mind-set, or at least could help them value their college education. ●

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FIGURE 1



In a comparison of 196,000 participants enrolled in a cognitive training program, researchers found that individuals with higher levels of education reached their cognitive peak later in life (Guerra-Carrillo, Katovich, & Bunge, 2017). On this chart, the circles and solid lines represent the median age of peak performance with a confidence interval of 95%. The dotted lines indicate the range of age at graduate, and the squares the average age of graduation.

EDITED BY C. NATHAN DEWALL

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.

REAPING THE REWARDS OF REGRET

By C. Nathan DeWall

McCormack, T., Feeney, A., & Beck, S. R. (2020). Regret and decision-making: A developmental perspective. *Current Directions in Psychological Science*. <https://doi.org/10.1177/0963721420917688>

People instinctively avoid activities, people, and places that produce negative emotions. On the surface, this makes sense. People benefit more from positivity than from remaining mired in distress. Yet, according to Teresa McCormack, Aidan Feeney, and Sarah R. Beck (2020), a specific type of negative emotion can improve children's decision-making and prosocial behavior. They argue that people should recognize how children reap the rewards of regret.

Regret occurs when people feel upset that they have failed to think, feel, or act in agreement with their personal or cultural standards. When asked about their life's biggest regret, more than 50% of people report choices made in the context of their education or career (Roese & Summerville, 2005). Often, people regret their past *inactions* more than their *actions* (Davidai & Gilovich, 2018; Gilovich & Medvec, 1994). Dropping out of college hurts more than wasting time but still earning a college degree.

But today's regrets can inform tomorrow's decisions and actions (Richard, van der Pligt, & de Vries, 1996). A missed meeting may produce sadness because you realize that you haven't lived up to your self-defined strict standards. Far from being a li-

ability, your regret is an asset: It spurs you to act better next time. This benefit of regret is true with adults, but psychologists have recently shown that children as young as age 6 benefit from regret.

McCormack and colleagues have devised a method to study children's regret (O'Connor, McCormack, Beck, & Feeney, 2015; O'Connor, McCormack, & Feeney, 2012). First, children learn that they can choose between two boxes to earn a sticker. If the kids choose one box, the sticker costs only one credit. Choosing the other box leaves the children far poorer, costing them six credits. Next, the researchers measure the children's feelings to determine their regret levels. Finally, the researchers give the children the same task again to determine whether they learned their lesson and will make a more optimal choice.

These experiments show two robust findings (McCormack et al., 2019; O'Connor, McCormack, & Feeney, 2014). The first is that children experience regret when making costly decisions, much in the same way that adults do. The second finding is that children's regret can become a boon to their future decision-making and behavior, predicting less risky and more rational decisions and more generous behavior.

To bring this cutting-edge research into the classroom, ask students to complete the following two activities. The first activity teaches students to recognize the benefits that accompany regret. The second activity shows students when to expect such benefits to emerge across the life span. Both activities utilize think-pair-sharing pedagogy. If teaching virtually using Zoom or another online platform, instructors can place students into breakout rooms with one or two partners. Instructors teaching in a face-to-face setting can encourage students to work with one person while maintaining local social-distancing and mask-wearing guidelines.

Activity #1

Ask students to read the following scenario and answer a series of questions about it.

Rose is 6 years old. She tested positive for SARS-CoV-2, the novel coronavirus. The doctors ordered her to remain quarantined at the hospital for at least 2 weeks. Rose understands that she is contagious, but she is also very lonely. She does not want to wait 2 weeks before socializing. Rose finds a way to leave her room and find other children who want to talk and play.

Through contact tracing, the hospital staff later realize that Rose exposed 10 healthy children to SARS-CoV-2. Rose regrets her decision to disobey the doctors' orders to quarantine.

How might Rose's regret affect her future decisions? If she became sick again, would she be likely to obey doctors' orders to keep her distance from healthy

people? Will Rose's regret make her prone to delay gratification and engage in prosocial behavior? Or will her regret make Rose more impulsive and less generous? If you were Rose's parent, would you try to minimize her regret? What negative consequences might occur if you successfully reduced Rose's regret?

Instructors can lead the discussion by teaching students about McCormack and colleagues' findings on the benefits of regret. Explain how regret improves children's decision-making, increases their likelihood of delaying gratification, and boosts their prosocial behavior. Instructors can broaden the discussion by asking students to consider how effective parenting sometimes involves not minimizing children's negative emotions.

