

SCIENTIFIC AMERICAN **MIND**

Stress Survival Guide

Tactics that everyone can easily use to control their response to intense life circumstances

PLUS

**NEUROLOGICAL
DIFFERENCES
BETWEEN
CONSERVATIVES
AND LIBERALS**

**PSYCHIATRIC
MEDS AT A
DEAD END?**

**A HISTORY
OF SCIENCE
DENIALISM**

WITH COVERAGE FROM
nature

FROM
THE
EDITOR



LIZ TORMES

SCIENTIFIC
AMERICAN
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Calm Yourself

If you've ever watched late-night TV, you've likely seen unfortunate advertisements for diet pills that claim to rid you of belly fat that arose from high levels of the stress hormone cortisol in the body. The pills are bunk, but the relation between cortisol levels in the body and chronic stress are real. Stress response is a vital evolutionary adaptation that allows us to run from predators or catch a train. Even if we haven't been doing either in 2020, stress levels are still running high—blame the TV again. And the pandemic.

Chronic high stress levels mean constant inflammation and lead to illness and burnout. It turns out that we have the power to decrease the physiological stress response by manipulating two bodily systems on the frontlines of stress detection: the breath and our eyes. In this edition's cover story, neuroscientist Andrew Huberman gives simple but powerful tips for how to get a handle on your body's stress response immediately (see "[Secrets to Surviving Stressful Times](#)"). I can't guarantee that the rest of the articles in this issue won't get your heart pounding in anger or fear, but at least you will have the tools to relax.

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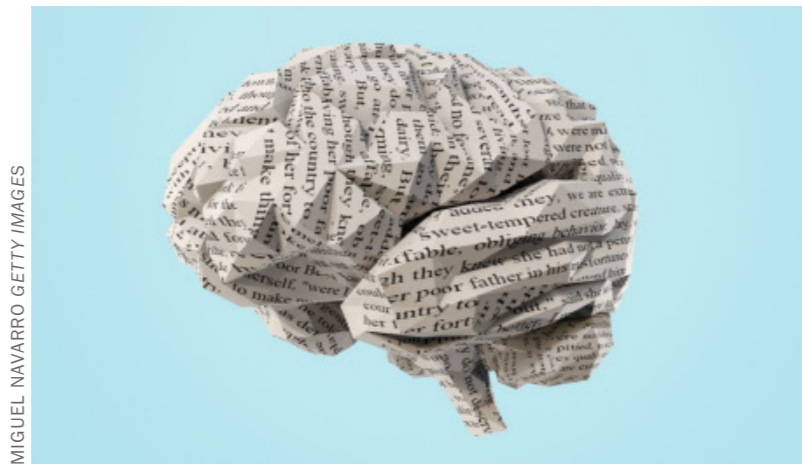
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Media Multitasking Disrupts Memory, Even in Young Adults

Simultaneous TV, texting and Instagram lead to memory-sapping attention lapses

The bulky, modern human brain evolved hundreds of thousands of years ago and, for the most part, has remained largely unchanged. That is, it is innately tuned to analog information—to focus on the hunt at hand or perhaps the forage for wild plants. Yet we now pummel our ancient thinking organ with a daily deluge of digital information that many scientists believe may have enduring and worrisome effects.

A new study published in October in *Nature* supports the concern. The research suggests that “media multitasking”—or engaging with multiple forms of digital or screen-based media simultaneously, whether they are television, texting or Instagram—may impair attention in young adults, worsening their



ability to later recall specific situations or experiences.

The authors of the new paper used electroencephalography—a technique that measures brain activity—and eye tracking to assess attention in 80 young adults between the ages of 18 and 26. The study participants were first presented with images of objects on a computer screen and asked to classify the pleasantness or size of each one. After a 10-minute break, the subjects were then shown

additional objects and asked whether they were already classified or new. By analyzing these individuals’ brain and eye responses as they were tasked with remembering, the researchers could identify the number of lapses in their attention. These findings were then compared to the results of a questionnaire the participants were asked to fill out that quantified everyday attention, mind wandering and media multitasking.

Higher reported media multitasking

correlated with a tendency toward attentional lapses and decreased pupil diameter, a known marker of reduced attention. And attention gaps just prior to remembering were linked with forgetting the earlier images and reduced brain-signal patterns known to be associated with episodic memory—the recall of particular events.

Previous work had shown a connection between media multitasking and poorer episodic memory. The new findings offer clues as to why

this might be the case. “We found evidence that one’s ability to sustain attention helps to explain the relationship between heavier media multitasking and worse memory,” says the paper’s lead author Kevin Madore, a postdoctoral fellow in the department of psychology at Stanford University. “Individuals who are heavier media multitaskers may also show worse memory because they have lower sustained attention ability.”

