THE GRAND CHALLENGES
OF PSYCHOLOGICAL SCIENCE
Published 6 times per year by the Association for Psychological Science, the Observer educates and informs the Association on matters affecting the research, academic, and applied disciplines of psychology; promotes the scientific values of APS members; reports and comments on issues of international interest to the psychological scientist community; and provides a vehicle for the dissemination of information on APS.

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Association for Psychological Science
1800 Massachusetts Ave, NW Suite 402 • Washington, DC 20036-1218 USA
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ON THE COVER: What are the possibilities? In this special issue of the Observer, psychological scientists explore the field’s greatest challenges and some of its most promising frontiers. Cover art and other images throughout this issue (with the exception of author photos and graphics from APS research) are from Getty Images.
The Grand Challenges of Psychological Science
An unprecedented confluence of forces has created what many psychological scientists consider to be an existential threat to their science. APS members share what they perceive as the biggest challenges to the field.

On the Right Side of Being Wrong
Spurred by the so-called replication crisis, researchers are embracing a new culture of transparency.

Ships at Sea: Exploring the Mysteries of Self and Consciousness
Psychological scientists are exploring the myriad ways consciousness influences the highs and lows of human experience.

Fully Credited
A new model of “contributorship” addresses the marginalization of early-career researchers in scientific publications.

Up-and-Coming Voices: Methodology and Research Practices
Previews of relevant research by students and early-career scientists.

Psychological Science Needs the Entire Globe, Part 3
Does Psychological Science Deserve Brilliant Researchers From Outside North America and Europe?
“When our work has matured to a place where we can responsibly say things with confidence, then I think we have an obligation to contribute to the larger conversations in society about race and racism. Surely psychological science should be part of this larger conversation.”

—JENNIFER A. RICHESON, IN CONVERSATION WITH JENNIFER L. EBERHARDT, PAGE 8
As COVID-19 left you feeling out of the loop? APS has a solution that will help you re-engage with friends and colleagues in new and exciting ways while also connecting with future collaborators, mentors, students, and friends. I am referring to the 2022 APS Annual Convention (psychologicalscience.org/convention2022), May 26 through 29 in Chicago, Illinois. We are excited to once again meet in person, and we invite you to share your research and join your peers for this unparalleled scientific conference.

After 2 long years of global COVID-induced isolation and Zoom-a-thons, it has become clear that although virtual platforms provide some wonderful opportunities and benefits for communicating, they are not the same as in-person meetings, with their many opportunities for social engagement and serendipity. After talking with meeting partners and APS members and carefully considering the limitations imposed by overlaying a virtual program onto an in-person conference to create a “hybrid” meeting, APS determined that we can best serve our members and advance our science by planning the 2022 APS Annual Convention as an in-person scientific conference.

The Convention Programming Committee, chaired by Ethan Kross, has been working hard to build an outstanding scientific program. Members of the APS Board of Directors, staff, and our partner organizations are planning plenary sessions and designing engaging new program elements including social gatherings, networking opportunities, and interactive workshops. By popular demand, we will continue to offer “flash talks” as a way for researchers to share their science outside of traditional sessions. The convention is also an ideal opportunity to recognize and celebrate the accomplishments of our distinguished colleagues who have shaped and will continue to shape the future of psychological science.

In addition to providing a vibrant forum for scientific engagement, the in-person convention allows APS to deliver the affordable and high-quality program our members have come to expect. To provide greater opportunities for students to participate, we are pleased to offer various forms of travel assistance. I invite APS members to join me in donating to the APS Student Travel Fund (member.psychologicalscience.org/donate) to help support the professional development of the next generation of psychological scientists.

We understand that some individuals will unfortunately not be able to join us in Chicago. This is one of the reasons that APS has launched and is expanding our virtual programing (psychologicalscience.org/conventions/virtual). Largely decoupled from the annual convention, virtual programs provide opportunities for psychological scientists to connect with colleagues around the world throughout the year. In addition to networking opportunities (psychologicalscience.org/networking), our virtual programs include webinars where participants can share their science, engage with research funders and policymakers, and collaborate with colleagues to tackle societal problems—for example, through the APS Global Collaboration on COVID-19 (psychologicalscience.org/covid-initiative). These are just some of the ways APS is supporting virtual engagement. Throughout 2022, APS will continue to explore ways to produce a rich mix of in-person and virtual offerings that provide our members with the tools and resources you want and need to advance your careers and science. As always, we welcome your suggestions.

See you at the Hyatt Regency Chicago! ☀️

Robert E. Gropp, PhD
Executive Director
CALL FOR SUBMISSIONS AND REGISTRATION NOW OPEN!

APS is thrilled to welcome psychological scientists from around the world to Chicago, Illinois to enjoy the energy and fun that only a live event offers. Don’t miss your chance to submit your research and register at special early discounted rates!

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THURSDAY MAY 26
• Skill-Building Workshops
• APS-STP Teaching Institute
• Opening Keynote
• Opening Reception
• APSSC Student Social

FRIDAY MAY 27
• Exhibit Hall Open—stop by the APS Booth!
• Poster Sessions
• Inclusivity Spotlight
• Cross-Cutting Theme Program
• Invited Talks, Addresses, and Symposia
• Flash Talks
• Student Events
• Plenary Events
• Friday Night Reception

SATURDAY MAY 28
• Exhibit Hall Open—stop by the APS Booth!
• Poster Sessions
• Special Events
• Cross-Cutting Theme Program
• Invited Talks, Addresses, and Symposia
• Flash Talks
• Keynote Addresses
• Saturday Night Reception

SUNDAY MAY 29
• Symposium Sunday
• Poster Sessions
• Skill-Building Workshops

Coffee breaks and networking sessions will be scheduled throughout the program.

CROSS-CUTTING THEME PROGRAMS
These programs cut across psychological science’s disciplines, feature high profile speakers, and create networking opportunities for a broad audience.

• How Can Psychological Science Contribute to the Study of Structural Inequities Related to Stigma and Prejudice?
• Social Justice and Equity: Impacts on Health

TOP 5 REASONS TO ATTEND APS 2022
1. Discover the latest research and trends from world-renowned psychological scientists.
2. Gain in-depth knowledge from workshops on the latest research and statistical tools.
3. Share your research with an audience of the top academics, clinicians, researchers, teachers, and administrators in the field.
4. Forge lifelong collaborations with psychological scientists from around the globe.
5. Be blown away by the Windy City’s iconic architecture, top chefs, and storied history.
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THE MAGNITUDE OF OUR MYTHOLOGY

Jennifer L. Eberhardt and Jennifer A. Richeson explore the persistent mythology of racial progress and its impact in areas including diversity, polarization, and public trust.

Eberhardt and Richeson spoke on December 7. Edited excerpts of their conversation follow.

EBERHARDT: A major theme in your program of research is what you call the mythology of racial progress in America. Can you describe that?

RICHESON: The mythology is simply a prevailing narrative in our country that progress toward racial equality in U.S. society is steadily, linearly, naturally, and automatically getting better across time. Whether we begin in the relatively recent past or the more distant past—let’s just say when slavery was still legal or before the civil rights movement—people usually think, “Yes, racism, discrimination did exist then, Jim Crow was bad, but surely, perhaps with some help from the Supreme Court or legislation or through activism or all of the above, we’ve steadily gotten better as a country, right? Things have become far more racially egalitarian and will continue to do so.”

EBERHARDT: Walk us through some of the studies you’ve conducted so we can get a closer view of how this mythology works.

RICHESON: Well, we’re only getting started, even though it feels like we’ve done a lot. And I should say the mythology piece of this is mostly the claim that this larger narrative is omnipresent. It’s a part of our cultural story, and so much so that it has this mythic status, right? That’s why I call it mythology, but we do have evidence of what I would consider the operation of this narrative of racial progress: that people believe we have largely achieved racial equality in society and that our progress toward it has been and is continuous, unfolding linearly, naturally, and perhaps even automatically. You see it almost everywhere once you start looking.

One place where we’ve tested this involves what people think is true about the economic gaps between White Americans and Black Americans. For instance, ask the average American about the share of wealth—the disparity between White Americans and Black Americans—say, 10 years ago, 20 years ago. I did this with a team of students, former trainees, and my close collaborator Michael Kraus at the Yale School of Management. We asked a representative sample of American adults to estimate the Black–White wealth gap at 12 points across time, starting in 1963 until 2016, which was the last date that we could get data on at the time. We compared their responses to the actual data collected by the federal government, and we saw two striking things: One, people are really wrong about the magnitude of the Black–White wealth gap, both today and in the past. In this one study I’m referencing, published in Perspectives on Psychological Science, participants on average thought the average Black family had just under half the wealth of the average White family in 1963. In 2016, respondents on average thought that gap had almost closed, to where the average Black family had about 90% of the wealth of the average White family. And if you look at respondents’ estimates for dates between 1963 and 2016, you see this nice, beautiful linear upward function. So, it seems that Americans are imposing this upward linear pattern on their perceptions of change in the Black–White racial wealth gap over time.
RICHESON: A few things. We think some of this is because most Americans really do want society to be more egalitarian, so some of it is wishful thinking that organizes our cognitions to pay attention to our desire to live in a society that both espouses and has achieved racial equality. Part of it is that sense of, "This is who we are." In fact, that's part of the problem too, right? Because if we believe this is fundamentally who we are, then we believe that over time we will achieve it in reality. It won't be aspirational; it's like racial equality is a preordained outcome for the United States. That's part of the mythology. But what it does, like anything else we so desire to believe, is organize our perception, our memory, our cognition around those goals. As a result, we might pay more attention to evidence in the historical record or even in the present that favors racial progress and ignore contradictory evidence.

I am not arguing that there's been no racial progress or that evidence of progress is illusory. It's just that progress toward racial equality is not automatic, it's not linear, it's not only moving in one direction, and it's certainly not preordained or natural. That means there will be evidence of progress, like the first Black president or the first woman, first South Asian, vice president, right?

EBERHARDT: Yes. Or we can point to evidence of progress in the legal changes that came about with the civil rights movement. The changes in policies, the opening of doors.

RICHESON: Exactly, all of those things. Those are examples of actual progress, not just symbolic. We know that the actual rise in the Black middle class happened because of changes in the law. We know that voting rights had actual, tangible, important outcomes that are relevant to racial equality and that helped to close gaps on economic and other measures of social equality. The problem is when we focus solely on these positive examples—when we remember them more strongly than the evidence of backlash, pushback, and retrenchment that also happened, often in response to these things. An example is Kamala Harris getting elected and then January 6 happening. People who follow this narrative are more likely to focus on Kamala Harris than on January 6. We remember Brown v. Board of Education [the 1954 U.S. Supreme Court case that declared racial segregation in public schools unconstitutional], but we don't remember how it resulted in the closing of Black schools, the firing of Black teachers and principals,
and, in some places, the decision to close rather than desegregate the public schools, along with the privatization of all sorts of public facilities, in order to maintain segregation. And, oddly, we tend to erase even the evidence of racial progress that happened during Reconstruction [the effort to grant equal protection under the Constitution to newly freed/formerly enslaved people after the U.S. Civil War] because it was so short-lived due to backlash in the form of racial violence, including lynchings and massacres and, ultimately the rise of Jim Crow laws.

EBERHARDT: We suppress some truths as we elevate the others.

RICHESON: Exactly. When we’re asked what that state of racial equality is today compared to what it was even 30 or 50 years ago, we think, "Well, obviously things are much better," right? Without any hesitation. And, for many outcomes, this is simply not true. Racial gaps in wealth, in home ownership, and in several markers of health are as big and in some cases bigger than they were 30 years ago. We’re motivated to believe this, in part, because our culture emphasizes this progress narrative. The movies we see, the literature we read often have a redemptive arc whereby the racial prejudice and inequality of “the past” is overcome. Of course, this could be changing and not in a way that will lead us to be a more equitable and just nation. There’s this conversation about what books and stories should be taught not in just elementary school, middle school, and high school, but also in college. There’s this sort of effort to teach “patriotic education,” which, it seems (based on what is and is not potentially being banned) is the education that makes us feel like everything is fine and has always been fine. So, ironically, the abandonment of the racial progress narrative may be due to a complete denial that the nation ever had a violently unequal past. As if, "we don’t even need to have the narrative anymore—we can just let go of all of it and just say that everything’s always been fine." Which is terrifying.

EBERHARDT: There must be a race difference in the extent to which this is happening. Are Black and White Americans equally likely to misconstrue this racial progress, or are Black people less likely to do so?

RICHESON: Great question. Black people are less likely to overestimate both progress toward and actual gaps in racial economic outcomes, but they still do it. And by “they,” I mean “we”; everybody does this. But Black Americans do it less than White Americans, and low-income Americans in many of our studies, irrespective of race, do this less than high-income Americans.

And you can see why, at least in the income or economic domain. If you want to believe that your financial outcomes are due to only your hard work and effort, your “just deserts,” and not in part due to structural barriers such as racial discrimination and other advantages, then you’re also motivated to overestimate the current state of racial economic equality. To believe that things are fair and better than they actually are. Because evidence of structural, systemic barriers to success based on race (as well as other factors) calls into question whether your own high income is solely due to your own hard work, talent, merit. To contend with that can be threatening.

EBERHARDT: Right. I’m wondering about other countries. Are Americans unique in this regard? Or, if you looked at inequality anywhere else in the world, would people in different countries have the same motivation?

RICHESON: It’s a great question, and I don’t have a really good answer because we and others haven’t looked at enough places around the world. But I don’t think it’s unique to the United States, especially in terms of perceptions of progress in other social domains that are valued here and in other countries.

For instance, people in Israel and Canada overestimate the percentage of women who are corporate CEOs and in other high-level management roles. Gender equality is valued in any number of countries but still not achieved, and you see similar effects in terms of an imposed linearity of perceived progress toward gender equality, at least in Canada. Research by Rachel Ruttan at the University of Toronto has found that people continue to think that surely there are more women in these roles today than there were 10 years ago, and there will naturally be even more women in those roles 10 years from now, even if nothing changes.

But, I think the racial-progress narrative is very much connected to our specific cultural story, our national story, of being exceptional. Americans tend to think of themselves as exceptional in any number of ways and of being a land of free people who get to determine their own destiny, not bound by blood or caste, because that’s in our Declaration of Independence, right? It’s part of who we understand ourselves to be. All the evidence to the contrary, including the foundational role of slavery in this country, is an obstacle, a threat that we have to psychologically manage somehow.

EBERHARDT: Right.
RICHESON: So we tell ourselves things like, okay, we acknowledge we got it wrong at the beginning, but then we had a civil war about slavery and lots of White people died for it. We take that as evidence of our national commitment to being racially egalitarian. We also had a judicial correction with Supreme Court cases like Loving v. Virginia [which struck down state laws banning interracial marriage in 1967] and Brown, as well as the civil rights movement. But we forget that Martin Luther King and other people were assassinated because of their efforts to engender those changes.

But people even see those examples as part of the story—in the sense of, yes, we had to go through that difficult moment to get “back on track” toward our ultimate destination of racial equality. That’s what we tell ourselves, as opposed to the realities of racial progress and social progress more broadly, where efforts to dismantle structural barriers to equality and full enfranchisement are often met by backlash and measures to weaken them or work around them.

There’s this sense that we’re on the road to racial equality, making good progress even, and as long as we avoid the little ditches here and there, we’ll be okay. But we have to constantly fight and agitate for equity, for justice, and be vigilant for signs and instances of injustice; we have to track what’s happening where, to whom, and how. This is the reality, rather than the mythology, of racial progress. I think about the climate change clock that’s counting backward down to the point where climate change is irreversible. We almost need to be in a similar posture around these efforts to create a more just, free, and equitable society.

EBERHARDT: Do you feel this is a different form of cognitive dissonance? It sounds like a lot of work is going into maintaining the current attitude.

RICHESON: Yeah. It’s maintaining a distorted perception of reality in order to maintain your beliefs about the society you live in, the nation you identify with. We don’t like to acknowledge our moral failings as individuals, or those of the groups that we value and identify with. And one way to not acknowledge them, well, is to not acknowledge what’s happening in the world or in our country—the reality that there continue to be vast racial inequalities in our country today. And when we’re confronted with evidence that things might not be as equal as we thought, we often respond with psychological gymnastics to explain or rationalize it away. You see this in our data, too.

EBERHARDT: You published an article on this work in The Atlantic last year. Why did you choose The Atlantic to tell this story as opposed to keeping your focus on academic journals? Why this detour?

RICHESON: The short answer is they asked me to, for a special issue on race and racism in America post–George Floyd, and I took it on to challenge myself to communicate psychological science to a lay audience. But we psychological scientists don’t have to do just one thing. We can do rigorous empirical research and write up papers for journals in order to contribute to the larger scientific literature. It’s really important for shaping the field’s thinking about these questions as well as the larger implications for intergroup relations and race relations. But, ultimately, I didn’t become a social psychologist to publish journal articles. No offense, because I am happy to publish them, but I’m motivated to do this work because of concern for equity in society, justice in society, peace in society. Those are the ends, those are the goals, that’s what my work is about. So, when our work has matured to a place where we can responsibly say things with confidence, then I think we have an obligation to contribute to the larger conversations in society about race and racism. Surely psychological science should be part of this larger conversation, yes?

Honestly, many of the professional service roles and activities I have taken on over the past decade, including PCAST, are not about my research but about trying to represent what our field knows collectively and making sure it’s part of the conversation.

EBERHARDT: I hear you. In the Atlantic article, you wrote, “This redemptive narrative not only smooths over the past but smooths over what is yet to come: It holds out the promise of an almost predestined, naturally occurring future that will be even more just and egalitarian.”

Your work outlines the costs of imagining this naturally occurring future. What are these costs?

RICHESON: This is why I think the mythology can be corrosive. There are costs associated with this narrative. For one, it can lead to a sense of complacency, especially right after something happens that is believed to be a big win, like the election of Barack Obama. Many people interpreted his election as evidence that racism was over in our country, that we are now in a “post-racial” society and can stop focusing on racial inequality. Sometimes you see this thinking in hiring or graduate or undergraduate admissions. A really diverse cohort might be admitted or even matriculate, which you immediately celebrate as evidence of change. But if the same efforts, vigilance, and attention that were required to get that cohort there in the first place are not maintained, you will immediately
fall back to whatever was happening before and see the same outcomes as before. So much for progress.

In short, we tend to glom onto seemingly any evidence of progress and, I think, in a straightforward goal-pursuit way, disengage from the goal of a racially egalitarian organization (or department or university) because we have a sense that we’re back on track, we fixed “the problem.” The worst-case scenario is when we go to all these efforts but they’re not translated into any structural or policy changes. Often, they’re not even written down, and the people who worked their butts off to make it happen are off doing something else, and so people don’t know what was done, much less how to replicate it. Because we’re susceptible to this narrative, we think progress will continue no matter what we do, including if we do nothing.

EBERHARDT: Right.

RICHESON: We actually have some new data on this. Working with Michael and Brittany Torrez, a Yale School of Management graduate student, we asked people what they think the racial disparity is in the number of male CEOs who are Black versus White, now, what this disparity was in the recent past (5–6 years ago) and what they think it will be in the near future (5–6 years from now). For that near future estimate, participants were split into conditions where they were told to imagine that most private companies will adopt a relatively effective policy to increase racial diversity in upper management (e.g., targeted recruitment), adopt a fairly weak diversity initiative (e.g., bias trainings), or do nothing different.

You would think that the signal of an effective, proactive diversity effort would lead people in that condition to think that the share of Black leaders in the future would increase more than people in the other conditions thought it would. But this information did not really matter. Regardless of what condition the study participants were in, they not only thought there would be significant progress in the share of Black CEOs in the near future, but they expected the same amount of progress regardless of the diversity policy. If things are naturally getting better; there’s no need to intervene.

There are other corrosive aspects of the perception that things are automatically getting better. For instance, this perception leads some people to see efforts to increase representation or to close the racial wealth gap as discriminatory, because they think things are already equal or soon will be. They think things are fine, so why would we need any intervention? So, efforts to increase equity can trigger a sense of grievance; a concern among White Americans that they are getting discriminated against.

EBERHARDT: Yes. Those efforts can trigger a sense that things were fair before.

RICHESON: Right—“and now you’re discriminating against us.” That dynamic kicks in because people are somewhat deluding themselves about the reality of racial inequality in contemporary society.

EBERHARDT: What would it take to disrupt the mythology that undergirds all of this?

RICHESON: Honest answer: I don’t know. Interestingly, we tried to disrupt the idea that society had made a lot of racial progress from the 1960s, thinking that if we just gave people information about the continued role of racism in society, then they would realize there hadn’t been as much progress as they thought. And they would update their beliefs about the current state of racial economic equality. Well, some of that happened. We told a sample of White Americans about the continuing role of racism in society—for instance the influence of implicit bias, of segregation, of educational disparities. Others were randomly assigned to read about neutral control information. Afterward, all participants were asked about their perceptions of racial wealth and income inequality today (in 2016) and in 1963. So, what happened? Well, some of our predictions were correct. Participants who read about racial bias in society did report that there’s been less progress, compared to participants in the control condition, but they did not produce more accurate estimates of the racial wealth or income gaps in society today.

Instead, they shifted their estimates of the past. That is, the people who read about the persistence of racism in society tempered their expectations about how much progress toward racial equality there had been since 1963, but instead of updating their beliefs about the size of these racial gaps in the present, they seem to have decided that maybe things weren’t as bad as they thought in 1963. It was the opposite of what we expected. They didn’t change their beliefs about reality today, in contemporary society; they changed their beliefs about the past, estimating that racial economic inequality in the past must not have been as bad as they thought.

EBERHARDT: Wow. You talked about the federal government collecting these data and sometimes publishing these facts about wealth distribution every few years. Do you think the government could also play a role in disrupting the mythology by giving people the real numbers?
RICHESON: That’s a great question. I do think trusted sources, whether the federal government or independent economists and policy centers, can have an impact in increasing awareness of these numbers on the reality of racial economic equality.

But almost every time these reports come out, they make a big splash, and for a few days everyone’s outraged. And then within a couple weeks, they go back to sleep. It’s hard. We don’t know what to do with this information. It’s so vast, which makes it helpful and useful to study, and it is such an important marker of economic well-being. We don’t want to think of ourselves as having these crystallized class strata, especially in this country. We want to think that everybody’s middle class; everybody can become rich if they really want to, if they work hard. We have all these other myths about what is possible, and the wealth distribution in our country just belies these myths. Wealth, especially extreme wealth, is not really accrued through hard work. In reality, wealth is typically accrued through inheritance, across generations. Your parents or grandparents earned it and you inherited it (the recent explosion of wealth in Silicon Valley notwithstanding).

All this is to say that you cannot work your way out of that whopping racial wealth gap. You can’t say, “Oh, if they would just go to school and pull up their pants or not buy sneakers, then the racial wealth gap would close.” None of those things are relevant to the racial wealth gap. In fact, it’s the opposite. The more wealth you have, the more likely you are to go to school, stay in school, get a good job, get a career, be healthy, for goodness’ sake, and be physically able to do any of the things that allow you to accrue income and ultimately wealth.

We just have it backward in our head, and we don’t know what to do with it. And race makes it even harder, because you’re ultimately confronted with the fact that many Black Americans don’t have a lot of wealth because they were part of somebody else’s wealth, right? We were property, and nobody wants to contend with that and the reason why, of all markers of economic outcomes, the racial wealth gap is the most stubborn and the most intractable.

EBERHARDT: Wow. I’m still looking for a thread here to hang some hope on, so I’m going to ask you one final question. You were recently appointed to the President’s Council of Advisors on Science and Technology. Tell us about this and what are your hopes are.

RICHESON: PCAST is a council of advisors to the president who meet with other experts to help the president with specific issues and questions. One of the chairs is Eric Lander, director of the White House Office of Science and Technology Policy and science advisor to the president, and two academic nongovernment employees are our co-chairs. The council itself is composed of, among others, people in industry, academics in the natural and physical sciences, and a few of us in the social sciences, including me as the lone social psychologist. But for me, it’s an opportunity to learn about what’s happening in government. And, to contribute the collective knowledge of psychological science to help solve the country’s most pressing problems.

I think we only need to look at the COVID response to know that the natural sciences and technology can only do so much, right? They’ve worked with the government to get the vaccine ready in record time, and we still have something like 30% of the adult population who has not taken it. This is a behavioral science problem, and the fact that so many people in and outside of government were blindsided by this level of vaccine hesitancy tells you that there have not been behavioral scientists in many of these public health conversations. The Biden–Harris administration recognized up front the need to include behavioral scientists among its science and technology advisors, and obviously that is part of why I’m there.

The Biden–Harris administration is also very committed to reducing racial inequity in general and in society. Part of the charge in all of their questions is, "How can we achieve this goal, such as increasing our economic flourishing through technology, in ways that do not increase racial disparities but in fact reduce them?" That’s our charge with everything, whether it’s climate impacts, COVID responses, science education, the scientific workforce, or any other priority: There’s always a mandate to pay attention to racial and other forms of equality, such as rural and urban and class disparities.

So that’s the charge. It’s overwhelming, it’s a bit scary, but it’s also a potential way to have a tangible impact on our country.

EBERHARDT: Well, at APS, we would love to figure out a way to support you and to partner with you on this. Thank you, Jenn, for the work you do and also for taking a moment out of your really busy schedule to speak to the APS membership. We appreciate you, and on behalf of APS, thank you for all that you do.

RICHESON: Thank you, Madam President.
Boosting Understanding and Identification of Scientific Consensus Can Help to Correct False Beliefs
Aart van Stekelenburg, Gabi Schaap, Harm Veling, and Moniek Buijzen

This research suggests that using a communication strategy that increases people’s understanding of and ability to identify scientific consensus might lead them to correct their misperceptions in certain domains. Participants who held false beliefs were exposed to either a control activity or a boosting intervention designed to empower them to first understand the value of scientific consensus and then identify it. Afterward, they read a news article about a scientific consensus opposing their beliefs. Compared with the control group, participants exposed to the boosting intervention were more likely to correct their false beliefs. These effects did not occur in all domains, but in the domain of genetically engineered food the boosting strategy was more successful in correcting misperceptions than merely communicating scientific consensus.