Activity #2

This activity encourages students to consider how people develop different abilities to feel regret. It shows students how toddlers, children, and adolescents may experience the same situation but feel different levels and types of regret. Instructors can show students the following scenario:

Alex (age 16), Bevy (age 6), and Ellis (age 2) are excited to play a candy game. They have saved their weekly allowance for 5 months, giving them each \$100. In the game, they choose to get their candy from one of three boxes. Once the kids make their selection, they learn the price that they will pay to obtain the candy: \$5 (low price), \$20 (medium price), and \$80 (high price). (Figure 1)

With a partner, students can discuss several questions related to regret. For example, would Alex, Bevy, and Ellis experience similar levels of regret, or is regret something that people

experience more as they get older? In typical psychological studies, people experience more regret when they choose the option that costs the most money. Would you expect similar results from this scenario? Why or why not? How would the children's initial selections affect their subsequent selections? Which children's future decision-making would benefit the most from their initial selection? Why?

The road to a meaningful life is not defined by an absence of sadness, fear, anger, and anxiety. Indeed, psychologists have argued that limiting our exposure to upsetting experiences deprives people of *antifragility*—the tendency to become stronger after experiencing setbacks, uncertainty, and even minor trauma (Lukianoff & Haidt, 2018). We should teach our children well by giving them opportunities to experience uncomfortable emotions, including regret. By allowing our children to reap the benefits of regret, we are setting them up for a happier, healthier, and more productive life.

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FIGURE 1



An activity involving choices with uncertain outcomes can help students consider how children develop different abilities to feel regret.

Careers Up Close



Kelsie Forbush, a professor of clinical psychology at the University of Kansas, demonstrates CARE's telehealth app, which provides students with guided self-help therapy that focuses on using cognitive behavioral principles to assist in the treatment of eating disorders. Students also meet remotely with trained clinical psychology PhD students and postdocs on a weekly basis.

KELSIE FORBUSH ON THE DRIVE TO CARE ABOUT EATING DISORDERS

Kelsie Forbush Spotlight

Current role: Associate professor in the Clinical Psychology Program and director of the Center for the Advancement of Research on Eating Behaviors (CARE) Laboratory, University of Kansas, 2014–present

Previously: Assistant professor of psychology, Purdue University, 2011–2014

Terminal degree: PhD in clinical psychology, University of Iowa, 2011

Recognized as an APS Rising Star in 2015

Kelsie Forbush of the University of Kansas is committed to improving the diagnosis and treatment of eating disorders—serious mental health conditions that have the highest mortality rate of any psychiatric illness. Forbush's self-report assessment of eating disorders, the "Eating Pathology Symptoms Inventory," is used by clinicians across the globe to assess eating disorder symptoms in both clinical and research settings.

See a longer version of this interview, including how her lab has responded to COVID-19, on psychologicalscience.org/observer.

Landing the First Job

I applied for jobs when I was on my clinical PhD internship, mostly faculty positions and a couple of postdoc positions, and decided to take a position at Purdue University as a tenure-track assistant professor. I talked with my graduate-school mentor about the job-hunting process, and I had excellent mentors on my internship. On internship, my cohort was able to give mock job talks and receive feedback, which was extremely helpful. In my internship cohort, three out of the five of us ended

Kelsie's Advice for Students

Go with your passion. Think carefully about what aspects of grad school you like the most. I think students need to be really honest with themselves in terms of what they want in their career, because there's no one-size-fits-all. The wonderful thing about the clinical psychology PhD is there are a lot of career paths and opportunities, whether that be clinical practice, industry, or academia.

up in a tenure-track faculty position, so I had built-in support because my colleagues were also searching for tenure-track positions. I also read books about finding an academic job. Although the books were not psychology-specific, they helped me understand kind of what the process is like.

Competing for Funding

One challenge that a lot of early investigators face is the issue of obtaining extramural grant funding. There's not as much funding as in the past, and it's highly competitive. You go from competing with people who are in grad school to competing with people in established roles—famous researchers who have huge centers and an amazing body of work and accomplishments. When you start in the field, you can't compete with those individuals, so you have to have a lot of persistence while you develop your independent research program. It can be very discouraging, but I think the secret of success is to keep persevering.

Launching a Lab

Eating disorders are an important public-health issue, but there's a lot of widely

held stereotypes held by the lay public and researchers in other fields. One thing many people aren't aware of is that eating disorders are serious mental health conditions that have the highest mortality rate of any psychiatric illness. Despite the severity and prevalence of eating disorders, treatment efficacy is lagging. Moreover, we've found that, in many cases, our diagnostic system for eating disorders doesn't do what it was intended to do—to inform treatment planning and predict clinical outcomes.