“This is an impressive study,” comments Daphne Bavelier, a professor of psychology at the University of Geneva in Switzerland, who was not involved in the new research. “The work is important as it identifies a source of interindividual variability when one is cued to remember information”—the differences in attention among the study participants. “These findings are novel and tell us something important about the relationship between attention and memory, and their link to everyday behavior ..., [something] we did not know before,” adds Harvard University psychologist Daniel L. Schacter, who was also not involved in the study.

Madore points out that the new findings are, for now, correlational. They do not indicate if media multi-

tasking leads to impaired attention or if people with worse attention and memory are just more prone to digital distractions. They also do not necessarily implicate any specific media source as detrimental to the brain. As work by Bavelier found, action video games in particular harbor plenty of potential for improving brain function.

But Madore and his colleagues, including senior author of the paper and Stanford psychologist Anthony D. Wagner, hope to clarify these unknowns in future studies. They also hope to pursue attention-training interventions that could help improve attention and memory in people prone to distraction.

With winter looming and the COVID-19 pandemic keeping us indoors, Madore feels the new study stresses the need to be mindful of how we engage with media. “I think our data point to the importance of being consciously aware of attentiveness,” he says, whether that awareness means resisting media multitasking during school lectures or work Zoom sessions or making sure not to idly flip through your Facebook feed while half watching the new *Borat* movie. —Bret Stetka

We Learn Faster When We Aren’t Told What Choices to Make

The way we decide may even give insight into delusional thinking

In a perfect world, we would learn from success and failure alike. Both hold instructive lessons and provide needed reality checks that may safeguard our decisions from bad information or biased advice.

But, alas, our brain doesn’t work this way. Unlike an impartial outcome-weighting machine an engineer might design, it learns more from some experiences than others. A few of these biases may already sound familiar: A positivity bias causes us to weigh rewards more heavily than punishments. And a confirmation bias makes us take to heart outcomes that confirm what we thought was true to begin with but discount those that show we were wrong. A new study, however, peels away these biases to find a role for choice at their core.

A bias related to the choices we make explains all the others, says

Stefano Palminteri of the French National Institute for Health and Medical Research (INSERM), who conducted a study published in *Nature Human Behaviour* in August that examines this tendency. “In a sense we have been perfecting our understanding of this bias,” he says.

Using disarmingly simple tasks, Palminteri’s team found choice had a clear influence on decision-making. Participants in the study observed two symbols on a screen and then selected one with the press of a key to learn, through trial and error, which image gave the most points. At the end of the experiment, the subjects cashed in their points for money. By careful design, the results ruled out competing interpretations. For example, when freely choosing between the two options, people learned more quickly from the symbols associated with greater reward than those associated with punishment, which removed points. Though that finding resembled a positivity bias, this interpretation was ruled out by trials that demonstrated participants could also learn from negative outcomes. In trials that showed the outcomes for both symbols after a choice was made, subjects learned

more from their chosen symbol when it gave a higher reward and when the unchosen one would deduct a point. That is, in this free-choice situation, they learned well from obtained gains and avoided losses.

That result looked like a confirmation bias, with people embracing outcomes—positive or negative—that confirmed they were right. But there was more to it. The experiments also included “forced choice” trials in which the computer told participants which option to select. Here, though the subjects still pressed keys to make the instructed choices, confirmation bias disappeared, with both positive and negative outcomes weighted equally during learning.

This impartiality might seem optimal, yet the learning rates were slower in the forced-choice situation than they were in the free-choice one. It is as though the participants were less invested in the outcomes—showing ambivalence about learning from them somewhat like a child woodenly practicing their scales on the piano to please a parent.

Because the confirmation bias arose only during the free-choice situations, the authors dubbed it “choice-confirmation bias.” The



tendency persisted in both poor and rich conditions, when rewards were scant or abundant. “Our human subjects were not capable of adjusting the bias as a function of the environment,” Palminteri says. “It seems to be hardwired.”

This observation means the brain is primed to learn with a bias that is pegged to our freely chosen actions. Choice tips the balance of learning: for the same action and outcome,

the brain learns differently and more quickly from free choices than forced ones. This skew may seem like a cognitive flaw, but in computer models, Palminteri’s team found that choice-confirmation bias offered an advantage: it produced stabler learning over a wide range of simulated conditions than unbiased learning did. So even if this tendency occasionally results in bad decisions or beliefs, in the long run, choice-con-

firmation bias may sensitize the brain to learn from the outcomes of chosen actions—which likely represent what is most important to a given person.