The Effect of Replications on Citation Patterns: Evidence From a Large-Scale Reproducibility Project
Felix Schafmeister

Schafmeister tested whether the publication of independent replication studies affects the citation patterns of the original studies. Looking at citation patterns before and after the publication of 95 replications conducted under the Reproducibility Project: Psychology, Schafmeister found no changes in citation rates around the time the replications were published. These results indicate that there might be a lack of attention to how replication results are communicated, which could slow down the scientific process’s self-corrective ability.

Thomas I. Vaughan-Johnston, Jill A. Jacobson, Alex Prosserman, and Emily Sanders

Gebauer and colleagues (2018) reported that mind-body practices such as yoga and meditation increase self-enhancement by boosting self-esteem and narcissism. Using the same procedures as Gebauer and colleagues (2018), Vaughan-Johnston and colleagues conducted a field study with yoga students and a meditation intervention with college students. Although the effect was not clearly obtained in the replication study, an integrative data analysis of the original and replication data suggested that mind-body practices indeed increase self-enhancement (self-esteem and narcissism) rather than quieting the ego.

Psychological Drivers of Individual Differences in Risk Perception: A Systematic Case Study Focusing on 5G
Renato Frey

What drives people to perceive risks in novel concepts such as 5G, the latest generation of cellular network technology? Frey tested a representative population sample during the initial deployment of 5G in Switzerland, when public debates about it were intense. The researcher analyzed participants’ perceived risk, perceived benefit, and policy-related attitudes.
He found that differences between individuals’ risk perceptions were associated with hazard-related drivers (e.g., trust in institutions regulating 5G) and person-specific drivers (e.g., electromagnetic hypersensitivity), which predicted their policy-related attitudes (e.g., voting intentions). In a longitudinal field experiment, Frey found that individual changes in psychological drivers were linked to changes in perceived risk.

What’s in a Name? The Hidden Historical Ideologies Embedded in the Black and African American Racial Labels
Erika V. Hall, Sarah S. M. Townsend, and James T. Carter

“Black” and “African American” racial labels are associated with the different ideologies of the historical movements that made each label prominent, and this appears to influence how people associate these labels with discrimination or equality. In two content analyses of editorials in media outlets and a search on Google Images, Hall and colleagues found that “Black” appeared to be associated more often with “bias and discrimination,” whereas “African American” appeared to be associated more often with “civil rights and equality.” Additionally, results of two experimental studies suggested that White Americans inferred the ideologies of organizations on the basis of the racial labels in the organizations’ names.

Antagonism in Daily Life: An Exploratory Ecological Momentary Assessment Study
Colin E. Vize et al.

Vize and colleagues explored how antagonistic traits (e.g., manipulativeness, callousness, deceitfulness, grandiosity) manifest in daily life. Participants completed measures of personality disorders, negative affectivity, detachment, disinhibition, and antagonism. Using ecological momentary assessment (EMA) for periods ranging from 7 to 21 days, participants also rated their positive and negative affect, empathy, loneliness, and warm/cold and dominant/submissive perceptions of the self and the other in daily social interactions. Results indicated heterogeneity within antagonism and robust relations of antagonism with some manifestations (e.g., negative affect) but not with others (e.g., empathy).

Digital Technologies for Emotion-Regulation Assessment and Intervention: A Conceptual Review
Alexandra H. Bettis, Taylor A. Burke, Jacqueline Nesi, and Richard T. Liu

Liu proposes a new model to explain how a placebo’s effect on the mind can affect the body, lessening a person’s symptoms. According to Liu’s model, context-based placebo effects arise from positive treatment beliefs but are directly caused by benefit expectations. Thus, placebos mediate a belief-expectation transformation, triggering therapeutic responses. Specifically, placebos’ effects depend on treatment beliefs and how those beliefs are converted into patients’ motivations as well as expectations of benefits. Thus, placebo effects shift from weak to strong when patients’ belief-based treatment expectations shift from less negative through neutral to positive, changing the patients’ motivations.

The Golden Rule as a Paradigm for Fostering Prosocial Behavior With Virtual Reality
Mel Slater and Domna Banakou

The Golden Rule of ethics states that you should not do to others what you would not want others to do to you, or that you should do to others as you would want them to do to you. This ethical principle can become a paradigm for promoting prosocial behavior in virtual reality, in which participants can directly experience the harm they inflict from the victim’s perspective. This is possible because in virtual reality, participants can experience the illusion of owning a virtual body, including that of their own victim. Slater and Banakou describe how this phenomenon has been used to influence implicit attitudes and provide examples of how applying the golden rule in virtual reality can increase helping behavior.
Transdiagnostic Approaches to Sexual- and Gender-Minority Mental Health
Nicholas R. Eaton, Craig Rodriguez-Seijas, and John E. Pachankis

Eaton and colleagues argue that transdiagnostic approaches might facilitate understanding and reduction of the mental health disparities affecting individuals from sexual and gender minorities. Contrary to traditional diagnostic approaches, science-based transdiagnostic approaches that account for patterns of disparities and comorbidity across mental health problems might more efficiently help researchers identify the mechanisms linking minority stress to poor mental health, develop interventions to reduce stigma, and identify when treatment of the negative outcomes of minority stress could be the most effective.

https://doi.org/10.1177/09637214211043918

The Predictive Brain Must Have a Limitation in Short-Term Memory Capacity
Sabrina Trapp, Thomas Parr, Karl Friston, and Erich Schröger

Trapp and colleagues explain how the traditional tasks used to assess short-term memory might conceal the function of short-term memory and the reason for its limited capacity. Specifically, they suggest that asking participants to retrospectively remember sensory input (words, images, or numbers) obscures the role of short-term memory in prospectively predicting future sensory input. Trapp and colleagues suggest that short-term memory’s capacity is limited because humans can predict more accurately by focusing on sequences of events that are long enough to allow them to adjust their behavior but short enough to avoid requiring them to compute too many possibilities.

https://doi.org/10.1177/09637214211029977

Individual Differences in Structure Building: Impacts on Comprehension and Learning, Theoretical Underpinnings, and Support for Less Able Structure Builders
Mark A. McDaniel, Elizabeth J. Marsh, and Reshma Gouravajhala

Structure building involves forming coherent mental representations of conversations, texts, pictorial stories, and other events. McDaniel and colleagues suggest that variances in these abilities influence people’s learning outcomes: Individuals with lower structure-building ability tend to perform worse on several comprehension and learning measures than individuals with higher structure-building ability. Lower abilities appear to be related to difficulties in processes including encoding factual content and inhibiting irrelevant information. However, some learning techniques might improve learning outcomes for lower structure builders, including embedding questions into learning materials, providing organizational support, and adding schematic diagrams.

https://doi.org/10.1177/17456916211000716

The Diversity Gap: When Diversity Matters for Knowledge
Justin Sulik, Babador Bahrami, and Ofelia Deroy

Despite the political and ethical value of diversity, research has not always found that it benefits knowledge. Focusing on cognitive diversity, Sulik and colleagues explain that evidence for a benefit from cognitive diversity is mixed. However, the researchers believe that rather than asking only why and how diversity benefits knowledge, scholars must re-think when one should expect these benefits. Sulik and colleagues show that the benefits of cognitive diversity are seen for multistage, complex, and creative problem solving during problem posing and hypothesis generation. In sum, cognitive diversity seems to be particularly beneficial for complex problem solving.

https://doi.org/10.1177/17456916211004070

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outweighed the original findings. Results indicated that a published replication led immediately to a small decrease in favorable citations of the original article and a small increase in unfavorable citations of the original article. These results suggest a perpetuation of belief in the original findings and only a modest corrective effect. Moreover, the replication studies were not cited as often as the original research in new articles. Thus, it appears that replication results that contradict original findings might not prompt a corrective response from the research community.

Putting Psychology to the Test: Rethinking Model Evaluation Through Benchmarking and Prediction

Roberta Rocca and Tal Yarkoni

How should we evaluate models and theories in psychological science? Rocca and Yarkoni suggest that introducing common benchmarks to evaluate psychological science may foster cumulative progress and encourage researchers to consider the practical utility of scientific models. The researchers draw inspiration from fields such as machine learning and provide guidelines and concrete suggestions on how to develop these common benchmarks (each consists of a data set of coded examples and a task specification defining the metrics that will be used to quantify the model’s predictions). Rocca and Yarkoni also address potential concerns that may arise during the development of benchmarks.

The Role of Human Fallibility in Psychological Research: A Survey of Mistakes in Data Management

Marton Kovacs, Rink Hoekstra, and Balazs Aczel

Data management is not immune to human error. Kovacs and colleagues surveyed 488 researchers about the type, frequency, seriousness, and outcome of mistakes made by their research team in the last 5 years. Most researchers indicated low frequency of errors. The most frequent errors led only to minor consequences, such as time loss or frustration. However, the most serious mistakes, though rare in comparison, led to moderate consequences (e.g., affecting some conclusions) for almost half of the researchers and to major consequences for one-fifth of the researchers. The most frequent mistakes included ambiguous naming/defining of data, version control error, and wrong data processing/analysis. These most frequent mistakes were attributed to poor project preparation or management and/or personal difficulties.
The University of Louisville Grawemeyer Award in Psychology is given for original and creative ideas: ideas that possess clarity and power and that substantially impact the field of psychology. These ideas help us understand one another and the world around us, and provide insights into the human mind. The purpose of this annual award is to acknowledge and disseminate outstanding ideas in all areas of psychological science. The award is designed to recognize a specific idea, rather than a lifetime of accomplishment. Nominations are judged on the basis of originality, creativity, scientific merit, and breadth of impact on the discipline.

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SEX, DRUGS, AND GENES: MORAL ATTITUDES SHARE A GENETIC BASIS

The researchers then compared fraternal and identical twin pairs to assess the extent to which condemnation of recreational drugs, openness to noncommittal sex, and the relationship between the two was explained by (a) genes, (b) the shared environment—such as growing up in the same household or community, or (c) unique experiences and environments not shared by the twins. The researchers found that moral views concerning both recreational drugs and openness to noncommitted sex are approximately 50% heritable, with the remaining 50% explained by the unique environment.

Furthermore, approximately 75% of the relationship between openness to noncommittal sex and moral views concerning recreational drugs was explained by genetic effects, and the remainder was explained by the unique environment. The researchers also found substantial overlap in the genetic effects underlying both factors—namely, that approximately 40% of the genes underlying openness to noncommitted sex also underlie moral views concerning recreational drugs.

“These findings suggest that the genetic effects that influence openness to noncommitted sex overlap with those that influence moral views concerning recreational drugs,” said Karinen. “Important parts of hot-button culture-war issues flow from differences in lifestyle preferences between people, and those differences in lifestyle preferences appear to partly have a genetic basis.”

See the full article online with references at psychologicalscience.org/news/news-release.
Have you ever felt a special "spark" with someone—an intense bond with a potential partner, friend, or colleague? If so, you probably thought you experienced “chemistry.” Countless books, films, and TV shows have referred to interpersonal chemistry between characters, but the term doesn’t refer exclusively to romantic chemistry. For instance, chemistry is a common metaphor in sports and music, and even in business, academia, and scientific partnerships. However, despite its ubiquity and assigned value, interpersonal chemistry has remained relatively unexplored in the psychological literature, according to APS Fellow Harry T. Reis (University of Rochester) and Annie Regan and Sonja Lyubomirsky (University of California, Riverside) in Perspectives on Psychological Science. To address this gap, the researchers proposed a conceptual model of interpersonal chemistry.

When individuals experience chemistry, they experience their interaction as something more than the sum of their separate contributions. Interpersonal chemistry requires coordination, in that the interacting individuals share and match their goals and efforts, supporting each other in the process. Beyond this generic definition, Reis and colleagues’ Interpersonal Chemistry Model emphasizes certain properties:

• Chemistry is an emergent phenomenon. Chemistry emerges from interactions rather than from the attributes, expectations, or biases of the involved partners. This might explain why online daters often struggle to predict whether chemistry will develop just from reading online descriptions of possible partners and why there is no scientific evidence for the effectiveness of matching algorithms in dating websites.

• Chemistry is a relationship effect. Chemistry can be related to liking, but it’s broader than that: It encompasses the feeling that a given relationship is special and different from other relationships.

• Chemistry is often embodied. Several aspects of chemistry occur nonverbally or even outside of awareness. These aspects include eye contact, mimicry of facial and bodily expressions, and synchronous movements. Interpersonal chemistry can also be felt inside one’s body.

• Chemistry is different from other high-quality connections. Relationships with family members, friends, coworkers, and even lovers can be productive and satisfying, but that does not mean they create chemistry. Similarly, an intense and immediate physical attraction might be conflated with chemistry, but relationships with chemistry have unique characteristics.

The model stipulates that chemistry encompasses behaviors (i.e., what chemistry “looks like”) and perceptions (i.e., what it “feels like”). According to this, the behavioral component involves a series of interactions in which two (or more) people express feelings, needs, desires, or goals that are met with understanding, appreciation, and support. Those behaviors, in turn, lead to the perception of chemistry, with cognitive (shared identity), affective (positive affect and attraction), and behavioral (perceived goal-relevant coordination) components.

Experiencing chemistry thus requires actual interactions. Reis and colleagues excluded from consideration the idea that people may experience chemistry at “zero acquaintance,” or solely through awareness of other person’s qualities. Instead, they proposed that chemistry involves repeated back-and-forth exchanges.

“As the interaction cycle unfolds, partners will often develop a substantial level of behavioral synchrony (e.g., linguistic matching, nonverbal synchrony, voicing similar thoughts and ideas),” Reis and colleagues wrote. The researchers propose that this sequence of expressive and responsive behaviors often unfolds quickly and spontaneously, and thus chemistry can be felt in the first interactions. However, they believe that moments of connection must accumulate before enduring chemistry is felt and observed.

See the full article online with references at psychologicalscience.org/publications/observer/obsonline.
THE LITTLEST LINGUISTS: NEW RESEARCH ON LANGUAGE DEVELOPMENT

How do children learn language, and how is language related to other cognitive and social skills? For decades, the specialized field of developmental psycholinguistics has studied how children acquire language—or multiple languages—taking into account biological, neurological, and social factors that influence linguistic developments and, in turn, can play a role in how children learn and socialize. Here’s a look at recent research (2020–2021) on language development published in Psychological Science.

**Preverbal Infants Discover Statistical Word Patterns at Similar Rates as Adults: Evidence From Neural Entrainment**

Dawoon Choi, Laura J. Batterink, Alexis K. Black, Ken A. Paller, and Janet F. Werker (2020)

One of the first challenges faced by infants during language acquisition is identifying word boundaries in continuous speech. This neurological research suggests that even preverbal infants can learn statistical patterns in language, indicating that they may have the ability to segment words within continuous speech.

Using electroencephalogram measures to track infants’ ability to segment words, Choi and colleagues found that 6-month-olds’ neural processing increasingly synchronized with the newly learned words embedded in speech over the learning period in one session in the laboratory. Specifically, patterns of electrical activity in their brains increasingly aligned with sensory regularities associated with word boundaries. This synchronization was comparable to that seen among adults and predicted future ability to discriminate words.

These findings indicate that infants and adults may follow similar learning trajectories when tracking probabilities in speech, with both groups showing a logarithmic (rather than linear) increase in the synchronization of neural processing with frequent words. Moreover, speech segmentation appears to use neural mechanisms that emerge early in life and are maintained throughout adulthood.

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**Parents Fine-Tune Their Speech to Children’s Vocabulary Knowledge**

Ashley Leung, Alexandra Tunkel, and Daniel Yurovsky (2021)

Children can acquire language rapidly, possibly because their caregivers use language in ways that support such development. Specifically, caregivers’ language is often fine-tuned to children’s current linguistic knowledge and vocabulary, providing an optimal level of complexity to support language learning. In their new research, Leung and colleagues add to the body of knowledge involving how caregivers foster children’s language acquisition.

The researchers asked individual parents to play a game with their child (age 2–2.5 years) in which they guided their child to select a target animal from a set. Without prompting, the parents provided more informative references for animals they thought their children did not know. For example, if a parent thought their child did not know the word “leopard,” they might use adjectives (“the spotted, yellow leopard”) or comparisons (“the one like...”)
Infant and Adult Brains Are Coupled to the Dynamics of Natural Communication

Elise A. Piazza, Liat Hasenfratz, Uri Hason, and Casey Lew-Williams (2020)

This research tracked real-time brain activation during infant–adult interactions, providing an innovative measure of social interaction at an early age. When communicating with infants, adults appear to be sensitive to subtle cues that can modify their brain responses and behaviors to improve alignment with, and maximize information transfer to, the infants.

Piazza and colleagues used functional near-infrared spectroscopy—a noninvasive measure of blood oxygenation resulting from neural activity that is minimally affected by movements and thus allows participants to freely interact and move—to measure the brain activation of infants (9–15 months old) and adults while they communicated and played with each other. An adult experimenter either engaged directly with an infant by playing with toys, singing nursery rhymes, and reading a story or performed those same tasks while turned away from the child and toward another adult in the room.

Results indicated that when the adult interacted with the child (but not with the other adult), the activations of many prefrontal cortex (PFC) channels and some parietal channels were intercorrelated, indicating neural coupling of the adult’s and child’s brains. Both infant and adult PFC activation preceded moments of mutual gaze and increased before the infant smiled, with the infant’s PFC response preceding the adult’s. Infant PFC activity also preceded an increase in the pitch variability of the adult’s speech, although no changes occurred in the adult’s PFC, indicating that the adult’s speech influenced the infant but probably did not influence neural coupling between the child and the adult.


Chi-Lin Yu, Christopher M. Stanzione, Henry M. Wellman, and Amy R. Lederberg (2020)

Language and communication are important for social and cognitive development. Although deaf and hard-of-hearing (DHH) children born to deaf parents can communicate with their caregivers using sign language, most DHH children are born to hearing parents who do not have experience with sign language. These children may have difficulty with early communication and experience developmental delays. For instance, the development of theory of mind—the understanding of others’ mental states—is usually delayed in DHH children born to hearing parents.

Yu and colleagues studied how providing DHH children with hearing devices early in life (before 2 years of age) might enrich their early communication experiences and benefit their language development, supporting the typical development of other capabilities—in particular, theory of mind. The researchers show that 3- to 6-year-old DHH children who began using cochlear implants or hearing aids earlier had more advanced language abilities, leading to better theory-of-mind growth, than children who started using hearing provisions later. These findings highlight the relationships among hearing, language, and theory of mind.

The Bilingual Advantage in Children’s Executive Functioning Is Not Related to Language Status: A Meta-Analytic Review


A common idea is that bilingual children, who grow up speaking two languages fluently, perform better than monolingual children in diverse executive-functioning domains (e.g., attention, working memory, decision making). This meta-analysis calls that idea into question.

Lowe and colleagues synthesized data from studies that compared the performance of monolingual and bilingual participants between the ages of 3 and 17 years in executive-functioning domains (1,194 effect sizes). They found only a small effect of bilingualism on participants’ executive functioning, which was largely explained by factors such as publication bias. After accounting for these factors, bilingualism had no distinguishable effect. The results of this large meta-analysis thus suggest that bilingual and monolingual children tend to perform at the same level in executive-functioning tasks. Bilingualism does not appear to boost performance in executive functions that serve learning, thinking, reasoning, or problem solving.

See this article online for links to these journal articles.
In the courtroom, eyewitnesses usually identify defendants as crime culprits with high confidence, regardless of how correct they are. Unfortunately, juries and judges tend to interpret eyewitness confidence on the stand as an indicator of accuracy, which can result in wrongful convictions. Data from the Innocence Project (2020), a nonprofit organization dedicated to exonerating individuals who have been wrongly convicted, suggest that eyewitness testimony contributed to wrongful convictions in 70% (262) of the 375 cases in which prisoners were later exonerated by DNA evidence. One problem with relying on eyewitness testimony and confidence in court is that by the time of trial, an eyewitness's memory has been contaminated by several factors, including the simple fact that they have been asked to identify a suspect several times before.

In a recent online supplemental issue of Psychological Science in the Public Interest, intended as a follow-up to their 2017 article (Wixted & Wells, 2017), APS Fellows John T. Wixted, Gary L. Wells, and Elizabeth F. Loftus, along with Brandon L. Garrett, proposed a new guideline for conducting proper eyewitness identification procedures: “Avoid repeated identification procedures with the same witness and suspect.” That is, test a witness’s memory only once.

Memory is constructive and malleable

In their new article, Wixted and colleagues expounded upon one of the newly proposed recommendations for proper eyewitness identification procedures that Wells and colleagues had outlined in 2020. Implementing this new recommendation would not involve any special training beyond educating police investigators, prosecutors, and judges about its science-based rationale, the authors said.

One of the first steps to comprehending why a witness’s memory should be tested only once is understanding that memory is malleable, especially following recognition tests, such as lineup procedures. As many experiments have indicated, testing people’s recognition contaminates their memory, rendering later recognition tests invalid. As Wixted and colleagues explained, “presenting a lineup leaves the eyewitness with a memory trace of all the faces in the lineup, including that of the suspect. As a result, the memory signal generated by the face of that suspect will be stronger on a later test involving the same eyewitness, even if the suspect is innocent.” Moreover, the eyewitness will likely be more confident about their memory. In the courtroom, this confidence is usually seen as an indicator of memory accuracy.

Wixted and colleagues described how the current theoretical understanding of recognition memory informs the best lineup procedures.

- **Encoding specificity** says that memory is cue-dependent, and thus it is important to reinstate the crime context rather than just asking whether a face is familiar (e.g., “Do you see the person who stole the car?”). When the retrieval cue reinstates the context, it also activates relevant content, including the culprit’s face.

- Upon seeing the lineup, the witness compares each face against the activated face (i.e., similarity-based matching). The comparison between each face in the lineup and the activated face generates memory-match signals, and the face associated with the strongest signal becomes a candidate for being identified.
**Recent Research: Observations**

- **Signal detection theory** provides a theoretical framework for this process, explaining when witnesses may misidentify a suspect or miss the culprit and why a guilty suspect is not always expected to generate a stronger signal than an innocent one.

- Comparing the lineup faces and the activated face also creates a detailed memory of each lineup face via **elaborative processing**, which causes items to be better remembered afterward. Thus, in a second test, a newly formed memory of an innocent suspect is accessible, and the signal generated by the memory of that suspect is likely to be strong.

- This can confuse the witness's memory of the activation source (i.e., a failure of **source monitoring**) in a second test and lead them to attribute such activation to the memory of the crime rather than to the previous lineup procedure. Several memory tests may then further increase the potential for misidentifications.

Wixted and colleagues emphasized that because of how human memory works, an eyewitness's memory will be contaminated after a first test, even when it and subsequent tests use pristine procedures. Another important point is that, in a first test, confidence is more likely to protect innocent suspects, and decisions made rapidly and with high confidence tend to be more reliable than decisions made slowly. Therefore, courts should not neglect the results of the first time an eyewitness is tested.

### The Importance of Implementing the “Test-Only-Once” Reform

**In his book Convicting the Innocent,** Garrett (2011) further examined Innocence Project data in which eyewitness misidentification contributed to a wrongful conviction. In almost 57% of the 161 cases analyzed, all of the witnesses who misidentified a suspect with high confidence at trial reported that their initial identification was made with low confidence (34 cases), that they had initially identified someone else or no one at all (64 cases), or that they had not seen the culprit’s face (15 cases).

In their *Psychological Science in the Public Interest* article, Wixted and colleagues presented two real-world cases in which testing an eyewitness’s memory more than once clearly influenced whom they identified and how confidently they did so, leading to the conviction of innocent suspects who were later exonerated by further evidence. The authors also described the case of Charles Don Flores, a man convicted for murder in Texas who remains on death row. Flores’s conviction was based on an eyewitness identification. However, in the first lineup test, the eyewitness did not identify Flores as the culprit. “The most remarkable fact about this case is that the eyewitness evidence that is mainly responsible for sending [Flores] to death row (namely, the witness's confident testimony at trial) is actually probative of innocence when properly understood (i.e., her initial description of the accomplice and her rejection of the initial lineup). In this case, police and prosecutors obviously failed to appreciate that only the first test counts,” Wixted and colleagues explained.

### References


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Also see the APS Research Topic collection on eyewitness memory at [psychologicalscience.org/topics/eyewitness-memory](http://psychologicalscience.org/topics/eyewitness-memory).
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TAXING SUGARY DRINKS CURBS CONSUMPTION, BUT ONLY WHEN COSTS ‘POP’

From sodas to sports drinks, sweetened beverages are a staple of the American (and to some degree global) diet, though this is not without consequences. Excessive consumption of sugary drinks is linked to a host of health problems, including diabetes, obesity, and heart disease.

To help curb consumers’ thirst for these unhealthy potables, some states and local governments have imposed special consumer taxes on sugary drinks. But beyond bolstering government coffers, do these taxes actually encourage consumers to make healthier choices? That answer depends on where and how clearly the added cost of a tax is conveyed to the consumer.

According to new research published in *Psychological Science*, taxes are effective at changing purchasing habits only when the customer is made aware that there is an added—yet undefined—cost at the point of sale.

“We investigated whether ‘how a sugary beverage tax is labeled’ influences purchasing of sugary beverages,” said Grant Donnelly, a researcher at The Ohio State University and lead author on the paper. “To have any impact, labels must clearly state that the price includes an added tax. This is compared to an all-inclusive price tag that makes no direct mention of the tax.”

There is, however, an exception to this finding. The researchers discovered that when the increase is relatively small—about 1 cent per ounce—listing the actual cost of the added tax does nothing to dissuade people from purchasing sugary drinks.

“Labels that simply say ‘Includes sugary beverage tax’ are effective because people tend to overestimate the size of the tax,” said Donnelly. “The typical estimate for such a tax is around 40 cents per container. It’s actually closer to 12 cents for a single-serving can of soda.”

When the additional tax is clearly recognized by consumers at the point of sale, the study reveals, people tend to purchase water instead of sugary beverages. So, the clearly stated sugar tax doesn’t reduce purchasing or hurt business. It does, however, result in healthier beverage choices.

To measure the impact of how and where taxes are presented, the researchers conducted three separate studies.

The first was an 8-week field study in San Francisco, which began with a control phase in which a store stocked drinks with price tags that made no mention of the added tax. For the next phase of the first study, the researchers made the tax more salient by adding the phrase “Includes SF Sugary Drink Tax” to the price tags. (SF stood for San Francisco.) In the final phase, the price tags included information on how revenues from the tax would support programs for students.