The long-term objective of my lab at KU (CARE, the Center for the Advancement of Research on Eating Behaviors) is to develop more user-friendly tools to better assess and diagnose or classify eating disorders that can be used in routine clinical practice to help inform prognosis and clinical decision making. All of my studies are designed to address our primary goal. I also have a new secondary goal to help improve the field's ability to disseminate treatments for eating disorders, particularly using newer mobile health technologies.

Outpredicting the *DSM*

We've come up with innovative ways to classify eating disorders that fit within a broader psychology movement called the Hierarchical Taxonomy of Psychopathology, or HiTOP. We've found that our dimensionally based classification system is three times more predictive of clinical outcomes than the traditional diagnostic system for predicting things like recovery and impairment. Now we're working to extend our work by testing whether we can predict not just who's likely to recover in a naturalistic sample, but who might respond to treatment. Within my research we also do a lot of assessment work. We've created new ways of assessing eating disorders through interviews, week-to-week trackers for clinicians, and a novel computerized adaptive measure delivered via a mobile-phone application.

Teaching Students to Assess and Diagnose

I teach a variety of courses at KU, including courses on eating disorders and abnormal psychology. Assessment II is a class for graduate students in our adult clinical psychology program in which students learn how to assess and diagnose mental health issues. It's very much practice-based. Students practice their skills with myself and the TA during class, and then also do a mock assessment of undergraduate students who have mild mental health concerns, so they can practice with lower stakes before working with clients in our in-house clinic. Active learning strategies, flipped courses, and hybrid learning have influenced the way I teach. A lot of studies show that active learning classrooms can significantly reduce, if not eliminate, critical learning disparities, such as those experienced by some first-generation and underrepresented minority students.

Collaborating With Clinicians

My ultimate goal is to create tools that can be used in clinical practice. One of the best parts of my job at KU is that I have the opportunity to collaborate with community clinicians and particularly with Children's Mercy – Kansas City's Eating Disorder Center. Working closely with community clinicians has enriched my research program by helping me see how our tools can be implemented within busy treatment centers and to understand the barriers to implementation. I think that my investment in community participatory research is part of why my assessments are used in quite a few clinics across the United States and abroad. It's easy to develop assessments or classification systems, but I think without close collaboration with clinicians, oftentimes the measure may not end up being disseminated as widely as it could be. ●

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.
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NEXT APPLICATION DEADLINE: OCTOBER 1, 2020

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POLICE BRUTALITY AND MENTAL HEALTH IN THE AFRICAN-AMERICAN COMMUNITY

By Erin Steatean



Erin Steatean
Grand Canyon University

Rodney King was severely beaten by Los Angeles police officers just 29 years ago. In 2014, Eric Garner was murdered by police in New York City after being placed in a choke hold. Sandra Bland died shortly after a traffic stop in Texas in 2015. She was found hanging in a police cell while in detention. Months earlier, Freddie Gray died after being brutally beaten and thrown without medical assistance in the back of a Baltimore police van. The next year in Minnesota, Philando Castile was pulled over for having a broken taillight. He died after being shot several times. We now have Breonna Taylor in 2020, an EMT in Louisville, Kentucky, who had been working to help people impacted by COVID-19. She was shot to death in her own home by police executing a no-knock search warrant. Should we

have to fear danger when we are in our own homes? And then of course came George Floyd, whose death triggered outrage across the nation. In times like these, as an African-American woman, I want to get angry. I want to act belligerently. Events of the last months will impact me for the rest of my life as I walk the earth and move into my career as a Black woman.

Repeated acts of police violence against Black people have caused mass demonstrations and public concern, and frequent depictions of these incidences have had a significant effect on the psychological well-being of Black families and communities, who are much more likely to experience police brutality than Whites. In 2018, researchers at the School of Public Health at Boston University and the University of Pennsylvania published a study demonstrating that increased incidences of violence in which unarmed African Americans were killed by police were associated with increased depression, tension, and other mental health issues among Blacks (Bor et al., 2018). In other words, as Lisa H. Thureau and Johanna Wald (2018) wrote in *USA Today*, systemic “police brutality is damaging the mental health of African Americans—even those who have no direct connection to the men, women, and teens who have lost their lives.” Using mental health assessment data and a police-shooting database, the researchers also found that when U.S. police officers killed unarmed Black people, it had a heightened impact on the mental health of Black Americans living in the same state, reported John Eligon (2018) in the *New York Times*. White Americans’ mental health was not found to be similarly affected, nor did they report experiencing a similar response to the deaths of unarmed White Americans at the hands of police officers.