“The paper shows that this bias isn’t necessarily irrational but actually a useful mechanism for teaching us about the world,” says Philip Corlett of Yale University, who was not involved in the study. He studies the origins of delusional thinking and agrees that an individual’s perception of control in a situation can shift their interpretation of the events around them. “Feeling as though you are the architect of the outcomes you experience is powerful and certainly would lead you to strengthen beliefs about those contingencies much more strongly,” he says.

The role for choice found here suggests that our sense of control in a situation influences how we learn—or do not learn—from our experiences. This insight could also help explain delusional thinking, in which false beliefs remain impenetrable to contrary evidence. An outsize feeling of control may contribute to an unflagging adherence to an erroneous belief.

Delusions can be a hallmark of psychosis, in which they may involve

extreme beliefs about alien abduction or being a god. Milder delusion-like thinking also touches otherwise healthy people, such as a sports fan with a superstition about wearing a lucky shirt to ensure a team's win. More harmfully, the current coronavirus pandemic has wrought some delusions of its own, such as one that holds that mask wearing causes sickness.

So a false belief remains fixed, and any outcomes that contradict it are not accepted by the brain. If choice is the point of reference that governs our learning style (with or without confirmation bias), then maybe something about choice or an inflated sense of control pushes people toward delusions. Perhaps individuals with delusions are choosing to have particular experiences to support a false belief and choosing to interpret information in a way that supports that belief. This possibility has not been tested. Questions for future research to answer, however, would be how beliefs are updated in a person with delusions and whether this process differs when choices are forced or made freely. To help individuals with delusions, the current findings

suggest, it may be more effective to examine their sense of control and choices than to try to convince them with contradictory evidence—which, over and over, has not been shown to work.

Another question raised by this research is: What might influence a person's sense of control? It may be an inherent feature of an individual's personality. Or it could be more pliable, as suggested by a recent study of people in the military in Belgium published in *Nature Communications*. The paper reported a greater sense of control among senior cadets, who are further along in their officer training and give orders, compared to privates, who obey them. The latter individuals' sense of control, also called agency, was equally diminished in both free-choice and forced-choice situations. "They don't experience

“Feeling as though you are the architect of the outcomes you experience is powerful and certainly would lead you to strengthen beliefs about those contingencies much more strongly.”

—*Philip Corlett*

agency, even when they're free to choose what to do, which should not be the case," says study leader Emilie Caspar of the Free University of Brussels (ULB).

Whether a diluted feeling of control affected those subjects' learning was not studied, and current work is examining whether this mindset follows participants beyond a military setting. But if a person's sense of control influences the strength of their choice-confirmation bias, it is interesting to consider the impact of 2020—a year battered by the pandemic and economic and political uncertainty—on an individual's cognition.

"There's this general sense that the rules don't apply anymore, and that is really unmooring for people and can lead to unpredictable, irrational behavior," says Corlett, who recently conducted a not yet pub-

lished preprint study that tracked changing levels of paranoia before and during the the global spread of COVID-19.

It's not clear whether the new-found choice-confirmation bias could inform public health messaging during a pandemic. For example, maybe voluntary mask wearing should be encouraged and coupled with rewards for choosing to put on a face covering and occasional punishments for not doing so.

Palminteri says it is hard to extrapolate from his experiments to the messy, complicated and somewhat removed contingencies of mask wearing. But the stark bottom line is that biased thinking runs deep in the human psyche. "Even when the stakes are so high, you may think humans would behave rationally," he says. "But that's far from clear." —*Michele Solis*

AI Assesses Alzheimer's Risk by Analyzing Word Usage

New models used writing samples to predict the onset of the disease with 70 percent accuracy

Artificial intelligence could soon help screen for Alzheimer's disease by analyzing writing. A team from IBM and Pfizer says it has trained AI models to spot early signs of the notoriously stealthy illness by looking at linguistic patterns in word usage.