This initial study revealed that making the added tax salient drove consumers to choose bottled water over sugary drinks. Informing consumers of the tax’s altruistic goals did nothing to offset this change in behavior.

The second and third studies were online experiments. The first demonstrated that tax-salient price tags reduced purchases of sugary beverages because they led people to overestimate the drinks’ ultimate cost. The final online experiment replicated the scenario tested in the first study, providing additional evidence that making the tax salient influenced consumer behavior.

“This research is important because many cities have instituted these taxes with the hopes of curbing consumption and purchasing of these beverages to improve public health outcomes,” said Donnelly. “We hope our results provide useful guidance on how these taxes should be labeled to ensure a positive outcome.”

**Reference**

argaining in an open-air market. Making trades at a sports memorabilia show. Monitoring price changes on a ride-sharing app. Every day, people in real-world marketplaces make choices using decision-making biases similar to those explored by psychological scientists in laboratory settings. And field experiments in such contexts “can serve an invaluable intellectual role alongside traditional laboratory research,” John List proposed in a recent review in Current Directions in Psychological Science. Moreover, “fundamental tenets in economics, such as the law of demand, might have deeper psychological underpinnings than most people believe.”

List is a professor of economics at the University of Chicago whose insights from field experiments have influenced areas from education to corporate social responsibility to government policy. His review divides the history of economic field experiments into three periods.

The first period, in the 1920s and 1930s, began when Jerzy Neyman and Ronald Fisher conceptualized randomization as an instrument for testing different types of agricultural experimentation. The second period, in the mid-20th century, was characterized by government agencies conducting large-scale social experiments with groups of individuals affected by government tax and spending programs. The third period, which covers the late 20th century to the present, has produced four general categories of experimentation, including controlled experiments in laboratories using university students; artifactual field experiments using relevant populations of interest in controlled environments; framed field experiments using relevant populations of interest in natural markets; and natural field experiments, which are covert.

In one of his own natural field experiments, List used a within-sellers design to explore the degrees to which different sellers in open-air markets discriminated against women buyers. A key mediator, he wrote, “was sellers’ subjective beliefs about the difference between men’s and women’s willingness to pay for the good.” List further explored market-based examples of behavioral biases previously explored in psychological research.

The “omission bias,” for example, is the tendency to judge harmful action as worse than equally harmful inaction. “Looking no further than COVID-19 vaccination decisions will reveal the power of this bias,” he wrote, citing people who attribute their resistance to vaccination to “the potential chance of death from the vaccination, even though the probability of dying from the disease itself is much larger.”

List’s review demonstrates how insights from economic field experiments can help psychological scientists think about the external validity of their research. “In the end, all empirical results are externally valid for some settings, and no empirical results will be externally valid for all settings,” he concluded.

See the full article online with references at psychologicalscience.org/observer.
What does it take for an enterprising person to rise above the competition and become a successful entrepreneur? Is it an ideal mix of startup cash, marketplace insights, and business savvy? Perhaps, but psychological science suggests that these assets may not be enough. Rather, specific characteristics and behaviors may differentiate the founder of a thriving new business from the leader of a failed startup.

In a recent episode of Under the Cortex, Nikki Blacksmith and Mo McCusker, cofounders of Blackhawke Behavior Science and corecipients of a 2021 APS Psychological Science and Entrepreneurship Poster Award, discuss their research on the crossroads of business acumen and psychology.

The first topic of discussion was the idea that people either have a million-dollar idea or don’t. According to Blacksmith and McCusker, there’s definitely more to it than that: Without the right team, even a million-dollar idea might not come to fruition.

“The company is only as successful as the people who are there to build that idea into reality,” said Blacksmith. “This is especially true with the lean-startup model that was so popular in the last few years.”

Most entrepreneurs focus on developing and marketing their product as fast as they can, but they need an equally strong focus on putting together a team with the right people to build the product. What failed entrepreneurs often lack is an understanding of the external environment—for example, who is your target customer, and who are your competitors? They also fail to understand where their business fits into the overall ecosystem.

Is entrepreneurship an innate characteristic? Not according to McCusker: “As a psychologist, I really don’t love the term ‘being entrepreneurial.’ What our science shows is that there is no one-size-fits-all model for an entrepreneur. You can’t reduce it down to a particular type of person. Beyond individual differences, entrepreneurs have a particular set of characteristics, like an ability to think in a creative manner about innovation and a willingness to challenge the status quo.”

For her part, Blacksmith doesn’t mind the term “entrepreneurs” if it’s used in the right context. “I really think of entrepreneurship as a process. It’s about doing what hasn’t been done before, bringing in the right people, and then managing and motivating them. But you have to know how to effectively collaborate across people.” She also credits persistence in the face of adversity, without which “you’re not ready to struggle and overcome obstacles.”

The critical point for both psychological scientists is understanding everything before diving in to start a new business. They both stress the need for learning and curiosity from the beginning.

“A lot of times what happens is someone has a great idea, and because they have technical knowledge but weren’t trained in marketing or finance, they are unsuccessful,” said McCusker. “They need to take time to learn all of these different things and not assume they know everything. Entrepreneurship is not just about a product. It’s about building a company, and a company is about building a community of people.”

Blacksmith amplified these ideas by emphasizing that certain people will enhance your abilities, productivity, and success. Take the time up front to find the right team that will make you your best self as an entrepreneur.

Listen to the interview with Blacksmith and McCusker on Under the Cortex: psychologicalscience.org/news/podcast-news.
Following a whirlwind 2021 for science in policymaking, APS’s government relations team previews the policy agenda for 2022. Here’s some of what’s ahead.

ARPA-H poised to shoot for the moon
In the United States, President Joe Biden, Congress, and the National Institutes of Health (NIH) all announced their support for the development of an Advanced Research Projects Agency for Health, or ARPA-H, which would fund “moonshot” projects to advance health and prevent disease. As the ARPA-H idea moves through the twists and turns of the legislative process, APS has weighed in at key moments to keep behavioral science’s contributions to health on the minds of all parties. Most recently, in October, Senate appropriators announced their support for this agency, proposing a $2.4 billion annual budget.

In part thanks to APS’s advocacy, we anticipate that when ARPA-H is launched, there will be immediate opportunities for APS members to submit funding proposals for moonshot health ideas as well as to explore job openings as ARPA-H program managers—temporary government employees who guide agency funding decisions. Now is the time to start thinking about a research idea you might bring to ARPA-H. These opportunities will likely present a once-in-a-generation chance to have your work funded by a new government agency.

APS experts convening on COVID-19
In June, APS launched its Global Collaboration on COVID-19 to bring together psychological scientists conducting research relevant to the global pandemic. Visit psychologicalscience.org/covid-initiative to learn more about what’s ahead for this initiative, including a January 21 event focused on the biology and psychology of infection, featuring a stellar lineup of speakers.

Throughout 2022, collaboration working groups associated with the initiative will continue to discuss ways psychological science has been—or should have been—leveraged to respond to the pandemic. One of the newest such groups, led by Jonathan Wai (University of Arkansas), is focused on psychology and education and education policy. The group is examining how COVID has affected education and learning as well as the interplay between COVID and college admissions processes.

Continued pushes for psychological science in policymaking
The APS COVID-19 collaboration is one way that APS is working to ensure psychological science contributes to ongoing policy work related to COVID-19. Similarly, APS continues its push to ensure that research psychology is recognized in policymaking broadly. We started 2021 with calls that newly elected President Biden involve experts from our field in his COVID-19 response team, and we now are encouraging that pandemic recovery efforts also leverage wisdom from our field.

APS advocacy has progressed similarly in Europe. When the European Union launched its Health Emergency Preparedness and Response Authority (HERA), APS encouraged full integration of our field in this effort. In a promising response, HERA informed APS that it will aim to “look into the possible links and contributions from psychological science and the other behavioral sciences to HERA’s work and operations” and eagerly awaits the products of APS’s COVID collaboration.

APS has connected policymakers to psychological scientists and their work in other areas, too. Over the
last few months, Congress has initiated a new caucus focused on understanding the social determinants of health; we’ve been in touch with offices on Capitol Hill to ensure that the fundamental and applied research that psychological scientists conduct is at the fingertips of policymakers seeking to improve health.

Congressional support for the behavioral and social sciences

In July, the U.S. House of Representatives issued reports associated with the annual appropriations process expressing key statements of enthusiasm for psychological science. These statements echoed APS’s concerns focused on strengthening support for behavioral science at NIH, integrating behavioral science into the country’s COVID-19 strategy, and emphasizing the importance of the National Science Foundation’s (NSF) behavioral science directorate.

In late October, APS heard that the Senate shared many of the same views previously expressed by the House. Specifically, the Senate appropriations chair released a version of the federal budget that also called to strengthen funding for the NIH Office of Behavioral and Social Sciences Research, which supports psychology work funded by NIH. This budget also proposed funding boosts to NIH and NSF, main funders of psychology research in the United States.

As this article goes to press, the APS government relations team is hopeful that the House and Senate will work together to develop a budget to send to the president’s desk—one that continues to echo APS priorities.

Separate from the appropriations process, APS has been tracking excitement around the idea of creating a new arm of the National Science Foundation (NSF) focused on use-inspired research. Different models for this arm have circulated throughout the year, and APS has advocated for full inclusion of the behavioral and social sciences in whatever form things take. Last we heard, an NSF Directorate for Technology, Innovation, and Partnership was gaining steam. Stay tuned to future issues of the Observer for updates.

Webinars for APS members led by government funders

Interested in top science funders that support psychological science research? Be sure to check out APS’s library of government research, funding, and policy webinars, available online. In these recordings—free to access for APS members—you can learn about such opportunities as NIH’s high-risk high-reward funding streams, NSF’s education grants, and social science funding announcements in Canada.

Stay tuned for further programming in the new year, and please let APS know at aps@psychologicalscience.org if you’d like to hear from other important funders in your area of psychological science.

New opportunities for graduates of PCSAS-accredited clinical psychology programs

The Psychological Clinical Science Accreditation System, or PCSAS—an APS-supported initiative that advances the clinical science model of training and integrates the science and practice of psychology—is increasingly recognized by employers throughout the country. Graduates of PCSAS-accredited programs are now eligible for the Commissioned Corps of the U.S. Public Health Service, for example. And as of December 2021, PCSAS programs are eligible to apply for the U.S. Health Resources and Services Administration’s Graduate Psychology Education Program, which has a pot of nearly $25 million in available grant money the programs can now access.

APS will continue to advocate for PCSAS to ensure that clinical psychological scientists have the broadest set of career opportunities available to them as they advance their science and practice. Keep up with developments involving these and other APS policy initiatives at psychologicalscience.org/policy.

QUOTE OF NOTE

“Sometimes the answer to these questions is yes, sometimes it’s no, often it’s complicated or it depends, but to be able to understand that and have these discoveries really make all of us better off understanding what works and what doesn’t. And to me, the especially important issue is the ‘why’—why does it work, or why is it not working? That’s the only way we can get better in government, by learning to identify that’s working and do more of that...”

—U.S. Administrator of General Services Robin Carnahan, reflecting on the work of the Office of Evaluation Sciences, an integrative team that designs and conducts assessments of government programs at a November 16 virtual event. Learn more at oes.gsa.gov/oes-at-100.
Announcing a new Editor of AMPPS!

Incoming Editor Dave Sbarra, University of Arizona, and his editorial team are now handling new submissions.

For more, read a Q&A with Sbarra on page 70 of the November/December Observer.

www.psychologicalscience.org/ampps
MAKING NOISE THAT CAN’T BE MISSED
My career applying psychological science to policy
By Tom Hilton

If a tree falls in the woods and everyone is around to hear it, does it make a sound? Of course it does—but the event won’t change much unless the right people are listening. Like that tree in the woods, behavioral research does not seem to lead to much change either. I think that is because we too often focus our attention on scholarship and the implications for theory rather than for daily life. For example, although most psychologists understood the implications of Philip Zimbardo’s prisoner study and Albert Bandura’s Bobo doll study, it took many years for that work to impact public policies and practices. My career as an industrial/organizational (I/O) psychologist has shown me time and again that it is possible for research to affect public and organizational policies and practices—if we make an effort to help policymakers apply it to everyday problems in the public and private sectors.

My career started when I was drafted right out of college and spent 4 years as a Navy officer. Thanks to a research fellowship at the Texas Christian University Institute of Behavioral Research (IBR), I completed my doctorate in January 1980. At the IBR, we tailored research projects to the needs of clients (large corporations and federal agencies) and strived to explain findings in ways that could help our clients readily identify changes to make things better. That approach never interfered with scholarly productivity—it probably enhanced it. The late Saul Sells, IBR’s director, had been a military researcher during World War II, a fact that attracted contract studies from the armed services as well as federal agencies and private-sector corporations. All of IBR’s research had direct implications for clients’ organizational policies and practices, and that became my orientation as well.

The year before graduating, I joined the faculty of the University of Texas at its Dallas campus. After a couple of years, I began to think about a career change because none of the trees falling around me were being heard. In 1982, I got a call out of the blue from the Chief of the Navy Medical Service Corps asking me to get back into uniform to lead a Navy-wide study to improve the delivery of health services aboard ships. Senior hospital corpsmen on independent duty (in lieu of physicians) were failing in their jobs at an unacceptable rate. Figuring that I could return to academia afterwards, I decided to give the Navy another try and reported for duty at the Naval Health Research Center in San Diego. I surveyed every shipboard corpsman in the fleet and interviewed most of the training faculty. Project results enabled both data-based policy and practice improvements that were easily implemented in the fleet and at the schools. Within 18 months, job failures dramatically dropped off.

In 1985, the surgeon general ordered me to Bethesda to conduct career-development studies for both the Navy Medical Corps (physicians) and the Navy Nurse Corps. In addition, I was tasked with evaluating the leadership and management training program for senior medical staff. In each project, I made sure that results and recommendations informed policies and practices to enable constructive changes by senior commanders and staff. In 1988, I began working at the Pentagon for the Chief of Naval Personnel. I was put in charge of Navy studies addressing recruitment, screening, advancement, training, career development, and many other topics I/O psychologists study. It was my best job ever, in part because the admiral was very data oriented. Only a Lieutenant Commander at the time, I soon became the only non-admiral participating in weekly board meetings. From that perch, I was able to help the admirals make changes to Navy personnel policies and practices, and I commissioned studies and analyses to address issues related to emerging problems the admirals faced.

After my Pentagon tour, the admiral arranged for me to manage a laboratory for the Federal Aviation Administration (FAA) which conducted organizational research that included an annual survey of the workforce. We also evaluated leadership and technical training programs.
Though my lab was in Oklahoma City, I was in Washington regularly to advise the administrator and his executive staff on human resource policy issues. While in DC, I often met with Pentagon officials to discuss the implications of studies I was doing for them on the side.

In 1992, the Department of Defense assigned me a 3-year part-time detail to the Clinton White House to oversee a national security project. Three years later the FAA administrator arranged a second detail to help evaluate Vice President Al Gore’s Reinventing Government Program. I was able to assemble a dream team of federal research psychologists from across the government—especially the U.S. Merit Systems Protection Board and the Office of Personnel Management (OPM). We developed a 40-item survey that my FAA lab distributed to a random sample of 40,000 military and civilian federal employees stratified by agency size. With a 40% response, results confirmed that Gore’s program was very popular among federal employees. However, Clinton’s elimination of all first-level supervisors (to make government more efficient) was viewed to have the opposite effect. The most impactful result of our project was that OPM liked our survey so much that its director decided to adopt it as an annual government-wide event. For the past 20 years, U.S. presidents have used OPM’s Federal Employee Viewpoint Survey results to gauge the relative success of all federal departments, and Cabinet members have used it to gauge how well their agencies are doing.

By late 1999, my career was at a crossroad. My next promotion would take me out of research, so I was considering retirement from the Navy. I shared my quandary with an old friend and his wife over dinner one night and he reminded me that I had a standing invitation to join his team at the National Institutes of Health (NIH), which I decided to do. My official role at NIH was as a program official (PO) at the National Institute on Drug Abuse. I oversaw a large portfolio of grants that focused on addiction health service delivery systems.

A key role of NIH POs is to help researchers shape their grant applications in ways that not only advance health science but also inform public health policy. We could freely do that because grant applications are independently peer-reviewed. Once applications are scored, POs advocate for funding the best ones. Very costly projects often hinge on POs convincing other NIH institutes, federal agencies, and even private sector foundations to co-fund. Thus, the size and scope of a PO’s portfolio of grants often depends on their awareness of the current research interests of other agencies and organizations. Once funded, POs administer the grants by monitoring progress and authorizing project modifications as situations might demand. As projects start producing information, POs also help to ensure dissemination to policymakers as well as the scientific community.

The thing I loved the most about being a PO was the freedom and resources to continue to engage in what I call “creative mischief.” Every grant initiative had its own unique challenges. It was not uncommon for more-senior POs to form small cabals of like-minded colleagues to help convince NIH top management to authorize new grant initiatives to promote using novel research designs, studying emerging topics, as well as employing promising methodologies that could help to advance health science while also informing health policy. If these were successful, NIH issued new program announcements and POs then worked to encourage researchers to apply for funding.

The biggest “cabal project” I worked on was to promote the use of computerized adaptive testing (CAT) technology, which uses Item Response Theory to reduce patient response burden. Sick and recovering people do not like filling out lengthy questionnaires to monitor their recovery progress, yet both healthcare providers and researchers need such information. CAT can reduce self-report response times from, say, 40 minutes to 10 minutes yet validly measure the same number of symptoms and capabilities. Our end goal was to create a gold-standard tool that would both increase patient participation and have high enough validity generalization to broaden use in research studies and clinical trials. I joined a half dozen POs from different institutes starting in late 2002 to brainstorm and draft a convincing proposal. We estimated the cost would be about $100 million over 10 years, which was too high for any single NIH institute to fund. Thus, we hoped to convince the NIH director to get all 27 NIH institutes and centers to help fund the project. We did, and the Patient-Reported Outcomes Measurement Information System (PROMIS) was the result. The project was approved in 2004 and is now in global use in more than a dozen languages.

My entire career shows that it is possible for behavioral research not only to advance science but also to influence policies and practices. 

Science in Service highlights psychological scientists who work in government or apply their research to policymaking. Would you be a good fit for this column? Write adesoto@psychologicalscience.org.
JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE

Psychological scientist Keiko Ishii, a professor in the Graduate School of Informatics at Nagoya University, shares insights on her country’s key research funder.

The Japan Society for the Promotion of Science (JSPS) is one of the premier funders of basic and applied science research in Japan. Established by an imperial endowment in 1932, JSPS supports research on topics ranging from the social and natural sciences to the humanities. JSPS supports both single-year and multiyear research grants.

Keiko Ishii is an associate professor in the Graduate School of Informatics at Nagoya University. Her research focuses on cultural differences in perception, cognition, emotion, and decision-making. She has also studied the influences of socioecological factors, such as voluntary settlement and residential mobility, on psychological processes. She received her first JSPS research grant in 2000 while enrolled in doctoral courses. Since then, she has received several other research grants from JSPS. Her most recent grant, titled “Understanding the Genetic Foundations of Cultural Variation in Cooperation With Evidence From Social Psychology, Neuroscience, and Endocrinology,” was selected as part of a JSPS program called the Topic-Setting Program to Advance Cutting-Edge Humanities and Social Sciences Research (Area Cultivation; learn more at jsp.go.jp/english/e-kadai). This program encourages researchers in the social sciences to collaborate with those in different scientific fields to explore new methodologies for research in social sciences.

Keiko Ishii

What research have you conducted using the JSPS grant?

It is no exaggeration to say that the various fields of the humanities and social sciences deal with cultural phenomena in a broad sense. However, the traditional humanities and social sciences do not provide sufficient answers to the fundamental questions of how cultural phenomena are created (i.e., how cultures are formed and maintained and why different cultures have emerged). One approach to these questions is to focus on the possibility that genes and sociocultural environments have coevolved (e.g., Boyd & Richerson, 2005). In our research, we applied the concept of gene and culture coevolution to the conventional social science approach that has examined the relationship between the nature of the human mind and the sociocultural environment, attempting to explain the origins of a wide range of cultural differences, including Western and Eastern cultural differences. Specifically, we examined how genetic polymorphisms related to neurotransmitters such as serotonin, oxytocin, and dopamine are associated with cultural differences. We developed a comprehensive battery of behavioral tests on the self, cognition, emotion, and distributive/cooperative behavior based on previous findings in social and cultural psychology, which also included scales for measuring individual intelligence and personality (e.g., IQ and Big Five traits) and questionnaires asking about their experiences moving and early family environment. We conducted the tests in two rounds in Japan (Kobe University) and Canada (University of Alberta) between 2015 and 2019. Eventually, we collected data from approximately 800 participants and analyzed them by targeting 18 genetic polymorphisms.

The results indicated that the interactions between culture and genes are very limited, suggesting the possibility that cultural differences are determined by the social and ecological environment of each society and are internalized by individuals indepen-
It usually takes about 5 months to hear from JSPS about their review of Grants-in-Aid for Scientific Research (called Kakenhi in Japanese). Scientific Research (called Kakenhi in Japanese). However, the review of Topic-Setting Program to Advance Cutting-Edge Humanities and Social Sciences Research (Area Cultivation) we applied for was faster. Every year of the grant, we submitted a brief annual report to JSPS. Also, we submitted the final report in the grant’s final year, which JSPS reviewed to decide whether our research grant could be extended (please note that this final review is specific to this unique grant program—in the case of Kakenhi, such extension is not usually allowed). Fortunately, the extension of our research grant was approved for 3 more years, which was very helpful for conducting further research.

What advice do you have for researchers applying for grants from JSPS?
JSPS has some fellowship programs for international researchers (including graduate students and postdocs) who are interested in working with Japanese researchers in Japan. However, only domestic researchers, including international ones working at Japanese universities and institutions, can apply for Kakenhi. Recently, universities have supported researchers by organizing a workshop for earning Kakenhi. In addition to following basic tips for research proposals (e.g., clarifying the objective of research, addressing significant research questions, and presenting a realistic and well-prepared plan of research), researchers should obtain a sort of implicit knowledge on applications for Kakenhi by attending workshops and speaking with colleagues who have received JSPS research grants.

Anything else you wish to share regarding JSPS funding?
As I said previously, JSPS has fellowship programs for international researchers (jsps.go.jp/english/e-inv_researchers/index.html). If you are interested in doing research in Japan, I encourage you to apply for them.

References
THE GRAND CHALLENGES OF PSYCHOLOGICAL SCIENCE

By Leah Thayer, APS staff writer
In October, APS invited members to share what they consider to be the "grand challenges" psychological science must address in the coming years. Our goal was to illuminate worrisome fault lines within the discipline, strengthen the field's collective impact, and draw attention to how scientific psychology can more effectively inform public policy and advance human welfare. We reached out to members around the world, aiming for a collective response that reflects the diversity of experiences and opinions within the multidomain world of psychological research.

Well over 100 of you responded, weighing in from every continent and representing every stage of your careers, from graduate school to more than 50 years postdoctorate. Although respondents were disproportionately White, North American, and male, your concerns were global and inclusive, touching on matters from rigor and relevance to stronger engagement of scientists, policymakers, the media, and society broadly. Many of you identified several overlapping challenges, along with detailed lists of priorities. Some of you suggested future directions for the discipline, whereas others aimed your recommendations squarely at APS. You expressed equal measures of skepticism and hope.

In the pages that follow, we spotlight some of the consensus issues that surfaced. To conserve space, we’ve excerpted some responses and paraphrased others. Though we can’t include every response, APS is taking them all to heart and will continue to do so as we move through our long-term strategic planning process.

On behalf of APS to all of our members—especially those who responded to this challenge—we are deeply grateful for your time, thoughts, and commitment to psychological science.
Why does any of this matter? “Taken together, the lack of representation and of transparency greatly threaten both the internal and external validity of our research,” wrote clinical neuropsychologist Luis D. Medina, University of Houston. “As our society becomes increasingly diverse across multiple domains, our observations, constructs, tools, and other products of our research—largely reliant on data from a limited subset of the global population—will become increasingly limited, or even irrelevant.” Consequently, “rather than working toward better understanding of human psychology and the reduction of human suffering, our field will continue contributing to the perpetuation of health disparities.”

Representation extends beyond geography, too. “We must grapple with the White- and male-centric nature of our discipline, making it a priority to listen to our colleagues (and participants) who seek more voice at the table,” wrote APS Fellow Gordon Hodson, a social psychologist at Brock University in Canada. “This will require cultural humility, epistemic inclusion, and the decentering of the default White and European/American ways of knowing and making decisions about the direction of our discipline. Of course, those with power or cultural primacy rarely relinquish it without resistance, and academic psychology will likely be no exception,” he added. “Here, psychology would be well advised to turn to many of our sister disciplines who have made headway on these issues.”

APS Fellow Douglas MacDonald, an associate professor at University of Detroit Mercy, advised “addressing inequities within the psychological scientific community in terms of race/ethnicity, sex and gender, and socioeconomic differences. This should take the form of improved representation on editorial boards and more equitable practices in the evaluation and publication of research by scholars of different backgrounds and countries.”

Community/social psychologist Crystal Steltenpohl, of Dartmouth College’s Center for Program Design and Evaluation, pinpointed the field’s need to overcome a “reliance on old measures of prestige as a way of determining a researcher’s value.” She mentioned challenges such as “lack of support for undergraduate education, especially at smaller regional schools,” and, in the context of graduate education, “the assumption that all students are going to or should want to become academics.”

“We need to adjust our frames around the radical authenticity movement of gender identity, too,” said Erica Kleinknecht, a cognitive scientist at Pacific University. “According to a recent study, 20% of Gen Z individuals from LGBTQ+ spaces identify as nonbinary, and when they come into intro psych where print materials still conflate sex and gender into binary divisions, we are making ourselves irrelevant to them. The 20th-century binary frame is wrong, and we need to move beyond it.”

To all these ends, APS Fellow Brian Carpenter, a clinical psychologist at Washington University in St. Louis, wrote that “psychological science needs to address the origins of and solutions for prejudice, discrimination, and intolerance of differences related to gender, race, national origin, age, sexual orientation, and other facets of identity and experience.”