Mental health research has shown a causal correlation between perceived racial discrimination and other negative effects on mental health as well. Depression, anxiety, and increased use of drugs, feelings of hopelessness, and suicidal ideation in Black youth and adults have been correlated with perceived prejudice, racism, and both implicit and explicit forms of discrimination (Bor et al., 2018). African American males racially profiled as offenders are also at increased risk of subsequent depressive symptoms and post-traumatic stress disorder.

Developing symptoms associated with mental health issues may in turn perpetuate a cycle of violence. Studies show that people with mental illnesses, especially those who are Black, are disproportionately at risk of being killed by police compared with the general population (Thureau & Wald, 2018). Psychological scientists, as leaders in mental health care, “can play a vital role in promoting a positive relationship between law enforcement agencies and the Black community while providing high-quality treatment to those affected by police brutality” (American Psychiatric Association, 2018). George Floyd’s death triggered a national uproar because African Americans are tired of the



Erin Steatean is a senior psychology major at Grand Canyon University with a focus on researching anxiety and depression.

senseless death and racist injustice. We will get heard. If we cannot get equity, it is only fair to give us equality.

“While these findings might seem unsurprising, particularly to African Americans,” Eligon noted in his article, “the researchers contended that their study was a significant attempt to assess the measurable, if indirect, harms that police violence has inflicted on the broader psychological and emotional well-being of African Americans.” ♦

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The candidate will be expected to teach four courses per year: a course in cultural psychology, two specialized courses in their area of expertise, and one course in qualitative research methods. Additional duties include advising and mentoring undergraduate students and engagement in department and university-level service. The Department has 18 full-time faculty members in the areas of cognition, culture, development, neuroscience, psychopathology, and social psychology. Members also contribute to interdisciplinary programs in Feminist, Gender, and Sexuality Studies, Neuroscience and Behavior, Science and Society, Educational Studies, and American Studies and participate in a departmental postdoctoral program. Located in Middletown CT, Wesleyan is a highly selective liberal arts college that values both scholarship and teaching, has a strong, diverse undergraduate student body, and offers a generous sabbatical program and competitive salaries and benefits. Wesleyan does not discriminate on the basis of race, color, religious creed, age, gender, gender identity or expression, national origin, marital status, ancestry, present or past history of mental disorder, learning disability or physical disability, political belief, veteran status, sexual orientation, genetic information or non-position-related criminal record. We welcome applications from women and historically underrepresented minority groups. Inquiries regarding Title IX, Section 504, or any other non-discrimination policies should be directed to: Vice President for Equity & Inclusion / Title IX Officer, 318 North College, 860.685.4771.

Candidates must have a Ph.D. in Psychology or related field in hand by the time of appointment to be hired as an Assistant Professor; a successful candidate may be hired as an Instructor if the candidate does not have a Ph.D. in hand at the time of appointment, but will complete the Ph.D. in Psychology or related field within one year of hire. To apply, please submit the following: the curriculum vitae, up to 3 reprints (in a single pdf), a research statement, a teaching statement, and teaching evaluations (if available). In the cover letter, applicants should describe how they will embrace the college's commitment to fostering an inclusive community, as well as their experience working with individuals from historically marginalized or underserved groups. In your research statement, we invite you to discuss your research approach in the context of ongoing discussions about research practices and open science and, if applicable, ways in which your research engages underrepresented populations in psychological research and/or focuses on matters related to race/ethnicity, class, or gender/sexuality. Applications should be submitted online at <http://careers.wesleyan.edu/postings/7422>. At the time of application, candidates will also be asked to provide email addresses for at least three referees from whom we will obtain confidential letters of recommendation. Review of applications will begin on October 1st, 2020.



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- As part of an appointing Department at Harvard Medical School, participate in recruiting, credentialing, and supervising over 40 full and part time psychology positions.
- Appointment to a faculty position up to the rank of Associate Professor, as determined by the criteria of Harvard Medical School, is anticipated.

The CHA Department of Psychiatry hosts ACGME accredited training programs in adult and child psychiatry, psychosomatic medicine, and geriatric psychiatry, as well as training in graduate level social work and psychiatric nursing. A two-year fellowship in psychotherapy is open to trainees of all disciplines.