Research integrity and applicability

Many APS members prioritized psychological science’s significant concerns with replicability and the sometimes dubious real-world applicability of research. “The biggest challenge that psychological science must address is to increase its rigor, reproducibility, and generalizability,” wrote APS Fellow Tom Beckers, an experimental psychologist at KU Leuven. “The change in research culture that is needed for this has already started to take hold but is very fragile still.” Granted, other sciences face similar predicaments. “Fields ranging from economics to biomedicine are grappling with similar issues about research integrity and rigor,” wrote freelance writer Scott Sleek in an article about the emerging culture of data sharing and self-correction (“On the Right Side of Being Wrong,” page 45). “But psychological science has stood out for the breadth of its self-correction initiatives.”

Retired experimental psychologist Harold Miller, Brigham Young University, was unsparing in his summation. “Beginning in 2015 or so with the publication in top-tier scientific journals of failures to replicate reports of
earlier research published in prestigious psychology journals, the discipline has worn a black eye,” he wrote. “Attempts to counter this trend took the form of long-overdue, broad-based recommendations for replacing long-standing traditions of peer review and editorial decision-making that were now seen as hopelessly biased. Calls for the preregistration of research proposals, the publication of negative results as a matter of course, and the disclosure of potential conflicts of interest by researchers, among other proposed remedies, appeared and were increasingly embraced as standard practices.” Amid these promising indicators, however, Miller noted “discomfiting counterindications, such as appeared in a recent Psychological Science—namely, a report that the original articles subsequently discredited as unreplicable still receive the lion’s share of citation.” (See a summary of this article on page 14 of this issue.)

Righting the ship may require rethinking the basics, many APS members opined. “It is not clear to me that psychology can continue to call itself a science when most of those practicing it do not know the fundamental methods or statistics of the field,” wrote APS Fellow Pamela Davis-Kean, of the University of Michigan. “When the story outweighs any evidence—then we are just philosophy and squarely in the humanities. We will continue to be challenged with poor training in methods and statistics, poor theory, unvalidated measures, tenure incentive being stronger than scientific integrity, and an aging field that values big names more than rigorous science.”

MacDonald identified “inconsistencies in best practices with respect to executing research in a transparent/open, ethical, and rigorous manner. There is a need for improved training of scientists that includes improvements in teaching what questionable research practices are and how they can be avoided.”

“We need to become more of a science, valuing incremental contributions and robust findings (even if they are not surprising or flashy),” wrote Heather Kappes, a personality/social psychologist at the London School of Economics and APS’s Visiting Behavioral Insights Scholar. “This probably means teaching and training in a range of techniques that are only lightly used at present, including things like computational modeling and qualitative methods. We should be trying to publish fewer papers, but being more careful with each that we do publish.” To that point, developmental psychologist Royette Dubar, of Wesleyan University, called out “the increased pace of publishing at the expense of quality research” and called for “more opportunities to publish (and value) nonsignificant findings that are based on sound theoretical and methodological designs.”

APS Fellow Elizabeth Hayden (University of Western Ontario), who studies developmental psychopathology, remarked that “invalid measurement practices contribute much more heavily to replication problems than people appreciate,” at least in her subdiscipline. “Most of our theories of etiology of psychopathology are based on a research literature that has drawn upon measurement practices that don’t meet modern standards for psychometric development and are developmentally insensitive. I don’t think open science practices can accomplish much without better measures,” Hayden added. “We should be spending more time on measurement development and validation and less time testing etiological models until we know we’re measuring what we want to, reliably and validly.”

Christopher Green, a quantitative psychologist at York University, proposed a three-step corrective course. “(1) We must correct the misuse (including rampant overuse) and the widespread misinterpretation of the meaning of null-hypothesis significance testing. (2) We must greatly improve the state of statistical training that psychology students receive. (3) We must expand the statistical (and, more generally, mathematical) tool kit with which psychologists are familiar and comfortable. We don’t need ever–more–elaborate statistical methods to be misused by researchers who were not adequately prepared to use them correctly. Instead, we need to teach the basics much better.”

How about asking tougher questions and allowing scientific facts to speak for themselves—even if they may be unpopular? “In my long career, I have watched the precarious balance between ideology and science as it teeters one way, then another,” wrote APS Fellow Carol Tavris, a social psychologist in Los Angeles, California. “At its best, science has been able to overturn, or at least slow, pernicious fads (e.g., recovered memory therapy) and benign but wrong theories (e.g., that women reason ‘in a different voice’). Today, I fear that the greatest challenge for psychological science is maintaining our emphasis on science, even when its findings question the current ideologies of race, gender, and social justice.”

As an example, Tavris wrote that “scientific evidence and ‘rigor’ are increasingly seen as the villains in the war against racism—if research doesn’t show what we want it to, it must be racist, worthy of being silenced and its promoters shunned. This is a tragically misguided belief…. I hope that APS will hold the line for competent, peer-reviewed research and debate.”

On a more hopeful note, cognitive scientist Laird Edman, Northwestern College, sees the replication crisis as “a sign our science is maturing—we have the
opportunity to refine our methods and make our science much better by adopting open science methods. However, we also need to understand the limits of our science and have the intellectual humility to embrace a sophisticated epistemology and philosophy of science. Too many psychological scientists are naive logical positivists but are unaware of how that epistemological position is untenable and long outdated … Developing a science that is more rigorous and more modest at the same time will serve us well and allow us to grow and give away our science better than we have in the past.”

Collaboration across fields and disciplines

For years, APS leaders have called for psychological scientists to collaborate across geographic and disciplinary borders and, as current APS President Jennifer Eberhardt wrote in this magazine, to get “more of the science into the world and more of the world into the science.” APS members echoed these sentiments in their responses.

APS Fellow Paul van Lange, a professor of social psychology at VU Amsterdam, identified behavioral economics and ecological and evolutionary science as fields within and outside of psychology that would benefit from a more integrated approach. “Thinking of the movie Toy Story, and the charming character Buzz Lightyear in particular, we need to cross borders—to the future, to the entire world, and beyond,” he wrote. Crossing borders “helps us understand the connection between psychological processes, the focus of the past decades, and the broader context.”

Weighing in from the University of Porto and the biological/neuroscience field, Fernando Ferreira-Santos wrote that “psychological science is, perhaps, the hardest science. Psychological phenomena only emerge when complex biological systems with a long evolutionary history go through a protracted period of ontogenetic development embedded in intricate sociocultural contexts. This means that psychology must be a natural science, branching out of biology and neuroscience, but also a social science, attuned to the systems described by anthropology, sociology, and economics, among other disciplines.”

Kleinknecht characterized the challenges in historic and demographic terms. “With increasing interdisciplinary work that crosses over conventional subfields, our modern scientific discoveries do not neatly fit in the 20th-century frameworks laid out in most textbooks,” she wrote. “With three generations in the workforce, there are three different worldviews about psychology influencing our practices. My boomer colleagues who were trained in the era/aftermath of behaviorism view our field differently than Millennials. Gen X psychologists were taught in the postbehaviorism era but are teaching Gen Z students. They have to go through a complete about-face as they reconcile how to handle history, bring in modern science findings, and explain away the archaic organization of our textbooks.”

“The way that research projects are so often independently organized by lab and faculty members—and often hidden—is detrimental to the goals of science as a whole,” wrote Manon Ironside, a graduate student at the University of California, Berkeley. “We need more centralization, more collaboration, less of a model that elevates the authority of individual researchers and promotes individual achievement. It is likely that in order for meaningful change to take place in this domain, the incentive structure around publication would need to shift,” she added. “We need more of an emphasis on building the tools to do great science, less of an emphasis on product—especially during the earlier training years, like during the PhD. If this doesn’t change, people will continue to organize projects haphazardly, and psychology labs will remain insular and idiosyncratic, leaving the field open to continued replication crises and away from progress we could make by putting more emphasis on collaboration.”

Climate change

As a basic matter of societal survival, addressing climate change stood out among the priorities of APS members in every generational cohort. “In my list of top 10 priorities for urgent research, application, and outreach attention, climate change would occupy Positions 1, 2, and 3, and probably a couple more slots as well,” wrote Geoff Cumming, a retired APS Fellow and quantitative psychologist from La Trobe University. “So many other urgent priorities, such as food supply, severe weather events, inequality, violence, disease and pandemic risks, safe water supply, livable housing, discrimination … all are exacerbated by climate change. Basically, if we don’t make massive strides on climate change mitigation and adaptation, then our children and grandchildren will have little or no chance of a decent life.”
Effecting positive action, he added, “requires attitude and behavior change—the very core business of psychological science.” He called upon all research fields within the discipline “to take on relevant climate change topics, challenges, and opportunities.”

Breaking down steps within that call to action, APS Fellow Craig Anderson, a personality/social psychologist at Iowa State University, implored researchers to devote more time to understanding “(1) the implications of rapid climate change for human behavior (e.g., development of violence-prone adolescents and adults, intergroup prejudice and violence, war); (2) the role that electronic media have played in science denial; and (3) ways that electronic media can be used to improve the general public’s understanding of this crisis and their support for action at the individual, group, and political levels.” Anderson has written several works on psychology and rapid climate change, most recently a monograph published by Cambridge University Press.

Health psychologist Donald Edmondson, of Columbia University Medical Center, called for “understanding how psychology and behavior will change as the climate crisis deepens, as well as how changes in psychology/behavior can influence the climate crisis. Whereas previous widespread changes to political, social, and other systems yielded changes in psychology/behavior, historically, systemic changes have been limited to one (or a few) dimensions of everyday life and have never impacted every human. The impacts of the climate crisis are expected to touch every dimension of human existence. This unprecedented global transformation has been described as akin to ‘moving to another planet.’ Our field has not yet begun to seriously grapple with how this harsh new planet will change us.”

Indeed, effecting action on climate change may be as much a matter of persuasion and communication as scientific research, members noted. Social psychologist Diane Sunar, professor emerita at Istanbul Bilgi University, pointed to “a wide spectrum of potential applications of psychological science to these issues, from finding the best ways to encourage ecologically sound individual practices (messaging, incentives, norm formation, etc.), to disaster management in response to weather and climate-related events, to ameliorating heightened social anxieties and resentments aroused by the international migrations resulting from drought, sea level rise, and the like. But the most urgent is the challenge of how to change the behavior of entrenched interests such as the carbon-based energy industry in all its forms. It is critical that decision-makers in the energy industry and other economic sectors that impact the environment and climate turn from their short-term interests to long-term interests. Do we know what persuasive techniques, messages, arguments, incentives can compete with short-term profits?”

APS Fellow Janet Ruscher, a personality/social psychologist at Tulane University, amplified those concerns, noting the need to motivate “individuals and organizations to incur personal immediate costs (e.g., potentially lower income/dividends, restrictions on personal preferences, inconveniences) for the overall good of other people and the planet (e.g., living wages and health care for all, public health over personal freedoms, mitigating climate change). We need to understand how humans can learn to play ‘the long game.’”

Communication, polarization, and public trust

Few would deny that recent years have seen sharp increases in political polarization and entrenched rejections of scientific findings, regardless of how clearly and consistently they are reported and otherwise communicated. According to Julie Morrison, an experimental psychologist at Glendale Community College (Arizona), the grandest challenge in this scenario is, “most fundamentally, trust in science. Without that, we can’t move forward with science-based interventions.”

Although reports on this topic have mostly focused on the United States, it appears to be common globally.

APS Fellow Kevin McConkey, a retired cognitive psychologist at the University of New South Wales, observed that “the rejection of expertise is a trend across much of the world, often associated with increased authoritarian attitudes and behaviors. We need to investigate more bravely and to communicate more broadly about these matters.”

“...
Canterbury. “In several nations, there are many people who don’t trust social scientists, and this limits the impact of our research. Our replication crisis did not help with this, but just like efforts to improve our credibility through open science practices, we also need to try harder to improve our credibility among the wider public. While important work is being done to persuade government and policymakers of the importance of our science, persuading only those at the top will not suffice. As the pandemic has taught us, a public that does not trust scientists has a negative collective impact on us all. This means we need to make efforts to better understand what contributes to public distrust of psychological science, engage better with diverse communities across any racial/ethnic, religious, and political divides, and work to build trust from the bottom up so we are seen as an honest broker when we weigh in on important societal issues.”

Graduate student David Grüning, of Heidelberg University, noted that the COVID-19 pandemic has underscored “how essential the thoughtful communication of science beyond researchers’ professional realm is for society. Specifically, psychology had to tackle the Herculean task of communicating insights to the public for, for instance, battling misinformation or increasing vaccination endorsement. In this process we have recognized communicative gaps that still need to be bridged.”

Rob Chavez, a social neuroscientist at the University of Oregon, wrote that misinformation and disinformation “and their potential for harm became particularly salient during COVID-19 pandemic. As psychological scientists, we need to be assertive in our approach to understanding these issues. However, it is also imperative that we be humble in the degree to which we suggest that psychological interventions are always the appropriate solutions to these problems, when perhaps institutional or other systemic changes would be more effective.”

To those ends, “The single most important challenge faced by psychological science is how to bring our increasing knowledge about human nature and motivation to bear on public policy decision-making,” wrote APS William James Fellow Lynn Nadel, an emeritus professor of cognitive science and psychology at the University of Arizona. “We know a lot more every year about the explicit and implicit drivers of human behavior, but we remain incapable as a species of doing the right things most of the time. Much of this has to do with the disjunct between our short life spans and the relatively longer-term nature of the critical problems we are now facing. Our inability to get beyond short-term thinking and drives has put us all in danger—our species and the planet we live on together. We are challenged to shed light on why humans are so susceptible to misinformation, and so easily led down destructive paths.”

APS Fellow Delphine Dahan, a cognitive psychologist at the University of Pennsylvania, noted the divergent trajectories of scientific discovery and public discourse. “As the field of psychology is growing and as more and more knowledge is accumulating, answers to questions will become more and more complex,” she wrote. “A significant challenge for psychological science will become to remain accessible and relevant to other disciplines and to the general public while also pursuing complex problems and providing complex answers. I fear that the public’s hunger for simple explanations to complex phenomena may lead the field astray.”

To Tom Hilton, a retired industrial/organizational psychologist and navy officer who worked at the National Institutes of Health, “a huge hurdle is lack of public awareness of what psychological science actually is. The public still stereotypes psychology as all about mental illness and psychotherapy—not science.” And the fact that relatively few researchers show the public how scientific psychology contributes to everyday life “doubtless attracts fewer students to our field, and it hides our science behind a stereotype of mental health.” (Learn about some of Hilton’s work applying psychological science to policy in “Making Noise That Can’t Be Missed,” on page 32 of this issue.)

Moreover, much of the world has little exposure to psychological science of any kind. In Hong Kong, for instance, “the demands of psychological services enhance, but the awareness and acceptance have not increased,” wrote Ching Sum Sin, a registered nurse who has a master’s degree in psychology. Better awareness and detection of mental health problems have led to rising demand for mental health services, but challenges remain in “removing the stigma associated with using psychological health services and promoting the allocation of resources to psychological science by the government and universities.”

And in India, developmental psychologist Aradhana Gambhir wrote, “it’s a taboo to consult a psychologist for psychological problems ... and by and large still a stigma to admit that one is suffering from depression. As a teacher, I emphasize the need to give importance to emotional problems and to reach out to professionals.”

“I fear that the public's hunger for simple explanations to complex phenomena may lead the field astray.”
–APS Fellow Delphine Dahan
**GRAND CHALLENGES:** **MEMBER-IDENTIFIED THEMES**

**Strengthening theory—and the road ahead**

Applied matters and empirical procedures were not the only challenges APS members identified. Others stressed the need for greater understanding of the theoretical underpinnings of psychological science, along with continued efforts to build a science with solid theoretical foundations.

“My own opinion is that psychological science needs to refocus attention from defensive obsessing about minutiae of methodology and the replicability of tiny effect sizes to making important discoveries about human behavior and mental life—important in the sense of revealing interesting and nonobvious facts that can be understood in the context of rigorous theoretical frameworks,” wrote Andrew M. Colman, a cognitive psychologist at the University of Leicester. “And by rigorous theoretical frameworks I do not mean mere hypothesized relationships between variables but formal structures that provide explanation and real insight into psychological mechanisms or processes.”

Peter Prudon, a retired clinical psychologist in the Netherlands, wrote that “the multitude of micro and mini theories to justify empirical investigations, undertaken to comply to the pressure to publish at all, and empirically in particular, is undesirable. It should be compensated by a much stronger emphasis on theoretical analysis and integration, with more attention to human existence as a whole.”

Also, writing from Leiden University, APS Janet Taylor Spence Awardee Eiko Fried elaborated on the importance of strengthening theoretical knowledge and application. “Psychology is hyper-empirical. We are good at testing things, but not good at theorizing,” wrote the clinical psychological scientist. “There is no shame in that, and there is great value in establishing phenomena: robust features in the world that require explaining (i.e., explananda). But such explanations happen in the form of theories that explain them (i.e., explanantia), and there are two grand theory challenges that psychological science must urgently address.

“First, we don’t have many great explanations in psychology,” Fried continued. “As Robert Cummins put it in 2000: ‘We are overwhelmed with things to explain, and somewhat underwhelmed by things to explain them with.’ Recent reforms in psychological science were focused on improving methodological and statistical practices to establish more replicable findings. That helps with the explananda part of psychology, but not at all with the explanantia part.”

Second, wrote Fried, “psychological theories are often weak theories, narrative descriptions that do not allow us to precisely deduce how data would look if the theory was true. This makes it difficult to decide in many psychological studies whether data actually support a theory or not. Often, we simply have to take the theorist’s word for it.”

To address both of these challenges, Fried advised “drawing on the rich disciplines of cognitive and mathematical psychology, and other areas outside of psychology, which feature strong theories: precise axioms or assumptions aiming to explain phenomena. Such theories can be represented via mathematical notation as formal theories, with several advantages. For one, the theory and all its auxiliary assumptions are now spelled out clearly and unambiguously. The theory, not its theorist, makes predictions via simulations. Further, formal theories are interdisciplinary, enabling collaborations.”

Getting back to fundamentals, educational psychologist A. Alexander Beaujean of Baylor University observed that “perhaps the biggest challenge is the lack of technical concepts. Concepts such as ‘executive functioning,’ ‘working memory,’ etc., are polysemous, so two psychologists employing the same terms often mean different things. As a scientific discipline, we will quickly reach a plateau in what we can learn without technical concepts that have shared meaning. At such a point, research will increasingly consist of busywork that has no importance outside of the lab in which it originates.”

APS members singled out numerous other tasks facing the field, from re-embracing the “lost art” of data modeling, to strengthening training in fields such as forensic psychology, to incorporating findings from neuroscience and technological advancements (e.g., developments in artificial intelligence), to more effectively addressing major societal problems involving poverty, racism, mental health, and social isolation.

Hodson expressed pessimism about the field’s willingness to grapple with the many challenges requiring redress. “But I have little doubt about our ability to do so, should we collectively decide to reshape how our science is done.”

APS looks forward to supporting conversations on these matters and more as our members endeavor to advance science and contribute insights and solutions to society.
IT’S TIME TO RENEW FOR 2022!

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A few years ago, a group of researchers decided to model a rare level of honesty for their colleagues. Each of them agreed to disclose their doubts about one of their published findings. They called it the “Loss-of-Confidence Project.”

“Our main goal was to destigmatize declaring a loss of confidence in one’s own findings,” Julia Rohrer, a personality psychologist at the University of Leipzig in Germany and leader of the project, told the Observer. “Because of that, we also decided to focus on instances in which it is hardest to be open—when the central finding of a study is called into question because of a clear theoretical or methodological problem for which one has to assume responsibility.”

The initiative resulted in a collection of 13 self-corrections published in Perspectives on Psychological Science. Rohrer and her colleagues are hoping their article will motivate other researchers to reassess their work and, if necessary, disclose potential mistakes or shortcomings to the larger scientific community.

In the decade since researchers in psychological science began uncovering methodological flaws in many studies—igniting the field’s “replication crisis”—scientists like Rohrer have been laying a foundation for a new culture in the social and behavioral sciences. They’re
GRAND CHALLENGES: REPLICATION AND RESEARCH PRACTICES

Creating a climate in which researchers can share their data and materials so that others can review and spot potential methodological problems, acknowledge errors without killing their careers, and get published even when their studies yield negative results.

“Real behavioral change in improving research practices has begun in psychological science,” noted APS Fellow Brian A. Nosek, a leader in the field’s efforts to bolster scientific methods and reliability. “The field is leading the way in making change and evaluating whether those changes are having their intended effects on improving credibility.”

Growing pains
Scientific psychology spent the 2010s in a period of intensive (and often rancorous) self-examination, as lab after lab reported smaller effect sizes or insignificant results when attempting to replicate some of the field’s most influential studies. Reformers pointed to the widespread use of results-skewing research practices like p-hacking (improper data selection or statistical analysis to make a nonsignificant result significant) and hypothesizing after finding a significant result. Authors of those studies found their reputations bruised if not battered.

Psychology is far from the only scientific discipline facing a replication problem. Fields ranging from economics to biomedicine are grappling with similar issues about research integrity and rigor. But psychological science has stood out for the breadth of its self-correction initiatives.

Nosek, a University of Virginia (UVA) professor, is at the forefront of those reform efforts. In 2013, he and quantitative psychologist Jeffrey Spies founded the non-profit Center for Open Science to increase transparency and integrity in scientific research. In the Center for Open Science’s first project, they assembled 270 scientists to replicate the results of 100 peer-reviewed psychological studies. Overall, 97% of the original studies reported statistically significant p values (p < .05), but only 36% of the replication studies found statistically significant results. Moreover, effect sizes on average were half of what was reported in the original studies (Open Science Collaboration, 2015). The results of that project fueled the field’s drive to advance reproducibility.

Additionally, a variety of grassroots efforts have emerged to foster a more robust science. Among them is the Psychological Science Accelerator, a worldwide network of labs aiming to reconduct experiments on a mass scale. In its first major project, reported in 2021, the group found strong evidence—albeit with some nuances—supporting the findings of a 2008 study showing that humans judge unfamiliar faces on trustworthiness and physical strength (Oosterhof & Todorov, 2008).

Acknowledging mistakes
Underlying these initiatives is a desire to erase the stigma surrounding scientific errors to help scientists understand that acknowledging a misstep doesn’t stain their careers.

Rohrer said the inspiration for the Loss-of-Confidence Project came from social psychologist Dana Carney (University of California, Berkeley), who in 2016 wrote that she no longer believed in her earlier findings regarding the emotional, behavioral, and hormonal effects of power posing. She pointed to small effect sizes, a tiny sample size, and p-hacking (Carney, 2016).

Rohrer’s team issued an open invitation for psychological researchers to submit statements about their loss of confidence in one of their previously published works. They also conducted an online survey and asked respondents whether they’d lost faith in a previously published finding and why.

“The idea behind the initiative was to help normalize and destigmatize individual self-correction while, hopefully, also rewarding authors for exposing themselves in this way with a publication,” Rohrer and her colleagues wrote in the Perspectives article.

Participating researchers submitted statements describing a study they believed no longer held up. Five reported methodological errors, four acknowledged invalid inferences, and seven acknowledged p-hacking—in many cases due to a poor understanding of statistical methods.

Rohrer’s team also gleaned 316 responses to their survey, capturing data from scientists at all career stages. Forty-four percent of the respondents reported losing trust in at least one of their findings. Of those, more than half said the finding was due to “a mistake or shortcoming in judgment,” and roughly one in four took primary responsibility
for the error. Respondents also admitted to questionable research practices.

Only 17% of those who lost confidence in their results said their concerns were a matter of public record, and most of those cases involved acknowledgement in articles, conference presentations, or social media posts that weren’t directly linked to the original study report.

Asked why they didn’t communicate their lost confidence in a finding, some respondents said they were unsure how to do so, while others felt that disclosing their concerns was unnecessary because the finding had attracted little attention. Some worried about hurting the feelings of coauthors, and others worried about how their disclosure would be perceived (Rohrer et al., 2021).

Rohrer and her colleagues want to promote a culture of self-correction so that researchers can disclose subsequently discovered problems with a study without fearing damage to their reputations and their work.

“Many researchers are concerned that such openness and humility may harm their career prospects,” she said. “I hope that for these people, the Loss-of-Confidence Project shows them that self-correction isn’t that big of a deal—everybody makes mistakes from time to time.”

Normalizing replications
Other scientists want to move replications beyond the success/failure paradigm and into an accepted part of scientific advancement.

“Replications can be strong indicators to other scientists, the public, and policymakers that things are working as they should,” John E. Edlund (Rochester Institute of Technology) and his colleagues wrote in a new article for *Perspectives on Psychological Science*. “Because replications can ensure sound results and

Citations Lag Behind Replication Failures
Although failed replications have thrown a string of landmark psychological findings into question over the last 10 years, citation patterns in the literature haven’t kept pace, new research suggests.

Scientists led by psychological researcher Tom E. Hardwicke of the University of Amsterdam culled four major multilab replications that contradicted original results. Hardwicke’s team then looked at patterns of citations after those failed replications and found only a small decline in favorable citations of the original research.

“Replication results that strongly contradict an original finding do not necessarily nullify its credibility,” Hardwicke and his colleagues wrote in *Advances in Methods and Practices in Psychological Science (AMPPS)*. “However, one might at least expect the replication results to be acknowledged and explicitly debated in subsequent literature.”

In another study, social scientists at the University of California, San Diego, used Google Scholar to examine the citation patterns of studies in psychology, economics, and general sciences, both before and after other labs tried to replicate them (Serra-Garcia & Gneezy, 2021). The researchers found that studies that subsequently failed to replicate were by far the most likely to be cited—and only 12% of those citations even acknowledged the unsuccessful replication.

In their *AMPPS* article, Hardwicke and his colleagues acknowledged that some replication results have been challenged. Even that doesn’t justify ignoring the incongruity, they explained.

“Because this debate remains far from settled, ideally any favorable citation of the original studies should at a minimum be accompanied by a co-citation of the replication results and some discussion of the discrepant results.”

References

Rohrer and her colleagues want to promote a culture of self-correction so that researchers can disclose subsequently discovered problems with a study without fearing damage to their reputations and their work.

spark conversations about the research findings, they can propel science forward … By valuing replications in our scientific communities, we normalize replications as part of the scientific process, allowing for beliefs to be modified as evidence emerges” (Edlund et al., 2021).

Fostering that outlook requires a change in the way scientific reputations are built, as Nosek, Rohrer, and a team of 14 other researchers suggested in a new article in the Annual Review of Psychology. Many scholars have based their professional identities on their findings, which can lead them into a defensive stance when those results don’t replicate (Nosek et al., 2021). And past behavior on social media validates those concerns: Many researchers have seen their character and intentions attacked after others discover shortcomings in their work.

But a 2016 report out of UVA suggests that scientists who acknowledge a failed replication of their work may see their reputations bolstered rather than impugned. Psychological scientists Charles R. Ebersole (now at the American Institutes for Research) and Jordan R. Axt (now at McGill University) worked with Nosek to examine this phenomenon in an online survey of nearly 4,800 U.S. adults. Participants were shown descriptions of one hypothetical scientist who produces “boring but certain” results and another who produces “exciting but uncertain” findings. (For a subset of the sample, the words “reproducible” and “not very reproducible” were used instead of “certain” and “uncertain.”) The respondents were asked to rate each scientist’s intelligence, ethics, reputation, admirability, and employability — and those ratings showed that they preferred the scientist who produced more certain results over the scientist whose findings were more exciting.

Ebersole and Axt then presented participants with various scenarios involving scientists whose findings failed to replicate. The respondents viewed researchers’ ethics and ability more favorably when they acknowledged a failure to replicate compared to when they criticized it. Moreover, they gave the highest ratings on those dimensions to researchers who conducted replications of their own work, especially if they published an unsuccessful replication instead of dismissing it.

Ebersole, Axt, and Nosek conducted a similar survey with 313 psychological researchers and 428 college students and found comparable results. But unlike members of the general population, these participants said they thought a scientist who produced exciting but uncertain results would experience greater career success (Ebersole et al., 2016).

The survey findings underscore a call for changing the incentive structure in science. For years, researchers who want to improve scientific integrity have complained that journal editors, funders, and academic institutions favor researchers who produce novel findings, often at the expense of robustness. University administrators want faculty whose scientific records bring in grant funding. Grant applicants exaggerate their expected findings to potential funders. And journal editors favor positive results, prompting researchers to bury null findings that likely won’t get published.

“Sustainable change toward rigor and transparency requires that the reward systems for publication, funding, hiring, and promotion actively promote rigor and transparency,” Nosek told the Observer. “If they do not, the clear progress on improving the research culture will inevitably regress.”

This problematic structure is slowly changing in the wake of the replication crisis. APS and its journal editors have led many changes to publishing practices in the spirit of transparency. These include preregistration, in which scientists detail the hypotheses, designs, and analysis plans for their studies before collecting data and analyzing results. And they’re awarding Open Practices badges to authors who make their data and materials openly available for examina-
tion. Evaluations of the impact of these advances are still in the early stages. Surveys have yielded variable rates of data sharing and preregistration, Nosek and colleagues reported. But there are some promising signs.

In survey results published in 2019, a group of researchers led by economist Garret Christensen found that the percentage of psychological scientists who reported sharing data or code rose from 20% in 2011 to 51% in 2017; over the same period, preregistrations climbed from 8% to 44% (Christensen et al., 2019).

Meanwhile, more and more journals are adopting policies designed to boost replicability. And universities are slowly but increasingly mentioning a preference for replicability and transparency in the work of applicants for faculty positions.

Many have argued that open science practices such as preregistration are cumbersome and slow down the pace of discovery. Others worry that an escalation in replication projects will further damage the field’s reputation, not to mention the careers of certain researchers.

But reformers say innovative research will be anything but stifled if the field can embrace structural changes and stop regarding replication failures as a crisis. Science exists to expand the boundaries of knowledge, Nosek and his colleagues wrote in their Annual Review of Psychology article—and that expansion includes false starts and unfulfilled predictions. A healthy psychological science will produce many nonreplicable findings while continuing to strive for improved replicability, they said.

“Part of a successful scientific career,” they wrote, “involves getting used to being wrong, a lot.”

Scott Sleek is a freelance writer in Silver Spring, Maryland.

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SHIPS AT SEA: EXPLORING THE MYSTERIES OF SELF AND CONSCIOUSNESS

How do humans maintain a stable sense of self in the face of constant change?
By Kim Armstrong

The Ship of Theseus, an ancient thought experiment, raises the question of whether a ship that has had all of its parts repaired and replaced is really the same ship the crew started out with—or, as the generally accepted answer proposes, a new ship conveniently referred to by the same name.

This thought experiment is designed to challenge our day-to-day assumptions about the permanence of identity, not just in relation to seafaring vessels but also to our own sense of self. After all, a person’s abilities and beliefs can change radically over a lifetime. Moreover, on a purely physical level, many of the cells that made “you” in your infancy have died and been replaced over time, creating a kind of chimera of the old and new that is “you.”

The common claim that all the cells in our bodies are replaced every 7 years may be a bit of an exaggeration, but as stem cell biologist Jonas Frisén (Karolinska Institutet) has found, our cells do seem to differ considerably in how
quickly they die and are replaced. Frisén’s research suggests that the cells lining our intestines, for example, are replaced roughly every 5 days. Yet he found that some of the neurons in our brains remain with us from birth, although we may continue to generate a certain number of new brain cells into adulthood through a process known as neurogenesis.

Various traditions throughout human history have grappled with the question of how humans can maintain a stable sense of self in the face of such constant change. A central concept of Buddhist tradition, for example, is the idea of non-self. Similar to the Ship of Theseus paradox, the concept of non-self proposes that humans, like all things, change so much from moment to moment and year to year that no irreducible, permanent self can be said to exist. Instead of a person, there is a process.

Over the past century or so, psychological scientists have entered the fray, exploring the myriad ways in which self-awareness and self-control influence the highs and lows of human experience, from religious trance to post-traumatic stress disorder. Even before researchers began inspecting the mysteries of consciousness under controlled laboratory conditions, humans were experimenting with the sense of self through rituals designed to create mystical experiences of altered consciousness, such as meditation and the use of psychoactive drugs like ayahuasca, wrote Ann Taves (University of California, Santa Barbara) in a 2020 article in Perspectives on Psychological Science.

Central to each of these experiences, Taves wrote, is ego dissolution, whether experienced in a house of worship or under the influence of a psychedelic at a music festival. Through this process, the perceived boundaries between the self, other people, and the world may seem to disappear, often resulting in a feeling of profound unity.

Viewing mystical experiences through the lens of ego dissolution allows these seemingly anomalous events to be better integrated into our broader understanding of human psychology, Taves continued.

“Researchers have generally converged on a distinction between two levels of self: a basic sense of self, referred to as the ‘minimal,’ ‘core,’ or ‘embodied’ self, that emerges in conjunction with low-level bodily processes … and a more elaborated sense of self, often referred to as the ‘narrative self,’ constituted through high-level reflective processes involving introspection and autobiographical memory,” she explained.

Ego dissolution has been found to influence both levels of self-awareness, Taves wrote, which can lead to feelings of becoming “one with the universe”—or, for those in the throes of a bad trip or psychotic episode, feelings of existential terror that one has ceased to exist at all.

In a 2017 study, for example, Jared R. Lindhal (Brown University) and colleagues interviewed 60 experienced meditators familiar with Theravāda, Zen, and Tibetan Buddhist meditation traditions and clinical mindfulness practices. The meditators, nearly half of whom had logged more than 10,000 hours meditating, reported experiencing altered states of consciousness through the practice—some blissful, some neutral, and some distressing. These included changes in their narrative sense of self and self-world boundaries, as well as their sense of physical embodiment, agency, and ownership over their body.

The measures psychological scientists have long used to generate self-reports of such experiences—namely, the Mysticism Scale and Mystical Experiences Questionnaire, which focus on feelings of timelessness, tranquil awe, and sacred revelation—can overlook the parallels between positively and negatively valanced alterations in humans’ sense of self, Taves wrote. This can hinder comparisons between experiences individuals perceive as pleasant or even enlightening, such as lucid dreaming or the sense of reliving a past life, and more terrifying events such as sleep paralysis or perceived demonic possession.

Historically, researchers have also tended to privilege altered states of consciousness associated with religious traditions over those that occur in other contexts, Taves noted. This can create an artificial divide between “authentic” experiences of “divine reality” emerging from religious practices and less formalized mystical experiences, which are often characterized as separate phenomena despite likely emerging from the same interactions between culture, the self, and the brain.

“It is clear that experiences elicited by the use of psychedelics and other practices can lead to transformative mental ‘resets’ and new ways of seeing things under supportive conditions,” Taves wrote. Psilocybin mushrooms, for example, have received significant attention recently for their potential, when used in a clinical setting, to assist in treating severe depression and other mental health conditions. “A framework that includes a wide range of alterations in sense of self … promises to help us better

GRAND CHALLENGES: SELF AND CONSCIOUSNESS

Over the past century or so, psychological scientists have entered the fray, exploring the myriad ways in which self-awareness and self-control influence the highs and lows of human experience, from religious trance to post-traumatic stress disorder.
GRAND CHALLENGES: SELF AND CONSCIOUSNESS

Losing Sleep

Unpleasant thoughts may arise for anyone who lets their mind wander or ruminates on the past, but intrusive unpleasant thoughts can come to dominate the lives of people with conditions like post-traumatic stress disorder, obsessive compulsive disorder, and major depression, wrote Marcus O. Harrington (University of York) and colleagues in a 2020 article in Clinical Psychological Science. Harrington’s research suggests that sleep deprivation, a common feature of many mental health conditions, may be one factor limiting these individuals’ ability to suppress unwanted thoughts.

“The onset of intrusive thoughts and affective dysfunction following bouts of poor sleep could create a vicious cycle whereby upsetting intrusions and emotional distress exacerbate sleep problems … inhibiting the sleep needed to support recovery,” Harrington and colleagues wrote.

In the study, Harrington and colleagues observed the responses of 60 healthy adults, half of whom had been awake for at least 24 hours, to a series of negative images of wounds, accidents, and insects, as well as neutral images such as landscapes. Participants who hadn’t slept the previous night were found to report 50% more intrusions while attempting to suppress their thoughts.

However, all of the participants became better at suppressing their thoughts with each successive trial, Harrington and colleagues noted, although sleep-deprived participants were slower to do so—and after participants had successfully suppressed a negative image, they found it less aversive when they saw it again. This suggests that improvement is possible even under trying conditions.

“Sleep deprivation substantially increases people’s vulnerability to unwanted memories intruding into conscious awareness when they confront reminders,” Harrington and colleagues concluded. “Developing interventions that improve retrieval suppression in poor sleepers may be a promising avenue for averting the potentially pathogenic consequences of disordered control over distracting thoughts.”

Controlling consciousness

In addition to changing our perspective on the self, research suggests that mindfulness practices can improve our ability to self-regulate emotion and attention and our interoception, or body awareness.

“Our model suggests that mindfulness decreases the threshold of conscious access by supporting attention,” wrote Charles Verdonk (French Armed Forces Biomedical Research Institute) and colleagues in a 2020 article in Perspectives on Psychological Science. “Mindfulness, therefore, facilitates the conscious processing of information that comes from within (body awareness and self-awareness) and outside the body (world awareness).”

This process allows individuals to more effectively filter out thoughts and feelings that aren’t relevant to their goals, the authors continued, and may strengthen the ability to engage nonjudgmentally with irrelevant information that does rise to conscious awareness.

The researchers examined these processes through a review of 29 articles involving event-related potential (ERP) studies of mindfulness. The studies involved a total of 1,185 participants ages 17 to 80 who engaged in some form of mindfulness—from regular meditation to weekly 10-minute mindfulness interventions. In each case, electroencephalography was used to observe variances in electrical activity in the brain related to information processing based on exposure to mindfulness practices. These ERPs, which occurred 100 to 600 ms after participants were exposed to a stimulus, included the following:

- **ERN** (error negativity, which peaks about 100 ms post-stimulus) is thought to reflect a comparison between the intended and actual performance of an action. If the two do not match, this is then followed by Pe (error positivity; 200–500 ms post-stimulus), which is thought to reflect error awareness and is stronger when an error rises from unconscious to conscious awareness. About a third of studies found a link between mindfulness and increased ERN and Pe, but most found no evidence of a relationship.

- **N2** (200–350 ms post-stimulus) is associated with conflict monitoring (noticing discrepancies between expectations and reality) and the inhibition of planned responses. On average, this ERP was stronger in participants who were more dispositionally mindful, had more experience with meditation, or had completed a mindfulness intervention.

- **P300.** This was the most commonly studied ERP, Verdonk and colleagues noted, and can be broken down into several parts.
GRAND CHALLENGES: SELF AND CONSCIOUSNESS

P3a (roughly 250–280 ms post-stimulus) is thought to reflect automatic, unconscious attention to information. This ERP was found to be lower when participants were meditating than when they allowed their minds to wander.

If a stimulus rises to conscious perception, P3a is followed by P3b (300–500 ms post-stimulus). Across studies that measured this ERP, mindfulness interventions were associated with a greater P3b amplitude in response to relevant stimuli and a lower P3b amplitude in response to irrelevant stimuli, indicating that more mindful participants paid more attention to relevant stimuli and less attention to irrelevant stimuli.

Finally, the no-go P3 (300–600 ms post-stimulus), which reflects response inhibition, was found to be stronger in relation to mindfulness.

LPP (late positive potential; 400–600 ms post-stimulus) overlaps with P3b and is used in research on emotional arousal. It tends to be stronger in response to images perceived as positive or negative in comparison to neutral images. Findings on LPP and mindfulness were mixed. Studies on dispositional mindfulness, meditation experience, and longer-term mindfulness interventions seemed to suggest an association between mindfulness practices and decreased LPP amplitude, indicating decreased emotional reactivity. Experiments that provided a brief mindfulness intervention in the lab before participants viewed emotional stimuli, on the other hand, found no evidence of an effect or reported increased emotional reactivity.

All in all, Verdonk and colleagues wrote, these findings suggest that mindfulness practices may have some influence on people's ability to block irrelevant information from conscious awareness and to disassociate from emotional responses, decreasing their emotional reactivity.

“Bringing information to consciousness could be viewed as a decisional process, a choice between leaving information unconscious or helping it to reach consciousness,” Verdonk and colleagues explained. “The idea of a lower threshold of conscious access is congruent with this hypothesis because attentional amplification helps to keep information under the threshold or bring it above the threshold depending on its relevance to the context.”

Additionally, long-term mindfulness practice was found to be more strongly associated with cognitive control than brief laboratory interventions. It may take a significant amount of time and effort to learn these strategies, Verdonk and colleagues explained, which means that inexperienced participants may show no change or even reduced attenional control.

“These findings suggest that although the development of mindful cognitive abilities is resource-consuming, mindful functioning is beneficial because it becomes more economical with the level of expertise,” Verdonk and colleagues concluded.

Birthing consciousness

Of course, not all altered states of consciousness require a person to consume a mind-altering substance or even intentionally engage in a particular practice. In a 2020 article in *Perspectives on Psychological Science*, Orli Dahan (Tel-Hai College) proposed the concept of birthing consciousness—a state that allows people to retreat inward in the face of overwhelming pain while giving birth—and suggested that this experience may be most accessible without the use of common medical interventions.

Giving birth, even with access to modern pain management, is often severely painful. But, Dahan explained, it isn't uncommon for people to also report feelings of empowerment, joy, or even pleasure throughout the experience—a contradiction that may be made possible by the power of our prefrontal cortex.

“Birthing consciousness is an example of an adaptive, pain-induced, altered state of consciousness,” she wrote. “Because successful natural birth for the mother and for her baby was essential to reproduction throughout...”
most of human history, and because natural birth is an experience of extreme pain ... the unique ACSs [altered states of consciousness] that I refer to as birthing consciousness increases the probability for optimal birth outcomes.”

This altered state of consciousness reduces activity in the prefrontal cortex, a process referred to as hypofrontality, which is associated with pain reduction, Dahan wrote.

Consciousness-altering behavior is common throughout the animal kingdom, she added, so it’s likely this adaptation occurred long ago in our shared evolutionary history. “This evolutionary explanation for the ubiquitous phenomenon of ASCs associated with transient hypofrontality can be roughly divided in two: Pain-induced ASCs are adaptive, whereas ASCs that are not pain-induced benefit from this brain mechanism because of its therapeutic effects.” Although this theory requires further study, it suggests that altered states during labor may have played an essential role in successful reproduction before modern medical interventions, laying the groundwork for other altered states of consciousness—such as dreaming, daydreaming, runner’s high, and hypnosis—that allowed humans to “retreat into an inner world where time seemed to be suspended.” The effects of certain drugs may also result in part from this adaptation.

“Perhaps we are hardwired to desire reaching states linked with transient hypofrontality because this brain mechanism once conferred a crucial evolutionary benefit in situations of acute pain,” Dahan suggested. “If so, it is possible that natural birth and other pain-induced ASCs benefit from a much more ancient and broader adaptation.”

These and other altered states of consciousness challenge some of our most basic assumptions about what constitutes an individual, stilling our perception of time, destabilizing our sense of self, and even extinguishing—if only temporarily—our desire to escape pain. Like the Ship of Theseus, parts of our psyche we take for granted as stable and fixed can be quietly replaced, becoming a new mind by the same name.

Kim Armstrong is a freelance writer in Boston, Massachusetts.

References
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A new model of “contributorship” addresses the marginalization of early-career researchers in scientific publications.

By William X.Q. Ngiam

Scientific authorship norms are outdated. Under current practices, scientists applying for academic positions or research grants are evaluated largely on the quantity and quality of peer-reviewed publications they have authored. These practices can have demonstrable effects on success throughout their careers—for example, co-authorship within the first 3 years of one’s first publication predicts later career success, as measured by citations (Li et al., 2019). Yet despite authorship being the most scrutinized performance metric in a scientist’s career, there’s little (if any) appreciable consideration of the criteria or factors that determine authorship on any given publication. Further, authorship disputes—which typically arise when someone does not receive credit for research contributions (Seeman & House, 2010)—are a prominent ethical issue for the scientific community (Benos et al., 2005). As an early-career researcher and an advocate for open science, I believe it is time to review authorship guidelines and practices to ensure they equitably confer credit to all contributing scientists and align more broadly with the aims of scientific research.

In the absence of the widespread adoption of a standardized framework, current authorship practices promote inequity in the recognition of scientific contributions (Eggert, 2011). Recommendations for authorship criteria exist; most science, technical, and medical journals follow those of the International Committee of Medical Journal Editors (see sidebar, next page). But many lead authors on research projects don’t think to have discussions around authorship until they submit the manuscript.
These criteria often require drafting or revising manuscripts for intellectual content. That is, if the work of a researcher does not involve any writing or editing of the manuscript, that researcher might be left off the ensuing publication—a phenomenon known as “ghost authorship”—despite having been necessary for the completion of the research project (Eggert, 2011). Further, researchers rarely explicitly explain their authorship criteria, instead relying on intuitions about current authorship norms (doing what “seems to be the right thing”; Seeman & House, 2010). Such intuitions, which may be informed by previous experience or departmental training, are widely variable across research labs; contributions recognized as authorship in one lab may not be in another.

Partly because of authorship incentive structures, of most importance to scientists are publications where they are the first author, which typically signifies being the main writer of the manuscript and the lead on the research project. Secondary authorship—indicating a contribution deemed enough to merit recognition—is not readily considered for research grants or academic jobs. This promotes an incentive structure in which scientists actively pursue research projects that will lead to first-author publications rather than pursuing collaborative projects. This model of authorship may have served science well when most publications had only one author (Rennie et al., 1997), but it is outdated today, as science moves from its “hero” model to a diverse collaboration of the efforts of multiple people (Borenstein & Shamoo, 2015).

“Contributorship” is a label for a more equitable system (Rennie et al., 1997) in which any person who made a substantial contribution to a manuscript is listed as a coauthor, regardless of whether their work included writing or editing. Moreover, their contributions are clearly listed on the publication. The most significant ways in which contributorship standards depart from traditional authorship intuitions are in removing any writing requirement and distinctly and explicitly recognizing various technical contributions.

One way to formalize contributorship involves the Contributor Roles Taxonomy (CRediT; Allen et al., 2019; Brand et al., 2015; McNutt et al., 2018; Vasilevsky et al., 2020). Created by a group of biomedical researchers and publishers, CRediT (casrai.org/credit) identifies 14 potential kinds of contributions to a research project, as shown in the table on the next page. The publishers of thousands of scientific journals have adopted it already.

Adopting a standardized contributorship model advances science. The CRediT model is transparent.
| Contributor roles in the Contributor Roles Taxonomy (CRediT) |
|---------------------------------|---------------------------------------------------------------|
| Conceptualization               | Ideas; formulation or evolution of overarching research goals and aims |
| Data curation                   | Management activities to annotate (produce metadata), scrub data, and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later re-use |
| Formal analysis                 | Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data |
| Funding acquisition             | Acquisition of the financial support for the project leading to this publication |
| Investigation                   | Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection |
| Methodology                     | Development or design of methodology; creation of models |
| Project administration          | Management and coordination responsibility for the research activity planning and execution |
| Resources                       | Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools |
| Software                        | Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components |
| Supervision                     | Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team |
| Validation                      | Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs |
| Visualization                   | Preparation, creation and/or presentation of the published work, specifically visualization/data presentation |
| Writing—original draft          | Preparation, creation, and/or presentation of the published work, specifically writing the initial draft (including substantive translation) |
| Writing—review and editing      | Preparation, creation, and/or representation of the published work by those from the original research group, specifically critical review, commentary or revision—including pre- or post-publication stages |
in recognizing contributions that do not require domain-specific expertise (often technical specializations—e.g., scientific programming or data analysis). Having one’s contributions visibly credited in any collaboration produces an incentive that promotes those collaborations, as well as specialization in and development of scientific software and data sets (Holcombe, 2019).

Further, the machine-readable quality of the CRediT taxonomy facilitates meta-science by enabling easy gathering of data on research contributions (Allen et al., 2019; Holcombe, 2019). These data provide important insights into many aspects of the research process, including contributions from various groups, revealing potential inequities. Bibliometric analyses have highlighted pervasive gender disparities in authorship (Macaluso et al., 2016; Ni et al., 2021), implying that transparent contributorship models may help improve the representation and visibility of women in scientific publications. Similarly, I believe that contributorship models have many potential benefits for early-career researchers—primarily undergraduate research assistants, graduate students, and postdocs.

Recognition for early-career researchers
Authorship disagreements are prevalent in science. A recent survey of more than 5,500 scientists reported that more than half had experienced disagreements involving author naming or ordering (Ni et al., 2021). Such disagreements, whether about inclusion or position, can be difficult to resolve amicably and are often decided on the basis of power differentials (Faulkes, 2018)—that is, by the lab’s senior researcher or principal investigators, who may have widely varied and vague criteria for what warrants authorship (Patience et al., 2019). When “unwritten rules” of authorship lead to decisions falling on the principal investigators, the decision whether to recognize the contributions of junior scientists with authorship becomes reliant on others’ motivations or the standards set in the research lab. Further, raising disagreements about authorship can lead to perceptions of being ‘entitled’ or ‘difficult,’ deterring researchers from raising such concerns in the first place. Therefore, early-career researchers are vulnerable to unfair authorship decisions (Andes & Mabrouk, 2018).

Without standardized criteria, varying determinants for authorship can also foster inequality across labs. Establishing CRediT or other standards from a project’s outset or as standard lab protocol lends transparency to expectations about authorship and clarifies parameters for resolving disagreements. This is incredibly helpful for junior scientists, such as research assistants or early graduate students, who may be unaware of what warrants authorship. Clear guidelines about authorship may also incentivize and motivate junior scientists to contribute across various roles or refine their research training—for example, to curate data and any experimental or analysis code in addition to collecting data.

Consider this scenario: A principal investigator using an internalized model of authorship may deem a research assistant who completed all the data collection for a research project unworthy of authorship on the paper. The research assistant, who was perhaps not asked to contribute to drafting or revising the manuscript, may then feel unfairly unrecognized. This violation of expectations, even with a successful resolution to the authorship dispute, can bring irreparable damage to a mentorship relationship. By comparison, a contributorship model explicitly and transparently recognizes the research assistant’s contribution.

In addition, junior scientists in their early academic years typically receive research training by helping with data collection and curation, but they seldom do any writing of a manuscript, a necessary criterion for authorship under current norms. This may set a standard from the beginning of a scientist’s training that not all research contributions are recognized (Allen et al., 2019). A large-scale analysis of metadata on PLoS publications by Larivière (2016) found that researchers with less experience (measured as the time since their first publication) were more likely to have contributed technical components of a research paper, such as experimentation, whereas senior researchers typically contributed conceptual components, such as writing. This is another form of ghost authorship, though the exact prevalence of this practice across science is not clear (Gøtzsche et al., 2007; Patience et al., 2019).

Further, conceptualization and other intellectual contributions to research projects are often mistakenly attributed to the senior researcher or principal investigator instead of to early-career researchers. In fact, principal investigators sometimes demand authorship on publications despite contributing little beyond funding acquisition (sometimes referred to as “honorary” authorship).
Greater utility of ‘secondary author’ publications

Authorship in secondary positions currently has untapped utility beyond the recognition of scientists’ work. Given the increasing number of coauthors per published scientific article (Fanelli & Larivière, 2016), the significance of any one person’s contribution may become diluted. Clarifying specific contributions enables early-career researchers to build a portfolio of their work from secondary-author publications, which often are not recognized at all. Consider the specialized forms of data collection required for many research projects, such as measuring electroencephalography or applying transcranial magnetic stimulation. Under the CRediT model, unlike traditional authorship norms, these contributions would be explicitly listed in the ensuing publication. An undergraduate research assistant could then use a publication to support graduate school applications or to demonstrate their training and experience with a data collection method. This could also help graduate students and postdoctoral researchers who specialize in statistical analysis or modeling applied across various domains. A collection of publications indicating formal contributions to analysis could help these researchers show an employer they have the necessary statistical skills. Further, greater incentives to develop specialized skills could help lead to an infrastructure in which scientific progress can advance with the division of labor.