CHA values scholarship, teamwork, commitment to patients and trainees, and mutual respect across clinical specialties and interests. The Psychiatry Department highly values all evidence based psychotherapies and maintains a strong commitment to psychodynamic principles, social determinants of health, with a focus on the health of our very diverse communities. As an Accountable Care Organization, CHA continues to expand and enhance our Primary Care-Mental Health Integration throughout our network.

Qualified candidates will demonstrate skill and experience in teaching, clinical practice and administration. Success in research activity is highly desirable. Please submit CV's through our secure website at www.CHAproviders.org, or by email to Melissa Kelley at ProviderRecruitment@challiance.org. The Department of Provider Recruitment may be reached by phone at (617) 665-3555 or by fax (617) 665-3553.

CHA is an equal opportunity employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability status, protected veteran status, or any other characteristic protected by law.



Federal Research, Funding, and Policy

Read the latest announcements and updates about federal research and funding for psychological science.

psychologicalscience.org/policy



ANNOUNCEMENTS

Let us help you promote your grant opportunities and upcoming events (including virtual).
Send info to apsobserver@psychologicalscience.org.

GRANTS

NIH Research Opportunities Related to COVID-19

In response to the rapidly evolving situation surrounding COVID-19, institutes within the U.S. National Institutes of Health (NIH) have issued notices of special interest (NOSIs) designed to allow researchers to apply their existing NIH research grants to COVID-19 research. These NOSIs offer competitive revision and administrative supplement opportunities that differ in scope and research area depending on the issuing institute; they allow researchers across all fields, including psychological science, to contribute their expertise and research projects to the growing body of COVID-19 research.

To view a compilation of these opportunities and additional information of potential interest to psychological scientists, visit the NIH's Office of Behavioral and Social Science Research at obssr.od.nih.gov/research-support/funding-announcements.

NIH Encourages Studying the Social Contagion of Substance Abuse

The National Institute on Drug Abuse (NIDA) invites grant applications proposing to study the social contagion of behavior and substance abuse. Proposed research should apply social network theory—the study of how people, organizations, and groups interact in a network. Applications are open through January 8, 2023.

Social contagion, as defined by NIH, is the “spread of affect or behavior from person to person and among larger groups.” NIDA recognizes “social network theory can also be applied to chronic behavioral conditions, including substance use disorders, as social factors and their interactions with age and sex are important determinants of substance use.”

Models that examine how substance abuse and peer use/misuse develop in peer groups should make use of big data sets and data science to form computational models required for social network analysis.

Learn more about NIDA's Notice of Special Interest: Modeling Social Contagion of Substance Use Epidemics (NOT-DA-20-009) at grants.nih.gov/grants/guide/notice-files/NOT-DA-20-009.html

NSF Funding to Support Transition From New Research Discoveries to Innovation

The National Science Foundation (NSF) offers researchers the opportunity to transition their research from discoveries to the marketplace through the Partnerships for Innovation Program (PFI). The program has five goals:

- identifying and supporting NSF-sponsored research and technologies that have the potential for accelerated commercialization;

- supporting prior or current NSF-sponsored investigators, institutions of higher education, and nonprofit organizations that partner with an institution of higher education in undertaking proof-of-concept work, including the development of technology prototypes that are derived from NSF-sponsored research and have potential market value;
- promoting sustainable partnerships between NSF-funded institutions, industry, and other organizations within academia and the private sector with the purpose of accelerating the transfer of technology;
- developing multidisciplinary innovation ecosystems that involve and are responsive to the specific needs of academia and industry; and
- providing professional development, mentoring, and advice in entrepreneurship, project management, and technology and business development to innovators.

The solicitation supports efforts on two tracks. The Technology Translation track provides the opportunity to turn NSF-funded research into technological innovations with promising social impact. The Research Partnerships track has similar goals but supports larger, complex, multifaceted technology development projects that require the involvement of more than one researcher or institution. This track requires the creation of a partnership between academic researchers and a third-party organization (e.g. industry, a federal laboratory, a public or nonprofit technology organization).

Deadline: January 13, 2021

Learn more about the PFI program at bit.ly/3ac7JDw

MEETINGS & EVENTS

Join APS this fall to attend live webinars and enjoy recordings of past events. Visit psychologicalscience.org/conventions/virtual to learn about the Student and Early Career Webinar Series; Government Research, Funding, and Policy Webinars; and other virtual events.