Valuable metadata to inform better research experience

Limited in time and resources, early-career researchers are incentivized to “publish or perish,” but the low value assigned to secondary authorship dissuades them from collaborating within or across research groups. Instead of specializing in a technical skill, they may feel they have to become skilled across all aspects of research projects. Further, technical contributions are least likely to be recognized under current authorship norms, which may be a driving force behind the lack of specialization in science structures. Collaboration between scientists clearly promotes knowledge sharing and increases research efficiency (Katz & Martin, 1997), as evidenced by Many Labs projects—recent large-scale efforts across multiple laboratories to conduct replications. Despite the importance of replications in light of concerns over reproducibility, many researchers’ contributions to these projects are inadequately rewarded or valued.

With scientific research undergoing significant reforms and becoming more collaborative, there is a growing need to understand and recognize contributions across all career levels (Holcombe, 2019). Analyses of the empirical literature like those by Larivière et al. (2016) and Macaluso et al. (2016) would be greatly facilitated and could help inform scientists about future challenges for reforming academic and research structures. Explicitly recognizing all researchers’ contributions with CRediT could facilitate the creation of specialized careers within science (Larivière et al., 2016), address mounting concerns about the imbalance between PhDs awarded and tenure-track academic jobs available (Larson et al., 2014; Sauermann & Roach, 2012), and improve the academic landscape for early-career researchers in the future.

References


UP-AND-COMING VOICES: METHODOLOGY AND RESEARCH PRACTICES

As part of the 2021 APS Virtual Convention, researchers had the opportunity to connect with colleagues and present their work to the broader scientific community in 15-minute “flash talks.” In this collection, we highlight talks by students and early-career researchers related to methodology and research practices, which are fundamental building blocks of addressing any grand challenges of psychological science. View the video recordings online at psychologicalscience.org/methodology-talks.

A Critical Review of the Utility of College Student Samples in Research on Trauma and Posttraumatic Stress Disorder

Elizabeth L. Griffith, Ateka Contractor, Heidemarie Blumenthal, and Adriel Boals (University of North Texas)

What did the research reveal that you didn’t already know?
There is some stigma around using college student samples, and the area of trauma is no exception. Some journals are reluctant to publish papers that use a college student sample, and proposing to use such a sample in a grant proposal can be a pitfall for a researcher’s grant hopes. Our critical review examined results from trauma studies based on whether the sample was a college student or non-college-student sample, such as combat veterans or assault survivors. We found that obtained results did not drastically differ based on the sample type. Our results suggest that the reputation of college student samples as inferior—at least in trauma research—is unfounded.

How might your findings improve methodology or other research practices in psychological science?
College student samples are more convenient and easier to obtain than non-college-student samples. Our findings will hopefully encourage researchers to take advantage of this resource, which makes it much easier to obtain very large sample sizes, allowing for more statistical power to identify small effect sizes and interactions. Perhaps more importantly, college student samples are more feasible than other samples in regard to prospective longitudinal studies because such samples may minimize likelihood of attrition. Prospective studies in trauma research are rare, yet sorely needed. A prospective trauma study would involve obtaining a large sample of participants and assessing them both before and after trauma exposure; researchers would then follow this sample over a relatively long period of time, identify those who have experienced trauma since baseline, and then follow up with those participants. Such a study is more feasible with college student samples.

Bold type indicates authors of responses
A Scoping Review of Structural and Intermediary Determinants of Health and Health Inequities in the ACEs Literature: Where Does the Story Begin?

Bria Gresham (University of Minnesota)

What did the research reveal that you didn’t already know?

As a researcher examining the associations between adverse childhood experiences (ACEs) and outcomes, I had not considered how excluding predictors of ACEs in my research contributed to the implications of my findings. The process of quantifying the extent to which social and structural determinants of health and health inequities (i.e., both characteristics of the socioeconomic and political context and their influence on income, race, etc.) were included in the ACEs literature was illuminating. Further, I was unaware of how the way structural determinants of health inequities are included in research designs (i.e., as predictors, mediators, moderators, outcomes) impacts the narrative being told. Our findings highlighted the lack of inclusion of social and structural determinants of health inequities in the ACEs literature. Overall, the findings demonstrate that the ACEs literature is focused primarily on downstream effects of adversity, rather than upstream factors that lead to exposure to ACEs in the first place—which is critically important for the prevention of ACEs.

How might your findings improve methodology or other research practices in the field of psychological science?

We found that ACEs are predominantly treated as predictors of health, underemphasizing the role of structural determinants of health inequities. Now that a robust literature on the deleterious effects of ACEs has been established, I recommend moving toward a focus on prevention of ACE exposure in the first place, marking a return to the public health roots of ACEs as a construct. This involves not only including structural determinants of health inequities in research designs but also placing them at the start of the story. Future research on intermediary determinants of health (e.g., ACEs, stress, health-risk behaviors) more broadly should incorporate the causal role of structural determinants of health inequities. Policies aimed at intermediary determinants should view these within a broader framework and focus more on preventing the factors that cause their inequitable distribution than on mitigating their health impacts.

A Systematic Review of the Literature on Measurement Invariance/Equivalence of Parenting Scales by Race and Ethnicity: Recommendations for Inclusive Parenting Research

Violeta J. Rodriguez, Dominique L. La Barrie, Miriam C. Zegarac, and Anne Shaffer (University of Georgia)

What did the research reveal that you didn’t already know?

We knew that in general, there is a limited consideration of how measures of parenting function in racially and ethnically diverse groups. So although we expected that there would be some lack of evidence for measurement invariance/equivalence across diverse groups of parents, we were surprised by the extent of this omission in the literature, which has persisted essentially unchanged for decades. We also learned more about specific potential problems with the ways measurement invariance/equivalence by race and ethnicity of parenting measures is assessed. That is, we found not only that measurement invariance/equivalence of parenting measures by race and ethnicity is rarely evaluated but also that when it is evaluated, the methods are inconsistently used across studies (e.g., whether factor-analytic or item–response–theory approaches are used). There is also a striking lack of qualitative research to inform measure development, and we see this as an important strategy to future measure development that is informed by input from diverse groups of parents.

How might your findings improve methodology or other research practices in psychological science?

We hope that the findings will stimulate more research on the psychometrics of parenting measures with samples comprising greater racial and ethnic diversity. This research is needed to improve the validity and utility of parenting measures with groups that have been historically underrepresented in parenting research and will ensure that conclusions based on group comparisons are psychometrically sound. We also recommend that more multimethod (e.g., qualitative, mixed methods) approaches are used in either developing or refining measures to incorporate more diverse perspectives and more accurately reflect the evolving demographics of the United States.
**Historical Trends in (Mis)Reporting \(p\) Values and Statistics: A Meta-Analysis**  
*Yuyang Zhong (University of California, Berkeley)*

**What did the research reveal that you didn’t already know?**  
This project investigated the trend of \(p\)-value distributions over time and found that despite the American Psychological Association’s editorial guideline, as of 2009, to present reported statistics as equalities, many authors still chose to report \(p\) values as inequality thresholds (e.g., \(p < .05\) instead of \(p = .035\)). The uptick in \(p\) values around .05, .01, and .001 did not decrease until very recently (after 2015), which speaks to the influence of a landmark paper on reproducibility in psychological science published by the Open Science Collaboration. This project also recalculated \(p\) values from reported test statistics to identify common errors authors have made—either rounding errors or outright inconsistent results.

**How might your findings improve methodology or other research practices in psychological science?**  
This project complements open-source, manuscript cross-check software (i.e., statcheck) that has played an increasingly important role in the publication review and submission process. It also provides additional information for future research to look out for common errors. This project also provides a framework to continue this systematic review every few years to see whether trends of \(p\)-value distributions will drastically change.

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**Identifying and Leveraging Social Norm Networks Guiding Energy Use in the US and India**  
*Rohini Majumdar, Gregg Sparkman (Princeton University), Radhika Khosla (University of Oxford), and Elke Weber (Princeton University)*

**What did the research reveal that you didn’t already know?**  
Although researchers have shown how the power of social norms can be harnessed to motivate prosocial behaviors, past studies have mostly focused on relationships between one or two norms and behaviors. Our work was partly inspired by the idea that behaviors are multiply determined by many norms (and attitudes), which we were able to visualize using norm networks. We found that closely interrelated norms cluster within a larger network of norms, and the ways in which norms cluster together differ across cultures. Comparing the networks in two countries (i.e., India and the United States) revealed that interventionists should target the same behavior differently in different places. For example, we found that willingness to pay more for energy-efficient air conditioners in India is related to thinking that air conditioners are important for social status and quality of life. In the United States, the same behavior is more related to injunctive norms about climate change mitigation and burden. Institutional signals from the government might be more effective in this context.

**How might your findings improve methodology or other research practices in psychological science?**  
Non-WEIRD (Western, educated, industrialized, rich, and democratic) populations remain underrepresented in psychological science even though we have no reason to believe that they think or behave in the same ways as people in WEIRD cultures, or that the strategies known to be effective in one context will also be effective in another. By studying a non-WEIRD population in India, we demonstrate the value of designing culturally sensitive behavioral interventions. Methodologically, the network approach allows us to consider norms, attitudes, and behaviors as part of a complex system of mutually influencing variables.

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**GRAND CHALLENGES: UP-AND-COMING VOICES**

Catch more flash talks, along with provocative poster sessions, panel discussions, and extensive additional programming, at the 2022 APS Annual Convention, May 26–29 in Chicago. Full details at psychologicalscience.org/convention2022.
One-Way-ANOVA Within-Subjects Data: The Case of Nonrandom Missingness in Skewed Distributions

Cristian Avila (The University of Texas at Austin), Rick Sperling, Destiny Lucero, and Pedro Gonzalez Aboyte (St. Mary’s University)

What did the research reveal that you didn't already know?
Like most students, I was taught that paired samples t tests and repeated measures analyses of variance (ANOVAs) are the appropriate tests to use when data from the same participants are collected on multiple occasions. It wasn't until I started learning about the problems associated with missing data that I began to wonder about the trade-off between the statistical power that comes from correlations across time points (repeated-measures ANOVA) and preservation of sample size (one-way ANOVA). Previous research on this topic didn't account for missingness and high skew simultaneously. That's what my study did. The results were mostly consistent with my expectations, but being able to identify the specific conditions in which the one-way ANOVA did and did not outperform the repeated measures ANOVA was gratifying.

How might your findings improve methodology or other research practices in psychological science?
Those of us studying this topic are motivated by practical applications that could lead to greater social justice. Underresourced schools tend to have lower attendance rates and higher student mobility, so finding ways to deal with missingness is critical if educators are to produce accurate assessments of student growth over time. We also are sensitive to the fact that teacher education programs typically do not require advanced statistics courses, and many teachers feel apprehensive about conducting complex statistical analyses on their own. More sophisticated ways of managing missingness, such as multiple imputation, are unattractive options for them. If the one-way ANOVA preserves statistical power at nominal or better Type I error rates, it represents a far more accessible method of addressing missingness than advanced approaches. Hopefully, my continuing program of research will tell us more about the appropriateness of one-way ANOVA under various conditions.

The Unintentional Dilution of Voices of Color in Traditional Qualitative Analyses

Morgan D. Mannweiler (Yale Center for Emotional Intelligence), Tse Yen Tan, Jennifer Seibyl, and Christina Cipriano (Yale University)

What did the research reveal that you didn't already know?
Our research illuminated the potential harm traditional qualitative research methods can propagate—specifically, the potential to dilute responses from minority groups in our samples and the resulting lack of identity representation when informing policy. Our pilot sample was composed of Connecticut school personnel, who are primarily White women (79% female and 83% White). We applied traditional qualitative coding and random sampling methodology to our data set. Upon analyzing the full sample of educators’ sources of stress, we found that responses from educators of color were significantly more likely to fall into our “miscellaneous” category than responses from White school personnel, potentially indicating missed themes within the larger sample and compromising our goal of informing educational leaders of the causes of stress among educators. To meaningfully evolve the generalizability of results to sociodemographic subpopulations, we built upon the lessons learned from our initial study and revised our research methods. We are currently analyzing data from a national sample of educators to explore the strengths of oversampling minority groups in qualitative analyses.

How might your findings improve methodology or other research practices in psychological science?
Traditional qualitative methods call for representative samples when considering participant race. However, deriving codes from random samples primarily representing dominant groups in the data set can result in coding schemes that unintentionally wash out the experiences of minority members. We have taken time to critically reflect on our research biases, intentionally center voices of color, and include educators as experts in their experience throughout the coding process. Such considerations are vital to promote equitable research practices that elicit truly representative policy changes.
Does Psychological Science Deserve Brilliant Researchers from Outside North America and Europe?

A persistent lack of diversity, the glacial pace of progress, and the urgent need for a more regional approach.

Third in a three-part series

By Patrick S. Forscher, Dana M. Basnight-Brown, Natalia Dutra, Adeyemi Adetula, Miguel Silan, and Hans IJzerman
This article concludes a three-part series in which a team of researchers in Africa, Asia, Europe, and South America explore the longtime dominance of psychological science by researchers in Western, educated, industrialized, rich, and democratic (WEIRD) countries. Part 1, published in the September/October 2021 Observer, explored the problems with U.S. dominance specifically. Part 2, in the November/December issue, addressed the legacy of colonialism and the challenges of psychological science in the developing world.

The “WEIRD problem” in psychological science—the problem that North Americans and Europeans predominate among researchers, article authors, and participant samples—is not new. Nor is the nature of the problem hard to grasp: You cannot learn about the psychology of humans by studying a narrow slice of them. Yet, despite a huge array of commentaries that advance these very arguments (Henrich, Heine, & Norenzayan, 2010; Hruschka et al., 2018; Rad, Martingano, & Ginges, 2018; Sears, 1986), and despite a similar volume of commentaries outlining potential solutions (Urassa et al., 2021; Onie, 2020; Dutra, 2020; Medin et al., 2017), little has changed to address the problem (Arnett, 2009; Rad et al., 2018; Thalmayer, Toscanelli, & Arnett, 2020; see also our first post in this series).

The lack of action on this problem is puzzling. The charitable interpretation is that solving the WEIRD problem requires collective action, so sustained change would require the simultaneous coordinated efforts of many people and institutions (Medin et al., 2017; Forscher et al., 2020). However, there is a less charitable interpretation of the lack of action: Most practicing psychologists simply do not care enough about the WEIRD problem to do anything about it. If true, this explanation would suggest an attitude of complacency: Psychological scientists are doing well enough with their ad hoc studies on undergraduates and MTurkers to satisfy the developed world’s appetite for think pieces, YouTube videos, and pop psychology books. Meanwhile, there are classes to teach, committees to chair, and senior theses to supervise. Is solving the WEIRD problem really worth the effort?

We think yes. Our answer is motivated not only because solving this problem is good for science, as we have asserted in the other posts in this series. Nor is our answer just motivated by ethical considerations. We think psychological science’s long-term viability also may depend on it.

We make our argument in three parts. First, we argue that psychological science is a “substitutable good” in the sense that other occupations and disciplines can fulfill its functions. Second, we argue that the world’s future lies with the world regions typically labeled “non-WEIRD”: To secure its future, psychological science needs to compete for talent in those regions. Third, we argue that effectively competing for non-WEIRD talent means doing away with the non-WEIRD label and considering the unique history, culture, and politics of each region. We close with some reflections on whether psychological science, as it’s currently constituted, is good for society and for researchers outside of the developed world.

Psychological science is a substitutable good

Economics has a concept called “substitutability.” Two goods are substitutable if they fulfill a similar function for consumers. This allows consumers to select the...
good that brings them better utility through, for example, higher performance or lower price.

Psychological science is a substitutable good. Psychological science promises to provide insight into human psychology. Some psychological scientists also promise to use this insight to solve human problems. Yet psychological scientists are far from the only people who make these two promises. For insight into human psychology, the public can also rely on literature, spiritual leaders, internet influencers, and movies. For solutions to human problems, the public can turn to advice columns, friends and family, social workers, nurses, and self-help gurus. Even if we focus only on academic disciplines, psychological science is potentially substitutable with economics, history, sociology, neuroscience, data science, anthropology, public health, and political science.

Psychological science is, in other words, replaceable: The services it provides to the general public can in principle be provided by other sources. To keep from being replaced, psychological scientists must make the case that the insights and solutions they generate are competitive with those offered by these other sources. But given psychology’s dubious replicability, excessive use of unvalidated and ad hoc measures, and overreliance on convenience samples, this is a difficult case to make even in North America and Europe. It is still more difficult to make in world regions that are both largely neglected by psychological science and funded with less expansive research budgets than are typical in North America and Europe. This is especially true in regions such as Africa, where no country dedicates 1% or more of its GDP to research and development (UNESCO, 2021). However, even in countries such as India, which has a somewhat higher research budget than the average African country, psychological science may take a back seat to research that could support urgent governmental priorities, such as curbing India’s high maternal death rate.

Here psychology’s competitive disadvantage relative to its prospective replacements really comes to the fore. Because while psychological scientists continue to conduct one-off MTurk studies on esoteric topics, some of the...
potential substitutes for psychological scientists—say, economists—will be only too happy to evaluate the effectiveness of Indian public health initiatives for impoverished postpartum mothers (Agarwal et al., 2019), combat caste-based discrimination (Thorat & Neuman, 2012), analyze the effects of gender quotas on Indian women’s leadership (Beaman et al., 2009), and guide Indian monetary policy (Patra & Kapur, 2011). If policymakers in a given country cannot see the relevance of psychological science to their priorities, they will turn to potential substitutes for which the relevance is more obvious.

The world’s future is “non-WEIRD,” and psychology should compete for this talent

Psychology’s substitutability highlights how the worth of psychological science is not inherent: It must be substantiated via the services the discipline provides. Among other audiences, the prospective psychological scientists of the future must be convinced of this worth. Most of these individuals are in the countries typically labeled “non-WEIRD.”

To see why this is the case, consider the graph (opposite page) from Our World in Data of the past, present, and future global population broken down by world region. North America and Europe currently constitute about 14% of the global population—a small fraction of the global total. By 2100, that percentage is projected to shrink to 10%, with the majority of population growth occurring in Africa and Asia.

Meanwhile, regions outside of North America and Europe are experiencing rapid economic growth, which will increase their available funds for science and innovation. If psychological science continues to show a studied disinterest in the psychological processes and problems that matter to those in the world regions experiencing the greatest growth in science, how long can it remain a viable and competitive scientific discipline?

Psychological science should be actively interested in tapping the vast reservoirs of talent outside North America and Europe—not just because doing so carries scientific benefits, and not just because it is an ethically good thing to do, but also because doing so will better secure the continued health of psychological science as a discipline.

To expand psychology research in a region, you need to know that region

If we accept that recruiting non-WEIRD researchers should be a high strategic priority, we should also recognize that non-WEIRD researchers are not a monolith. It is hard to make a compelling case to someone to join your profession when you treat them as largely interchangeable with the 86% of the world that falls in the non-WEIRD grouping.

In this sense, the WEIRD problem is not a WEIRD problem at all. It is a Kenya problem, an India problem, and a Philippines problem; a Cameroon problem, a Brazil problem, and a Colombia problem; a Vietnam problem, an Uzbekistan problem, and a Turkey problem.

Each of these countries, and the many others throughout the world, have their own histories and cultures, their own political circumstances, and their own higher education sectors. All these features interact to produce different relationships between psychology research and the general population and must be taken into account to grow psychology as a discipline.

For example, in Kenya, where one of the authors of this series (Dana Basnight-Brown) lives, psychological science barely exists as a discipline. In fact, when Dana started a lab at her local institution, she learned that it was the only lab dedicated to the study of human cognition in East Africa. Another major player in the area is the Busara Center for Behavioral Economics, a behavioral science consultancy that emerged out of a desire to create a local lab to facilitate decision-making research. Based on this local example, solving the “Kenya problem” will involve making the case to universities that psychology is a scientific discipline with the potential to add value to Kenyan higher education and national research goals; ensuring that those universities are able to recruit professors; supporting those professors as they establish their research labs; and ensuring that
The WEIRD problem is not a WEIRD problem at all. It is a Kenya problem, an India problem, and a Philippines problem; a Cameroon problem, a Brazil problem, and a Colombia problem; a Vietnam problem, an Uzbekistan problem, and a Turkey problem. The research they produce is visible to important national and international audiences.

To take another example, the Philippines, where another author (Miguel Silan) lives, has a strong presence of research psychologists. Philippine research psychology is strongly influenced by the indigenous psychology research tradition (see Part 2 of this series), which emphasizes qualitative approaches, especially in research with hard-to-reach populations (e.g., Relis et al., 2016; Santos et al., 2019). In addition, the Philippine journal system is less robust than the system in the United States and Europe. For example, the country’s top journal, the Philippine Journal of Psychology, has an inconsistent publication timetable. Other journals have small readerships, which incentivizes local researchers to publish in non-Philippine journals with larger international audiences. Furthermore, the reforms developed in psychology’s credibility revolution have not gained much traction, either in journals or in academic departments, and the Philippine research scene as a whole does not have a clear set of shared research priorities. Solving problems related to the low presence of Philippine researchers on the global scientific stage is complex and will likely require a multilevel intervention targeting infrastructure, Philippine and non-Philippine academic institutions such as funders and scientific journals, and pedagogy within academic departments.

As these examples illustrate, the state of psychology varies tremendously across Kenya and the Philippines, and across countries more generally. Beyond affecting the local infrastructure and scientific institutions, this variability also affects the relevance of psychological science to local conditions. If psychological science wishes to make the case that it is relevant to these different populations, it may need to grow beyond the topics that currently dominate its journal space.

In some regions, relevance is even enshrined by the decision-making institutions that determine whether projects take place. In East Africa, for example, many ethics boards and funders approve proposals based on how they will impact local communities, with less emphasis on gaining knowledge just for knowledge’s sake. If psychological science can demonstrate that it is relevant to making progress on broad human development targets such as the United Nations’ Sustainable Development Goals, the discipline may find itself on more competitive footing in East Africa relative to other disciplines. Psychological science has the potential to assist in reaching these targets; good health and well-being is one of the Sustainable Development Goals, and psychological processes are integral to good health and well-being (Lund et al., 2018). To demonstrate its relevance to East Africa, psychological science need only demonstrate its relevance to concerns such as these.

Conclusion
Despite the urgency of the problems relating to psychology’s lack of national and cultural diversity, the progress toward solving them has been glacial (Arnett, 2008; Rad et al., 2018; Thalmayer et al., 2020). Given changing global demographics, we think these problems rise to the level of existential threats. North American and European researchers need to acknowledge that increasing national diversity is worth their time, as the “dominance of one culture of knowledge” compromises the advancement of the whole planet (Auerbach, 2021). In the same vein, responsibility for advancing these goals also lies outside of North American and European contexts too, and local governments in many developing research societies will need to invest in their local research cultures with stronger budgets, less bureaucracy, and more emphasis on rigor. Finally, given the diversity in research questions and priorities across different countries, fully addressing these problems will require assessing and understanding the state of psychological science on a region-by-region basis rather than treating all regions outside North America and Europe as a monolith.

Addressing these problems may also require a re-examination of what psychology is for. Psychological science promises to give insight into human psychology, yet human psychology likely differs, perhaps substantially, across world regions. Psychological science also promises to use its insights to solve human problems, yet the specific problems that humans face vary substantially according to varying economic, social, historical, and political circumstances throughout the world. A psychological science that lives up to its promises should recognize these forms of variability.

When psychological scientists discuss diversity issues in the discipline, they often assume that psychological science is a gift that is either graciously dispensed to or viciously withheld from those who wish to enter the discipline. This outlook is mistaken. We should not assume that academic
psychology as it is currently constituted is a good place for the many brilliant prospective scholars who are scattered throughout the globe. Nor should we assume that society would be better off with more psychological scientists of the type that our discipline currently produces. Yet we have a chance to improve the discipline and thereby substantiate our value, both to the many different societies on Earth and to the brilliant prospective scientists we may have the opportunity to recruit. A psychological science that conclusively substantiates its value will be better and stronger than the one in which we work today. ●

References


Rob Goldstone, the editor of *Current Directions in Psychological Science*, commissioned the image he calls “The Modern Measure of Humanity” by illustrator Joe Lee, who was inspired by Leonardo da Vinci’s “Vitruvian Man.” “Da Vinci believed his Vitruvian Man represented the ideal measurements of bodily proportions,” Goldstone explained. “Today, we are surrounded by a staggering web of measurement devices constantly recording not only our body proportions but our voices, writings, faces, choices, movements, and physiological responses.”
FOR WHOSE BENEFIT? THE PROMISE AND PERILS OF BEHAVIORAL MEASUREMENT TECHNOLOGIES

A special issue of Current Directions in Psychological Science explores increasingly ubiquitous behavioral measurement technologies.

When the coronavirus pandemic relocated millions of workers from their offices to their homes, many of their employers began monitoring them remotely, often on a minute-by-minute basis, through surveillance technologies such as facial recognition and keyboard and web-browser tracking. Remote worker monitoring is just a recent example of an accelerating trend playing out all over the world. At thousands of time points every day, people feed behavioral data into a multitude of measurement tools, ranging from mobile health apps and wearable fitness trackers, which monitor performance at the individual level, to street cameras, web browsers, and smartphones, which surveil individuals’ whereabouts and activities. In a forthcoming issue of Current Directions in Psychological Science, 13 teams of researchers review existing research on the individual and social consequences of behavioral measurement technologies (BMTs)—their promise and perils alike.

BMTs “offer the promise of helping us to know ourselves better and improve our well-being by using personalized feedback and gamification,” writes Rob Goldstone, the journal’s editor, in his introduction. “At the same time, they present threats to our privacy, self-esteem, and motivation. At the societal level, the potential benefits of reduced bias and decision variability by using objective and transparent assessments are offset by threats of systematic, algorithmic bias from invalid or flawed measurements. Considerable technological progress, careful foresight, and continuous scrutiny will be needed so that positive impacts of BMTs far outweigh the negative.”

Goldstone elaborated in an email to the Observer. “I went into this project wearing my research psychologist’s hat, with ‘kid in the candy store’ excitement about the prospects for better understanding psychology through the creative use of technology-enabled behavioral measurements,” he wrote. “While the articles vividly show the opportunities in this regard, I was surprised to find myself increasingly troubled by the consequences of these measurements. The reviews point to many psychological dangers, for both individuals and society at large, in measurement systems that are being widely deployed and are rapidly affecting the course of our lives.” One result of these revelations, Goldstein added, is his “strong belief that psychologists need to play a more active role in critically assessing assessment itself. Rather than complacently using measurements as they currently exist, we need to be pushing for and creating better measurements that better capture the richness of human experience, and do not lead to negative consequences when they are used to guide people or policies.”

Here are brief summaries of each article, with further insights from a few of the authors.

See the special issue, and all issues of this journal, at psychologicalscience.org/publications/current_directions
APS SPOTLIGHT: THE WELL-MEASURED LIFE

Day-Long Mobile Audio Recordings Reveal Multi-Timescale Dynamics in Infant Vocal Productions and Auditory Experiences

Anne Warlaumont, Kunmi Sobowale (University of California, Los Angeles), and Caitlin Fausey (University of Oregon)

The everyday sounds heard by human infants—their own babbling, adults singing lullabies, siblings squabbling, dogs barking, and so on—fluctuate over time. Infant-friendly wearable audio recorders allow researchers to capture and observe these sounds. Warlaumont and colleagues reviewed recent discoveries about how infants’ soundscapes are organized over the course of a day based on analyses designed to detect patterns at multiple timescales. The analyses revealed that everyday vocalizations are clustered hierarchically in time, vocal explorations are consistent with foraging dynamics (i.e., the patterns of infants’ exploration of different resources), and musical tunes are distributed such that some are much more available than others, which might help infants learn to categorize and generalize tunes. This approach—focusing on the multi-scale distributions of sounds heard and produced by infants—provides new insights on human communication development from a complex systems perspective.

Toward a "Standard Model" of Early Language Learning

George Kachergis, Virginia A. Marchman, and Michael C. Frank (Stanford University)

Cognitive scientists have long attempted to understand early language learning and the mysteries of how speechless, wordless infants develop into children who use language expressively and creatively. Kachergis and colleagues see the emergence of a new synthesis of understanding based on theoretical and empirical work on vocabulary development. “Our goal is to present this synthesis as the beginnings of a ‘standard model,’” they write, “a baseline theory that is widely accepted in its outlines and that should guide future work, even if its assumptions still require rigorous evaluation.” Noting that the field of physics has a standard model that describes all known elementary particles along with three of the four known fundamental forces in the universe, the authors observe that psychology, “in general, has been criticized for lacking such formal theories that inform and drive empirical research.” They point to computational models, and “accumulator models” in particular, as potential sources of a unifying theory.

Ten Lessons About Infants’ Everyday Experiences

Kaya de Barbaro (University of Texas at Austin) and Caitlin Fausey (University of Oregon)

Infants experience a diversity of activities, postures, objects, speakers, and more in a typical day. Their experiences are neither static over time nor interchangeable across infants. These and seven other lessons about infants’ everyday experiences emerged out of de Barbaro and Fausey’s review of recent research that used audio recorders, accelerometers, cameras, and other wearable sensors to quantify patterns of infants’ sensory histories. Wearable sensors “offer the unique opportunity to capture the experiences on which a lot of learning is hypothesized to depend,” the authors write. “The striking heterogeneity of experiences—there is no meaningfully ‘representative’ hour of a day, instance of a category, interaction context, or infant—inspires next steps in theory and practice that embrace the complex, dynamic, and multiple pathways of human development.”

“What’s really exciting is that wearables tell us things about development that are unknowable from other methods that yield data from only one task or only one short time period,” de Barbaro explained in an email to the Observer. “A really striking fact that this research prompts us to think more about is how infants’ experiences change from moment to moment and context to context. We’re excited to push theory in new directions that deal with this heterogeneity.”

Digital Life Data Filling the Clinical Whitespace

Glen Coppersmith (Qntfy)

Coppersmith uses the term “digital life data” to describe the traces of our lives that are encoded in our routine interactions with technology, from social media posts to financial transactions. These data “can provide signals relevant to our psychology, well-being, and mental health,” he writes. “For example, GPS coordinates can indicate if we are staying home or moving about, and smartphone actigraphy can indicate whether we are resting or engaging in doomscrolling while we are stationary.” The author examines a few areas in which he believes these advances could significantly alter our approach to mental health and well-being, including greater personalization to improve adherence to and outcomes of clinical treatments and adaptive interventions calibrated to serve the right person at the right time.

Personality Change Through Digital Coaching Intervention

Matthias Allemand and Christopher Flückiger (University of Zurich)

Personality traits—relatively enduring patterns of behaviors, thoughts, and feelings—are powerful predictors of a wide range of outcomes involving education, work, relationships, health, and well-being. They are generally considered rather immutable, but research suggests that many people want to change their personality. Can these traits be intentionally changed through psychological interventions? Moreover, should they? Allemand and Flückiger, writing from a per-
spective that assumes personality traits to be somewhat more dynamic and plastic than traditionally believed, explore the potential of digital applications to guide and support people in their desire to change personality and trigger change processes. They provide a rationale for nonclinical personality change interventions, draw from studies illustrating this emerging field of research, and explore future directions.

Digital Games as a Platform for Understanding Skill Acquisition From Novice to Expert

Tom Stafford and Nemanja Vaci (University of Sheffield)

Digital gaming is a domain of profound skill development. Players’ digital traces create data tracking the development of expertise from novice to professional-level skill. Reviewing existing research on skill development using data from digital games, Stafford and Vaci show that gaming data allow novel analyses and make recommendations for future research into learning with games. They argue that existing work has not taken advantage of gaming data to understand skill acquisition, and that to fully do so will require computational accounts of complete game performance at the individual level, tied to a cognitive theory of skill and backed by experimental rather than observational studies.

Lifespan Learning and Development and Its Implications for Workplace Training

Margaret Beier (Rice University)

The psychology of aging tends to focus on age-related decline (e.g., in abilities, memory, and cognitive processing speed) rather than age-related growth and development. “Considering these declines, it is a wonder that most people are able to engage in problem solving, thinking, and learning beyond middle age,” writes Beier. Her research shows that older individuals can and do, in fact, learn, particularly when the content is aligned with their prior knowledge and interests.

Focusing on working-age people between 18 and 70 years old, Beier describes age-related changes in abilities and motivation that affect lifelong learning in the context of workplace training and development. “Considering these declines, it is a wonder that most people are able to engage in problem solving, thinking, and learning beyond middle age,” writes Beier. Her research shows that older individuals can and do, in fact, learn, particularly when the content is aligned with their prior knowledge and interests.

Field Experiments on Social Media

Mohsen Mosleh (University of Exeter), Gordon Pennycook (University of Regina), and David Rand (Massachusetts Institute of Technology)

Research using online behavioral data is often purely observational, which limits its ability to identify causal relationships. Mosleh and colleagues review recent innovations in experimental approaches to studying online behavior, with particular focus on research related to misinformation and political psychology. Their article explores “different approaches for doing experiments ‘in the wild’ on social media,” including hybrid field–lab studies, “rather than traditional survey experiments most psychologists do,” Rand explained via email. “This allows you to look at the effect of interventions on the online behavior of people who don’t know they are in an experiment, and who are making real decisions rather than hypothetical (e.g., about what content to share or whom to follow).” The authors review one experiment in which Twitter bot accounts sent an accuracy-priming message to users who had been sharing links to misinformation. This

For more on this topic, see “A Lifetime of Learning” in the November/December 2021 Observer.

Do Social Networking Sites Influence Well-Being? The Extended Active-Passive Model

Philippe Verduyn, Nino Gugushvili (Maastricht University), and Ethan Kross (University of Michigan)

Do social media sites influence well-being? The answer depends on how the sites are used, according to the active-passive model of social networking site (SNS) use. It argues that using such sites to actively and positively interact with other people is good for well-being, whereas consuming SNS content passively has a negative impact.

Verduyn and colleagues “offer a more nuanced approach by illustrating that SNS are not inherently good or bad but that their consequences depend on how they are used (usage types) and by who uses them (user characteristics),” Verduyn explained via email. The authors propose an extended active-passive model of SNS, in which active use stimulates social capital and feelings of connectedness only when users engage in “warm” interactions with specific individuals, rather than merely posting status updates. Passive use of SNS, in turn, “only results in damaging social comparisons when consuming success (vs. failure) stories of other users, especially when the content is relevant to the evaluation of one’s self-concept.” SNS research, Verduyn wrote, “should move away from only assessing the amount of time spent on social network sites and instead focus on the interaction between usage types and user characteristics.”

APS SPOTLIGHT: THE WELL-MEASURED LIFE

For more on this topic, see “A Lifetime of Learning” in the November/December 2021 Observer.
tactic was found to significantly increase the quality of news these users shared.

**Psychological Measurement in the Information Age: Machine-Learned Computational Models**

**Sydney K. D’Mello (University of Colorado Boulder), Louis Tay (Purdue University), and Rosemary Southwell (University of Colorado Boulder)**

Could psychological measurement benefit from an information-age update based on real-world data and advances in sensing and computing? D’Mello and colleagues explored the emerging field of machine-learned computational models (MLCMs)—computer programs that learn from data, usually with human supervision. Providing examples from cognitive and affective science, neuroscience, education, organizational psychology, and personality and social psychology, they consider the accuracy and generalizability of MLCM-based measures, cautioning researchers to consider the underlying context when interpreting performance and making claims. They conclude that “in addition to known concerns of data privacy and security, the use of MLCMs entails a reconceptualization of fairness, bias, transparency (i.e., interpretability), and responsible use.”

**Integrating Insights About Human Movement Patterns From Digital Data Into Psychological Science**

**Joanne Hinds, Olivia Brown, Laura Smith, Łukasz Piwek, Adam Joinson (University of Bath), and David Ellis (Lancaster University)**

Existing research largely uses data-driven modeling to detect patterns in people’s movements, but such approaches are often devoid of psychological theory and fail to capitalize on what movement data can convey about associated thoughts, feelings, attitudes, and behavior. Hinds and colleagues outline trends in current research and explore how psychological scientists might better address theoretical and methodological challenges. They argue that interdisciplinary research combining approaches from psychology and data science will enable better predictions about human movement patterns and could advance psychological theory.

“Movements are fundamental to everyday living,” Hinds wrote in an email to the Observer, noting examples ranging from workers’ everyday commutes to refugees’ mass migrations. “Modern technologies such as smartphones and wearable devices track people’s geographical coordinates via GPS, as well as psychical activity patterns such as speed of walking and rotation (via accelerometers and gyroscopes).” But more than identifying where people are, digital data can also “reveal rich socio-psychological insights about their behaviors,” she added, citing Bluetooth and GPS data indicative of loneliness among Catholics and Protestants as they traveled through public spaces in Belfast. “From a scientific perspective, digital data relating to people’s movements provides opportunities to test theories in new contexts (e.g., intergroup contact theory). However, it also raises ethical issues relating to privacy and surveillance. We discuss these opportunities and challenges and suggest ways that researchers can overcome them.”

**What’s to Come of All This Tracking ‘Who We Are’? The Intelligence Example**

**Wendy Johnson (University of Edinburgh)**

In theory, all this tracking of what we do and how well we do it should foster greater health and well-being, but clear empirical evidence supporting these goals is in short supply. Johnson cites the example of IQ testing, which for more than 100 years has been used to determine who gets access to social benefits ranging from greater educational opportunities to higher-paying occupations. Moreover, the individuals receiving these benefits often pass the ability to “test well” to their children, leading to the intergenerational transmission of the benefits as well. “What does this mean for our future?” Johnson asks. She points to Aldous Huxley’s 1932 novel *Brave New World*, which depicted a dystopian future society based on selective breeding and predetermined “castes,” as a cautionary tale.

In Huxley’s world, “all this is imposed by design, but we’re largely bringing it on ourselves,” Johnson writes. Who is most likely to benefit from the onslaught of new algorithms measuring behavior? “Those with highest levels of what we measure as intelligence and its underlying genes.”
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On January 1, APS Fellow Klaus Fiedler began his tenure as the editor of *Perspectives on Psychological Science*. Fiedler is a professor of social psychology at the University of Heidelberg and will be APS’s first journal editor in chief based at an institution outside North America. Having studied a variety of topics, from language and cognition to computer-simulation models, he brings a broad body of research and knowledge as well as significant editorial experience to the journal. APS Publications Director Amy Drew recently asked Fielder a few questions about his vision for *Perspectives*.

**What goals do you have for *Perspectives* under your editorship?**

My most prominent, superordinate goal is to use *Perspectives* as an instrument to foster the quality of psychological science.

To more vividly express the spirit of my answer to this question, I might say that:

- *Perspectives* is a key journal for the ongoing discourse of how to improve the quality of behavioral science.
- It highlights a major developmental task of a discipline that is flourishing at the empirical level, whereas the theoretical underpinnings are lagging behind.
- It is extremely important to enrich merely statistical and numerical methods with more superordinate perspectives on methodology, including philosophy of science.
- As a rule, I believe that statistical methods are subordinate to research design, which is subordinate to logic of science. In other words, even the most sophisticated statistical methods are worth nothing if the research design is flawed. Likewise, even the most elaborate or compact research design is useless if the theory guiding an investigation is ill-defined, imprecise, or insensitive to prior knowledge.

I hasten to add, however, that psychological science is inherently pluralistic. It always allows for different standpoints, and I promise to make pluralism a guiding principle for *Perspectives*.

While I do not want to conjure up a rivalry of mutually dependent layers of methodology, I am overaccentuating here what I diagnose as a major obstacle for the current growth of science. One main motive of the role I have been playing in recent years is indeed helping to improve the quality of psychological science, not just in research but also in teaching, applied work, and communicating scientific results to the public.

In my view, *Perspectives* affords a key instrument to unfold this motive. I am deeply convinced that an effective strategy is to give more weight to the best exemplars of excellent research, of which we can be proud and which we want to imitate and to elaborate on in future research, rather than complaining about malpractices and embarrassing examples of bad research, which do not deserve to fill our major journals.

**Elaborating on the best exemplars of psychological science is more prominent and more constructive a goal of a leading journal like *Perspectives* than expressing complaints and lamenting negative examples.**
Related to this conviction, I propose that really compelling, ground-breaking findings are rare. From the scarcest of outstanding work, it follows that a reasonable cost-benefit analysis will reveal that false negatives can be much more costly than false positives. The latter can be corrected for, whereas the former are hardly recognized and therefore unlikely to be corrected. Thus, elaborating on the best exemplars of psychological science is more prominent and more constructive a goal of a leading journal like Perspectives than expressing complaints and lamenting negative examples.

Are there any topics or subject areas you would like to highlight more in Perspectives?

Honestly, I am perfectly happy with self-organizing forces determining the journal’s contents. It is most important, I think, that the journal highlight the strongest ongoing research programs, scientific debates, and academic activities in an authentic fashion. Highlighting what I personally consider cute topics is not important.

However, beyond articles from diverse subject areas speaking to basic, translational, and applied research and transcending the boundaries of specific subdisciplines, an asset of Perspectives that we might exploit more is the possibility to invite contributions of activist research. Here I am not only talking about special issues or special-issue sections convened by guest editors in their domains of expertise. I also intend to, and I have already started to, encourage leading scientists and outstanding junior scientists to document multilab collaborations, adversarial debates, model tournaments, and meta-science debates, to list but a few examples of what I call activist research.

Written with the help of my editorial team—which will include Mirta Galesic (Santa Fe Institute), Leonel Garcia-Marques (University of Lisbon), Tina Lowrey (HEC Paris), Tim Pleskac (University of Kansas), Aparna Labroo (Northwestern University), and Richard Morey (Cardiff University) as associate editors—my first editorial will not make a distinct attempt to make Perspectives a different journal. Why should we not stick to the many assets of a successful journal? However, our editorial will make a deliberate attempt to clarify what submissions the Perspectives team wants to attract and what submissions should be submitted elsewhere, if only to reduce the rate of frustrating desk rejections that reflect plain misunderstandings.

Interested readers of the Observer are invited to see our editorial at psychologicalscience.org/publications/perspectives.

How has your previous editorial and research experience prepared you for the job of editing a journal as broad and unique as Perspectives?

Independent of my former editorial work, I like to be involved in a general journal with a broad readership. Since my time as a student, I have found it challenging and illuminating to approach behavioral-science questions from varying perspectives, and I believe my broad spectrum of interests is reflected in my publication list.

However, I learned many useful lessons during my previous editorial work for general outlets (Journal of Experimental Psychology: General; Psychological Review) as well as for more specialized journals with a restricted domain (Journal of Personality and Social Psychology, Journal of Experimental Social Psychology, European Journal of Social Psychology). Drawing on almost 20 years of editorial experience and on numerous editorial-board memberships, I recently coauthored, with Christian Unkelbach, a chapter on how to perform a good peer review for an Oxford University Press handbook. Feedback is welcome; maybe the idea can be developed further.

The editorial process relies on peer reviewers doing an honorable and highly responsible job. The very experience of changing perspectives—entailing the ability to consider pieces of scientific work from authors’, reviewers’, editors’, and readers’ perspectives—is the key to overcoming a narrow-minded, egocentric view of the peer-review process. Although recognizing the unselfish, constructive, purely scientifically motivated review process takes time, I believe that a good editor can contribute a lot to facilitating it.

What are your plans to ensure diverse representation—among authors and the editorial board—across demographic and geographic categories and content domains, as well as among underrepresented or marginalized groups?

This is indeed a challenging question, but the diversity topic is also charged with optimism and positive connotations. I really believe that, in the long run, the critical mass of research and the amplitude of the best exemplars will increase when a journal like Perspectives moves from an elitist outlet for a small subset of culturally homogenous scientists to a melting pot of diverse people representing different cultures, ethnic origins, and racial backgrounds.

Frankly speaking, the benefits of enhanced diversity may not be visible at once. As a former executive committee member of the European Association of Social Psychology, which was a pioneer among politically engaged
scientific associations, I can only assure that it was worthwhile investing work, effort, and affirmative action into the development of disadvantaged countries. The benefit was not visible at the beginning. However, this transitory state was overcome soon, and leading young scientists (including exchange students) from underprivileged countries excelled in their motivation and qualifications. They soon enriched research and discourse in a refreshing way. Nowadays, many impressive examples of excellent psychological science in Europe originate in such formerly disadvantaged countries as Portugal, Italy, Poland, Croatia, Hungary, Turkey, and the Czech Republic (needless to say that this is just an ad hoc sample).

Note that diversity is not just an enlarged reference set. As in biological evolution, it amounts to a richer variety of mutations, gene recombination, and creative compounds that provide fertile ground for evolutionary progress.

Note also that appointing an editor from outside the United States (like me) is already a sizable step to enhance the diversity of authors and editors. I can assure you that the network of reviewers and advisors I have built up during the last two decades includes scientists from various cultures. Yet the circle of major players could be certainly enlarged just by open-minded diversity initiatives of the world’s major science organizations.

In the end, I do not believe that diversity can be enhanced in a bottom-up fashion, just by circulating emails, social media messages, or blogs. I rather believe that active steps will be necessary. Concretely, this may take different forms. In addition to announcing relevant special issues and inviting contributions from underprivileged countries and subcultures, I particularly believe that lecturers and copy editors might help researchers from different cultures to optimize the quality of their papers before they are published.

In my comments on diversity, I am alluding not just to skin color, ethnic origins, and social orientations but also to the pluralism of science and openness to nonmainstream research, in the spirit of Hannah Arendt’s challenge to overcome conformity and obedience.

What do you want prospective authors to consider when thinking about submitting to the journal and preparing their manuscripts?

Two things come to mind. First, I would like to emphasize once more that I hope Perspectives will be a forum for positive messages focusing on the best exemplars of compelling research rather than negative messages complaining about embarrassing exemplars of weak research. Of course, if authors have good reasons to submit papers that convey skeptical arguments, I will handle their submissions fairly.

Second, I would like prospective authors to beware of the trade-off between two criteria that a high-quality journal must meet simultaneously: It must oblige authors to the highest possible level of scientific scrutiny, and it must, at the same time, embrace pluralism and open-mindedness with regard to research topics, disciplinary rules, methodology, and affiliation with theoretical schools or vocational fields. If I may quote from our editorial:

…perhaps the most important, superordinate principle of good science is pluralism and openness for an up-front deliberation of all viable standpoints… However, … pluralism is not a synonym for leniency, laissez-faire, or “everything goes.” For pluralism to help [Perspectives] foster the quality of science, it must be understood as a commonly shared obligation to substantiate and explain all diverse standpoints at the same high level of scrutiny.

Prospective authors should keep this trade-off in mind. Although there can be no doubt that Perspectives is a highly selective journal with a demanding entry threshold, it intends to be open to unorthodox, unfamiliar, and nonmainstream research of all provenances. Suffice it to say that pluralism is also open to the old fundamental issues that have been of interest since the beginning of scientific psychology more than 100 years ago.
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THE CHALLENGE IS GRAND: COMMUNICATING SCIENCE TO A SOMETIMES-SKEPTICAL PUBLIC

By Charles Blue, APS staff writer

In this issue of the Observer, we present the results of a recent survey of members to identify what they believe are the grand challenges of psychological science. This exercise was inspired, in part, by similar efforts, including the National Academy of Engineering’s (NAE) Grand Challenges for Engineering (engineeringchallenges.org/challenges.aspx).

The goal of these exercises is to identify the frontiers of research or resolve an intractable problem in a particular discipline.

One of the many compelling challenges identified by our members is bridging the widening gulf between science and the public. These concerns go beyond the scope of APS’s current public-outreach and media-relations programs. Rather, our members expressed their grave concerns that psychological science and the other sciences are vastly undervalued and have been bested in their efforts to counter misinformation and science denial. These trends have dovetailed with widespread anti-science beliefs, including vaccine skepticism, climate-change denial, and an overall lack of trust in the fruits of scientific research. The following comments reflect this concern:

“I think the challenges of the information age we are living in, including the trust in misinformation (and mistrust in science), are among the biggest psychological hurdles of our time.”

“I believe that the accelerating attitude in the USA (and other countries as well) of science denial is a tremendous risk to both our profession and all science. … If Americans do not trust science in general and in fact deny its validity, then the future of psychological science is in jeopardy as well.”

Many similar comments called attention to the dearth of public understanding of science and the critical need to counter what many see as a rising tide of coordinated disinformation.

One of the best summaries of the tactics used to push an anti-science agenda is the book Merchants of Doubt by science historians Erik Conway and Naomi Oreskes. They explain strategies that have been widely used to obstruct science-based solutions to major social challenges, including the use of vaccines and masks, programs to combat systemic racism, and policies that address economic disparity. Now comes the question for APS and psychological science: How should we respond?

Unlike traditional efforts in science communication, proactive public-awareness and issue-management campaigns are costly and labor-intensive, and often have no clear finish line. Fortunately, APS has certain strengths it can bring to the table. First, we are a nimble organization, able to pivot to promising programs quickly. For example, in 2021, APS organized two reporter roundtables on topics related to racism. Each event came together quickly with the kind support of our members. Second, at the onset of the COVID-19 pandemic, APS quickly prepared and disseminated a series of backgrounders that outlined insights from psychological science on combating the spread of the disease and its mental toll.

Though effective, both of these efforts were stand-alone and reactive. Programming to address the broader and more systemic grand challenges outlined by our members will require much more.

In the 1990s, I worked with a coalition of engineering societies on a similarly ambitious outreach campaign. Its goal was to increase public awareness of the impact of engineering on individuals and society. This campaign began in reaction to data drawn from national opinion polls on how the public viewed engineers (they drove trains) and their innovations (inventions come from scientists, not engineers).

The decision to tackle these misunderstandings led to a coordinated effort. What resulted was a suite of multiyear programs and public-awareness campaigns on the local and national level, including the flagship Great Achievements (greatachievements.org) effort, which led, eventually, to the Grand Challenges effort by NAE and, by extension, our current exercise here at APS.

My takeaway from this experience is that major public-outreach challenges require more resources than can be mustered by one organization. The challenge of tackling misinformation is orders of magnitude more complex and requires more commitment.
GEORGIA

GEORGIA STATE UNIVERSITY

Georgia State University (www.gsu.edu) invites applications for one anticipated tenure-track (rank of Assistant) faculty position to contribute to its funded Center: Research on the Challenges of Acquiring Language and Literacy (RCALL). This anticipated position is part of a major initiative to enhance existing strengths in language and literacy at Georgia State and continues our successful hiring in this area. The focus of RCALL is research with children and adults, with or without disabilities, who face challenges in acquiring language and literacy. In this university-funded Center, more than 40 faculty members from 8 departments in the Colleges of Arts & Sciences and Education & Human Development come together to engage in interdisciplinary research. The Center’s faculty has a broad range of external funding support including from the Institute of Education Sciences, the National Institutes of Health, and the National Science Foundation.

We encourage applicants whose program of research addresses basic or applied, conceptual or methodological issues concerning challenges in the acquisition of language and literacy with a particular interest in intervention research. Applicants must have a Ph.D. degree in special education, psychology, educational psychology, communication sciences and disorders or related areas. The appointment is open to all programs within the Center. The successful applicant will be the individual who is prepared to take advantage of the interdisciplinary collaborative research opportunities available, has a strong record of programmatic research, can obtain external grant support, and has a commitment to, and experience in, the instruction of undergraduate and graduate students. We are particularly interested in applicants whose research complements other faculty within this Center. (www.researchlanglit.gsu.edu).

Inquiries may be made to Co-Directors, Dr. Rose A. Sevcik (rsevcik@gsu.edu) or Dr. Daphne Greenberg (dgreenberg@gsu.edu). Submit curriculum vitae, a brief statement of professional goals and research interests, evidence related to teaching interests and effectiveness, and the names and three letters of reference electronically to Keneé Stephens at kstephens@gsu.edu, with the subject line “Language & Literacy Faculty Search”. The review of applications will begin on October 15, 2021 and continue until the position is filled contingent on available funding.

An offer of employment will be conditional on background verification. Georgia State University is an Equal Opportunity Employer and does not discriminate against applicants due to race, ethnicity, gender, veteran status, or on the basis of disability or any other federal, state or local protected class.

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Job seekers in need of a reasonable accommodation to complete the application process should call 773-702-1032 or email equalopportunity@uchicago.edu with their request.