Research! America 2020 National Health Research Forum

September 10, 2020
Washington, DC

researchamerica.org/2020-national-health-research-forum

European Research & Innovation Days

September 22, 2020–September 24, 2020

For more information, visit

erc.europa.eu/event/european-research-and-innovation-days-2020



STUDENT RESOURCES

1 **Funding & Recognition**

Student Grant Competition
Student Research Award
RISE Research Award

2 **Build Your CV**

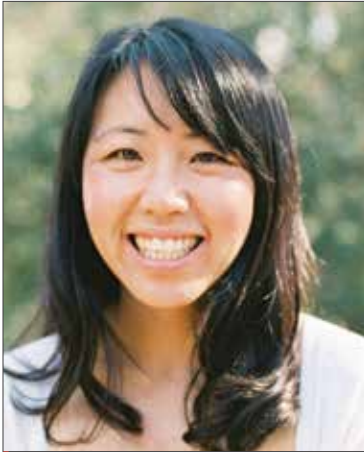
Become a Reviewer
Serve on the APS Student Caucus Executive Board
Write for the Student Notebook
Represent APS on Your Campus

3 **Connect & Keep Current**

Mentorship Opportunities
Student Programs and Events at the APS Convention
Access to Research and News Online and on Social Media
Student and Early Career Webinar Series

Learn More at psychologicalscience.org/students





Ji Son
California State University

BUILDING A BETTER STATISTICS CLASS

Ji Son, a professor of cognitive psychology at California State University, Los Angeles, brings the sum of her experience as a researcher and educator to develop data-based methods for helping students understand statistics more deeply.

How did you originally become interested in cognitive psychology and the science of learning?

Early on, I found that I learned things better by forcing myself to explain them to others. I also had a variety of tutoring jobs where I came up with little ideas on how to teach more effectively (a diagram! a table! an analogy!). But I wondered—how would I know whether a little idea really was an improvement? So I started doing research in cognitive psychology with the basic belief that if I knew how the mind was structured, then I could “feed” the mind information more effectively.

What are some common misconceptions about teaching statistics or teaching in general, and what does your research have to say about them?

The biggest misconception is that we can actually know when someone has learned something! We can measure how well students did on some question, test, or course, but are these good measures of understanding? Take the example of division in K-12 education. Over time, students learn how to divide integers, fractions, decimals, and even polynomials. Given that students know

how to divide in so many situations, one might assume that they know what it means to divide. But many U.S. college students conceptualize division in a limited way, as “making smaller” or “breaking into pieces,” and cannot explain why $\frac{5}{6} \div \frac{1}{3} = 2\frac{1}{2}$ has an answer “larger” than both of the numbers involved in the division (Geller, Son, & Stigler, 2017). This should give us all pause. . . How do we know if someone understands division?

What are some of the most common hurdles to overcome when applying science-based teaching techniques?

Learning research seems so clean and straightforward when we read about it in a published article. But in the real world of teaching multiple classes, with adjunct professors getting handed a syllabus a week before class, and COVID-19 shifting all universities into remote instruction, things are a lot messier. Most research is univariate (for good reason!), while teaching and learning is multivariate. My goal is to creatively overcome this hurdle by building our capacity to conduct research that, by design, fits well into this complex system.

For example, in our “Better Book” project (Stigler et al., in press), our team has developed a free interactive online statistics textbook (coursekata.org) that continuously improves based on learning data. The experimental solutions are attempts to address real issues identified by students and instructors. Live experiments with students are conducted in the textbook, and any innovations that arise from the research are then directly implemented in the freely available learning materials so that data-based innovations can be easily accessed.

What is the most challenging part of teaching statistics? The most rewarding?

Teaching students hard things and seeing students learn hard things. It’s incredibly difficult to grapple with concepts that take days, weeks, or months to learn. There are days when students feel like they “get it” immediately, followed by a day of despondent confusion. But that’s what the process of learning something hard actually feels like. There’s also a real satisfaction from that kind of complex learning. It’s like watching someone give birth—pain and joy so close to each other! ●



Read this article online for references and to see how Ji Son teaches statistics through the “Better Book” project’s interactive textbook at psychologicalscience.org/observer/jison.

Back Page showcases particularly interesting work by a wide variety of psychological scientists. Know of a good candidate for a future profile? Contact the *Observer* at apsobserver@psychologicalscience.org.

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