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The Department of Psychological and Brain Sciences is seeking to fill three positions for visiting assistant professors to teach undergraduate courses in the areas of Introductory, Clinical, Social, Cognitive, or Developmental Psychology, and/or Neuroscience. The ideal candidate will be an experienced instructor at the college level with an interest in adding value to the undergraduate program. This will be a 1-year appointment, renewable for one additional year. The teaching load is five courses per year. Candidates with a PhD in Psychology, Neuroscience, or related field in hand at the time of appointment are preferred, but ABDs will be considered. Applicants should have documented teaching experience. Applicants should submit a letter of application that includes a statement of teaching philosophy and experience, evidence of teaching effectiveness, a diversity, equity, and inclusion statement, a curriculum vita, and three letters of recommendation. H1-B sponsorship is not available for this position.

Interested candidates should review the application requirements and submit their application at https://indiana.peopleadmin.com/postings/11397. Questions regarding the position or application process can be directed to: Jillian Odle-Araman, Assistant Director of Undergraduate Studies, at jiodle@iu.edu or by mail at ATTN: Instructor Search, Department of Psychological and Brain Sciences, 1101 E. 10th Street, Bloomington, IN 47405-7007. Review of applications will begin January 3, 2022 and continue until the positions are filled. The position start date is August 1, 2022. Information about the department and the university is available at http://psych.indiana.edu. The College of Arts and Sciences is committed to building and supporting a diverse, inclusive, and equitable community of students and scholars.

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psychologicalscience.org/policy
ne of the biggest challenges researchers and science communicators face involves representing complex data in ways that are accurate, engaging, clear, and informative. Thankfully, new scientific research may help researchers establish some strategies for making better data visualizations.

"Visualizing data effectively to convey information is a science unto itself with research-informed best and worst practices," explain Eric Hehman and Sally Y. Xie (McGill University) in a 2021 article in *Advances in Methods and Practices in Psychological Science*.

In their article, Hehman and Xie distill best practices for data visualization, discuss guiding design philosophies, demonstrate how these philosophies apply to visualizing common types of results, and provide R code and example data sets (available at osf.io/kx4us) to help users create their own data visualizations.

**Guiding principles**

Focused on how rather than what to visualize, Hehman and Xie summarize two guiding philosophies that can help researchers design better data visualizations. Although the two philosophies might appear contradictory, understanding both can lead to a better understanding of how to create figures:

- **Information richness.** Although any visualization is a simplification of data, including fine-grained details can better convey important patterns within data and avoid masking meaningful variation. For example, error bars allow viewers to understand variability around means, and individual data points can expose outliers. However, too much richness can overwhelm audiences, ultimately undermining the goal of conveying information clearly.

- **Minimalism.** Minimize visual clutter that might interfere with the information you most want to convey. Remove image elements that convey no information or prevent readers from assessing information. For example, shadows under text, needless 3D effects, and excessive gridlines can create visual noise whose removal would increase a visualization’s clarity.

**Using color**

Choosing a color palette for a data visualization is more than a matter of taste. One key concern has to do with inclusivity: 5% of humans have some form of color blindness—most commonly an inability to distinguish between shades of red and green. Another concern is choosing colors that are distinguishable both on-screen and when printed in gray scale.

The type of data and variables depicted should also influence color choices. When data are categorical, maximally differentiable colors are ideal. For continuous data, to prevent color gradients from biasing readers, ensure that the differences in colors consistently map to differences in the values they represent (i.e., the colors should change to the same degree as the values). To aid in these decisions, Hehman and Xie suggest using tools such as ColorBrewer (Brewer...
et al., 2003), available at colorbrewer2.org, and the R packages viridis (Garnier et al., 2018), colorspace (Zeileis et al., 2019), and scico (Crameri, 2018).

Visualizing common results
Generally, visualizations are most effective when they highlight your specific hypotheses or goals. Hehman and Xie discuss best practices for designing some of the most common visualizations and provide examples and code for creating the corresponding plots, mainly using the package ggplot2 for R.

Central tendency measures, such as the mean or median: The mean is one of the most commonly depicted measures, usually represented using bar plots. Adding error bars representing variation around means improves the visualization of means and averages. Medians are usually depicted using box plots. Adding the actual observed data points and their distribution can increase information richness. The authors suggest using raincloud plots or cluster heat maps, which provide more information than traditional bar plots and box plots.

Proportions and frequencies: Pie charts and other circular visualizations are traditionally used to depict proportions. Hehman and Xie suggest instead using bar plots, which facilitate comparisons of proportions between categories; stacked bar plots, which facilitate comparisons both between and within categories; and line plots, which are ideal for depicting frequencies in variables over time.

Relationships between variables, such as correlations or regression slopes: Hehman and Xie believe these are the data for which scientists have already adopted best visualization practices. Nevertheless, they suggest enhancing a traditional plot with information about the relationship’s central tendency, the variance around that relationship, and the distribution of data. For these purposes, Hehman and Xie recommend using improved scatterplots (which add features of histograms or density plots), contour plots (essentially, a scatterplot into a heat or topographical map in which each color represents a density of observations—ideal for showing many data points), and spaghetti plots (for modeling relationships in clustered data in multilevel frameworks).

“Visualizing data effectively to convey information is a science unto itself with research-informed best and worst practices.”
—Eric Hehman and Sally Y. Xie

References

Figure 4. Examples of an improved scatterplot, including histograms and a 95% confidence band of the slope; a contour plot, including probability density functions; and a spaghetti plot, including the grand intercept and slope across all participants. Reprinted from Hehman and Xie (2021), Figures 10, 11, and 12. CC BY-NC.
TEACHING THE TRUTH ABOUT AGING

By Beth Morling


Browse the “humorous” section of the birthday card aisle and you’ll see many stereotypes about what it means to get old. Older people are comically depicted as being wrinkled, hobbled, and baffled by technology. Outside the card aisle, they are stereotyped as lonely, idle, and cognitively impaired.

APS Fellow Laura Carstensen and Hal Hershfield take on those stereotypes. Older people are not the lonely, bewildered people they are stereotyped to be (see table). And when public health and marketing messaging is based on such stereotypes, it’s not likely to motivate people. Grounded in socioemotional selectivity theory (SST), Carstensen and Hershfield argue that public health and consumer messages should focus not on older people’s chronological age but instead on how long they perceive their futures to be.

SST begins with the observation that humans are uniquely aware of their own mortality, and they estimate how much time they have left to be alive. A typical young adult perceives that they’ll live for decades. They’re motivated to try, explore, and learn new things. As people age, however, their remaining time shrinks and they adjust their goals. They’re less likely to expand their horizons and more likely to prioritize emotionally positive and meaningful experiences.

Multiple studies support the “time left” theory of aging: People (of any age) who perceive that they have less time left to live report more positive emotions. Rather than being confused and melancholy, they feel more appreciative, happy, and joyful (Carstensen et al., 2020). As the suggested activity illustrates, whereas younger people prefer to pursue novelty (e.g., talking to a new acquaintance), older people prefer emotionally gratifying and personally meaningful activities (e.g., spending time with friends and family). Older people want to savor life.

People’s perceptions of their future years, not their chronological age, affect whether they find public health and marketing messaging motivating. Older people prefer an advertisement that emphasizes positive emotions and experiences, such as the “joyous celebrations” and “smooth velvety flavor” of coffee, whereas younger people prefer ads highlighting the “excellent value” of coffee with “no bitter aftertaste.” Manipulating an ad’s time frame can eliminate these age differences. Adding the tagline “Life is short” reduces the time horizon and motivates a preference for positivity; adding “Life is long” stretches it out and motivates a preference for the practical (Williams & Drolet, 2005).

As this segment of our population grows, it has never been more important to learn how to motivate behavior in this age group.

See the complete reference list for this article at psychologicalscience.org/tag/teaching-current-directions.

<table>
<thead>
<tr>
<th>Stereotype of older people</th>
<th>Contradictory evidence</th>
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<tr>
<td>Lonely</td>
<td>On average, older people are less lonely than younger people (Nguyen et al., 2020).</td>
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<tr>
<td>Subject to more negative emotions</td>
<td>Older people experience fewer negative emotions than do younger people (Carstensen et al., 2011), even during the pandemic (Carstensen et al., 2020).</td>
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<tr>
<td>Financially poor</td>
<td>Older people have accumulated more wealth than younger generations (though one-third of U.S. seniors are financially insecure; Cubanski et al., 2018).</td>
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<tr>
<td>Severely cognitively impaired, with disabling memory deficits</td>
<td>Older Americans are increasingly well educated; some cognitive functions improve with age; and the incidence of dementia is going down (Langa, 2017).</td>
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<tr>
<td>Oriented toward limited goals in line with age-related declines</td>
<td>Older people’s goals are adapted to how long they perceive they have left—their future time horizon (Carstensen, 2006).</td>
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STUDENT ACTIVITY: 
TEACHING SOCIOEMOTIONAL SELECTIVITY THEORY (SST)

Almost all undergraduates have older people in their lives, so they’ll be eager to discuss the stereotypes around aging.

Critiquing media
Start the discussion by asking students to watch this advertisement for Jitterbug phones: youtube.com/watch?v=Kmp5dgzeZuk. As students nominate stereotypes depicted in the ad, you could present the data contradicting those stereotypes (from the table).

Manipulating time horizon
Continue the discussion by having students engage in a within-subjects version of a classic SST experiment (Fung & Carstensen, 2006). First tell students the following:

You have 30 minutes free to spend time with one of the following people:
(a) the author of a book you just read
(b) a recent acquaintance with whom you have much in common
(c) a close friend or member of your family

(Among traditional-age undergraduates, you’ll likely see an equal distribution among these three choices. In contrast, older people show a preference for Option c—the emotionally meaningful choice.)

Next, tell students the following:

You are moving across country alone. In the middle of packing, you find yourself with 30 minutes free to spend time with someone.

Given the same three options, you should find (as researchers have) that younger people now tend to prefer Option c. Carstensen reports that this exercise helps students understand older people better.

Using SST to predict messaging success
As an application exercise, ask students to make SST-based predictions about which messages are likely to be effective among older adults.

1. Which intervention will get older people to start walking more (as measured by a pedometer)?
   (a) “Walking has many benefits for people of all ages. It helps preserve flexibility and improves posture. Walking can reduce anxiety and tension.”
   (b) “Not walking enough has many dangers for people of all ages. You can lose flexibility and your posture may deteriorate. Not walking enough can increase anxiety and tension.”

2. Which camera advertisement caption would be more successful among older adults?
   (a) “Capture those special moments.”
   (b) “Capture the unexplored world.”

Each pair of examples was tested in experiments with older adults (by Notthoff & Carstensen, 2014, and Fung & Carstensen, 2003, respectively). In both cases, the positive option (a) was more effective.

Students can also watch Carstensen’s 10-minute TEDx Talk, Older People Are Happier.

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 previous columns, classroom activities, and demonstrations: psychologicalscience.org/publications/teaching-current-directions.
Collective threat is a part of life. Over the past 10,000 years, the world has witnessed pandemics, wars, the rise and fall of various world powers, genocides, and dramatic climate change. But these threats were unequally distributed across countries. Some countries have experienced a constant deluge of threats, barely getting a chance to recover before the next scourge. Other places have existed with few threats. How might a country’s history of chronic threat impact its tightness—strict adherence to norms, with severe punishments for rule breakers—and looseness—lax adherence to norms and weak punishments for scofflaws (Gelfand, 2018)? And how might a culture’s tightness or looseness predict its responses to the COVID-19 pandemic?

APS Fellow Michelle Gelfand (2021) offers a cultural evolutionary answer to these questions. According to Gelfand, countries that frequently experience collective threats develop adaptations that help them identify threats and strategies for coping with them. Over many generations, these countries become tighter, emphasizing the importance of following strict norms. Regardless of their size, tight countries, such as China and South Korea, become nimble problem-solvers in the face of collective threat because their citizens follow strict norms meant to aid their survival and reproduction.

Looser countries, such as the United States and Brazil, have far less practice dealing with collective threats. As a result, Gelfand argues, loose countries experience an evolutionary mismatch when faced with a threat like the COVID-19 pandemic. Leaders and citizens in these countries underreacted when they should have overreacted, such as when then-President Donald Trump said of COVID-19 on March 10, 2021, “Stay calm. It will go away.” In other cases, governing bodies in loose countries overreacted when they should have underreacted, such as by closing schools despite little evidence of young children catching, transmitting, or dying from COVID-19 (Leonhardt, 2021).

Teaching students about cultural tightness and looseness will help them understand how cultural differences evolved. Such cross-cultural differences can have life-and-death consequences when countries face a global pandemic.

References
STUDENT ACTIVITY: HOW TIGHT OR LOOSE IS YOUR CULTURE?

Ask students to complete the cultural tightness–looseness scale (Gelfand et al., 2011).

Instructions: The following statements refer to a country as a whole. Please indicate whether you agree or disagree with the following statements about your country using the following scale. (Note that the statements sometimes refer to "social norms," which are standards for behavior that are generally unwritten.)

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1. ____ There are many social norms that people are supposed to abide by in this country.
2. ____ In this country, there are very clear expectations for how people should act in most situations.
3. ____ People agree upon what behaviors are appropriate versus inappropriate in most situations in this country.
4. ____ People in this country have a great deal of freedom in deciding how they want to behave in most situations.
5. ____ In this country, if someone acts in an inappropriate way, others will strongly disapprove.
6. ____ People in this country almost always comply with social norms.

Next, students will score their responses. Reverse-score Item 4 (i.e., subtract the rating from 7) and then average your responses to all six items. Instructors can explain that students completed the cultural tightness–looseness scale. Cultural tightness describes countries that have strict norms and severe punishments for people who break them. Cultural looseness refers to countries with lenient norms and less severe punishments for infractions. Higher scores on the scale indicate more cultural tightness.

Ask students to discuss their responses with a partner. How tight or loose do they perceive their country to be? Compared with other countries, do students believe their country's tightness is above average, below average, or average? Why? Provide students with examples of countries whose tightness scores are above average (China, Pakistan, South Korea), below average (the United States, Brazil, Venezuela), and average (Iceland, France, Germany; Gelfand et al., 2011).

The next part of the student partner discussion focuses on how cultural tightness and looseness may predict responses to the COVID-19 pandemic. Tell students that culturally tight places often have a vast history of experiencing and responding to chronic collective threats, such as war and disease (Gelfand, 2021). How might their own country's tightness levels predict behavior during the initial stages of the pandemic (complying with lockdown requirements, mask mandates) and today (vaccination rates, travel restrictions, attitudes toward vaccine mandates for students and workers)? How might their country's tightness levels predict the number of COVID-19 deaths?

Finally, instructors can display the results of a multinational study showing that greater cultural tightness predicted fewer COVID-19 deaths (Gelfand et al., 2021, Figure 1). Compared with people in the most culturally tight countries, those in countries with the highest levels of cultural looseness were more than 8 times as likely to die from COVID-19. This broad difference between tight and loose countries makes sense, considering tight countries' extensive history of coping with various threats.
Jolynn Pek is an associate professor of quantitative psychology at The Ohio State University. Her research interests are motivated by quantifying uncertainty inherent in results obtained from fitting models to data, especially latent variable models.

**JOLYNN PEK ON QUANTIFYING UNCERTAINTY**

Jolynn Pek is an associate professor of quantitative psychology at The Ohio State University. Through her research, Pek analyzes sources of uncertainty in statistical results and develops new approaches to practicing replicable psychological science.

**Landing the job**

Very many people opened doors for me to be here at The Ohio State University (OSU). When I did my undergraduate degree at the National University of Singapore (NUS), Fredrick T. Leong spent a sabbatical semester there in my 3rd year. I worked on a research project with him that ended in a publication and later completed my honors thesis under the direction of Dr. Weining Chang. This work was focused on traditional and modern Chinese values related to self-identity.

Fred recommended that I work with George Bishop, with whom I did my master’s of applied psychology at NUS. George later spent a sabbatical at Duke University and made it possible for me to be a visiting scholar with the support of Redford Williams at Duke’s Behavioral Medicine Research Center.

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**Jolynn Pek Spotlight**

- **Current role:** Associate professor of quantitative psychology at The Ohio State University, 2021–present
- **Previously:** Assistant professor of quantitative psychology at The Ohio State University, 2017–2021
- **Previously:** Assistant professor of quantitative methods at York University, 2012–2017
- **Terminal degree:** PhD in quantitative psychology from the University of North Carolina at Chapel Hill, 2012
- **Recognized as an APS Rising Star in 2017**
My research examined the effect of emotions to ambulatory cardiovascular functioning, involving intensive longitudinal data, which introduced me to advanced quantitative methods. At Duke, I introduced myself to Rick Hoyle because of his work in structural equation modeling and managed to sit in on graduate courses on data analysis and social psychology. Rick also accompanied me to the University of North Carolina at Chapel Hill (UNC), which was in the next small city, to consult experts at the Odum Institute for Research in Social Science about analyzing my master’s data.

While I was exploring what UNC had to offer, I somehow crossed paths with Kristopher Preacher to puzzle through a problem involving statistical mediation. Kris was a postdoc at the time, and after chatting with me about my interests, he recommended that I speak with Bud MacCallum, director of the L. L. Thurstone Psychometric Lab. I met with Bud, was convinced to apply to the graduate program in quantitative psychology, became his student, and the rest is history.

**Modeling methods**

At the time I became an APS Rising Star, I was moving away from the highly technical work I did for my dissertation on profile likelihood estimation in structural equation modeling and structural equation finite mixture models. Instead, I was drawn to moving methods into practice. This move was motivated by my experience teaching graduate-level quantitative methods. It became clear that future scientists should be equipped with modern methods to conduct better research and that the responsibility for building that bridge rests on quantitative psychologists like myself. To that end, I wrote several papers intended to demonstrate current methodological best practices. One paper emphasized the many ways to report effect sizes; another paper focused on conceptual considerations underlying mediation analysis. I also wrote several papers with Augustine Wong, a statistician, on how to deal with non-normal data from a linear modeling framework.

My focus on bringing methods into practice was also motivated by concerns about the replicability of psychological results. Discussions on how to improve psychological science touched on power analysis, which is a highly abstract topic. My research at OSU, which marks the time right when I become an APS Rising Star, is centered on how to improve power analysis to better reflect complex realities researchers face when conducting a study. Complexities tend to increase uncertainty, and my technical work provided a way to formally incorporate uncertainties in power analysis to obtain calculations that better reflect reality. In collaboration with my non-methods colleagues, especially Duane Wegener, we have started to examine the extent to which power is useful for evaluating research.

**Competing ideas**

The work we do as intellectual athletes is highly demanding. We put our best ideas out to compete with other ideas. For these ideas to be refined and evolve, they are challenged, questioned, dismissed, and modified. One needs to fully believe in an idea for it to be eventually communicated to others. The route from an idea to a published work and eventual discussion is typically off the beaten path. There will be cycles of failures and successes accompanied by self-doubt and then confidence. This tension is important for developing an eventual robust idea. Stay the course, because doors will open in the form of support from colleagues, mentors, and students. The journey never ceases to be a dramatic adventure, so make sure to have fun along the way.

**Everyday outliers**

The best part of my job is working with brilliant students and colleagues to puzzle through worthwhile problems. The biggest challenge is having to wear different hats at the same time. ●
FIRST PERSON: STUDENT NOTEBOOK

EXPRESS YOURSELF: EMOTION PROCESSING IN BILINGUALS

By Mónica C. Acevedo-Molina

Picture this: You are bilingual, and you are having a heated discussion with your partner. You are angry and frustrated. You have so much to say, but to convey your feelings truly, you have to speak in your native language. There’s just one problem: Your partner does not speak that language. This scenario exemplifies a common occurrence reported by bilingual speakers in which emotions are experienced with greater intensity in their native language. Research suggests that emotion processing in a second language provides greater emotional distance than the native language (Pavlenko, 2012). Yet a closer look at the literature shows the complexity of this claim.

The link between language and emotion processing
There is no doubt that language plays a vital role in emotion processing. Emotional terms are language specific in meaning and reflect the culture from which they arise. For instance, in the book *How Emotions Are Made* (2017), APS Past-President Lisa Feldman Barrett talks about the myth of universal emotions. She gives the example of ancient Romans, who did not smile to show happiness—there is no word for "smile" in Latin. The “basic” emotions are not universally conceptualized as we know them. Culture and language have significant implications for how we think about emotional words, and we associate them with particular emotions.

Language and culture
The relationship between language and culture plays a vital role in what word is used to express a particular emotion. For instance, let’s say you are in a relationship and you want to make sure the other person knows you care about them, but you are not quite ready to say “I love you.” In Spanish, you can say “te quiero.” With this phrase, you are not saying you love them, and you’re not saying you just like them—it’s an in-between sentiment. And there is no analogous way to express it in English.

There are many examples like this one because Spanish is rich in words that express emotions. Why? Some have argued that cultures where Spanish is the predominant language are collectivistic cultures that value group responsibility, harmony, and activities. Indeed, Spanish is considered to have an abundant emotional lexicon, which is thought to promote emotion processing (Llabre, 2021). By comparison, English can be perceived as cold and unemotional. Cultures where English is the predominant language tend to be individualistic, emphasizing independence over collectivistic values. One could argue that this leads to less need for words or concepts associated with connection, affection, and emotions.

Affective processing in bilingual speakers
So far, this discussion has focused on how language and emotion relate for speakers of one language. But how do language and emotion connect when an individual is bilingual? Learning another language means coming to live with significantly different conceptual and emotional words. For instance, research
Spanish is rich in words that express emotions. Why? Some have argued that societies where Spanish is the predominant language are considered collectivistic. Values in these societies tend to center around family and group responsibility, harmony, and activities.

It has been shown that bilingual speakers rate advertising slogans as more emotional and have better recall for emotional words when information is presented in their native language (for a detailed review of these studies, see Dewaele, 2010; Pavlenko, 2005). Moreover, multiple factors—such as the age of acquisition of the second language and language proficiency—influence emotion processing. One fascinating phenomenon is how bilingual individuals report their emotions more intensely when experienced in their first rather than in their second language.

Although there seems to be some evidence for different emotions being more readily expressed in one language than another, evidence suggests that emotional intensity is comparable across languages. For instance, Ferré and colleagues (2010) examined if there were differences in the emotional intensity of first-language (Spanish) and second-language (Catalan or English) words among early and late bilinguals. In addition to examining the age of second-language acquisition, the researchers examined how language dominance, the similarity between languages, and the context in which they were learned influenced the emotional intensity of words. The authors found that the examined variables did not have any effect on memory for emotional words. Also, at least among proficient bilinguals and in the context of memory tasks, words seemed to have the same emotional intensity in the speakers’ first and second language. The authors argued that their data support the “bilingual interactive activation” model, which theorizes that when a word is presented to a bilingual, its semantic representation is activated regardless of the language of presentation.

Conclusions and future directions
A closer look at the link between emotion and language in the context of bilingualism presents a complex picture. Whether bilinguals experience emotion more intensely in their native rather than their second language appears to be a complicated question—and a tricky question requires a complex answer. Future studies should investigate how the physiological aspects of emotion influence emotion when using different languages. Studies that focus on the relationship between emotion and memory in bilingualism may also provide insight into the topic.

More than a century ago, Freud (1893) reported differences in how bilingual speakers emotionally react in different languages. Although research on this topic has advanced, there is still much more to find out, and it seems like we will be asking these questions for many years to come.

References
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IT’S A CONSPIRACY!

APS Fellow Karen Douglas is a professor of social psychology at the University of Kent. She studies the psychology of conspiracy theories, examining why they appeal to so many people and their consequences for individuals, groups, and society.

Karen Douglas
University of Kent

What drew you to the psychology of conspiracy theories?
Conspiracy theories are fascinating. They propose elaborate and intriguing explanations for events when official explanations can seem quite mundane. Over the course of history, conspiracy theories have been closely linked to prejudice, rejection of mainstream medicine and science, revolutions, terrorism, witch hunts, and genocide. I wanted to understand why they are appealing to so many people.

Your research shows that people are drawn to conspiracy theories to meet unsatisfied needs that are epistemic, existential, or social. Yet we know that conspiracy beliefs do not fulfill these needs. What can help to change these deeply held beliefs?
Instead of satisfying unmet psychological needs for knowledge, safety, and belonging, conspiracy theories appear to frustrate them even further. However, people can become very attached to conspiracy theories, and it can be difficult to change such deeply entrenched beliefs. It can therefore be better to stop conspiracy theories from taking root in the first place rather than trying to refute them once people already believe them. “Inoculating” people against conspiracy theories and other types of misinformation such as fake news can restrict their influence on people’s attitudes and behaviors. Ultimately, however, dealing with the reasons why people believe in conspiracy theories in the first place is crucial. Addressing people’s vulnerabilities and frustrated needs could make them think twice about turning to conspiracy theories when a crisis hits.

Even before COVID-19 vaccines were developed, conspiracy theories about them had taken hold in many countries. What accounts for the global speed of this spread? Vaccinations have always been accompanied by conspiracy theories. In this case, people wanted to know if there would be microchips in the vaccines, or even if COVID-19 was all a ploy to introduce mandatory vaccination. The ease of sharing information on social media no doubt fueled the global spread of conspiracy theories like these, especially among people who might have already believed in other vaccination conspiracy theories, or conspiracy theories in general. Have we reached “peak conspiracy”?

Many people argue that we are experiencing an “infodemic” worse than anything we have encountered before, but we have no idea what events might be around the corner. This is why it is so important to understand the predictors and consequences of believing in conspiracy theories.

You do a lot of interviews with mainstream media. Why is this important?
Psychological scientists are uniquely placed to contribute knowledge on a wide variety of topics. I think we have a responsibility to disseminate our research as widely as possible so that everyone can benefit and so that people listen to, and trust, scientists rather than turning to conspiracy theories and misinformation.

Are there any areas of future research you want to share?
I am about to embark on a 5-year project funded by the European Research Council. In this project, I will be investigating the consequences of conspiracy theories, specifically focusing on the political, health, and environmental consequences of conspiracy theorizing. I will also be examining the consequences of conspiracy theories for the people who spread them—in other words, what do people gain and lose from sharing conspiracy theories with others? I am very excited to begin this project, which I hope will contribute important knowledge to this growing topic of research in psychological science.

See a longer version of this interview on psychologicalscience.org with links to Douglas’s interview in the Under the Cortex podcast and her 2017 article on the psychology of conspiracy theories.
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