Other researchers have already trained various models to look for signs of cognitive impairments, including Alzheimer's, by using different types of data, such as brain scans and clinical test results. But the latest work stands out because it used historical information from the multigenerational Framingham Heart Study, which has been tracking the health of more than 14,000 people from three generations since 1948. If the new models' ability to pick up trends in such data holds up in forward-looking studies of bigger

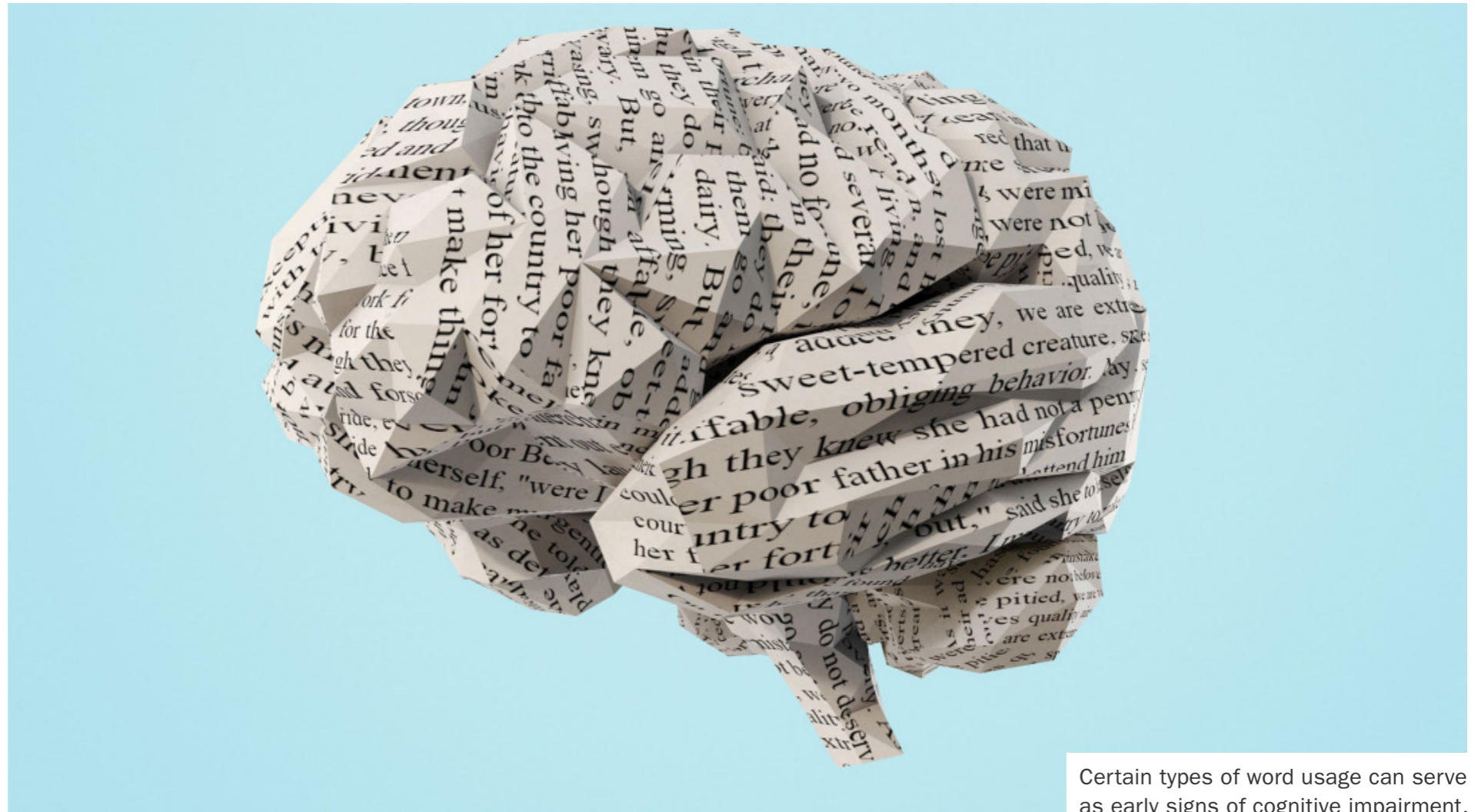
and more diverse populations, researchers say they could predict the development of Alzheimer's a number of years before symptoms become severe enough for typical diagnostic methods to pick up. And such a screening tool would not require invasive tests or scans. The results of the Pfizer-funded and

IBM-run study were published in October in *EClinicalMedicine*.

The new AI models provide "an augmentation to expert practitioners in how you would see some subtle changes earlier in time, before the clinical diagnosis has been achieved," says Ajay Royyuru, vice president of health care and life sciences

research at IBM. "It might actually alert you to some changes that [indicate] you ought to then go do a more complete exam."

To train these models, the researchers used digital transcriptions of handwritten responses from Framingham Heart Study participants who were asked to describe a



Certain types of word usage can serve as early signs of cognitive impairment.

picture of a woman who is apparently preoccupied with washing dishes while two kids raid a cookie jar behind her back. These descriptions did not preserve the handwriting from the original responses, says Rhoda Au, director of neuropsychology at the Framingham study and a professor at Boston University. (Her team was responsible for transcribing data for the new paper but did not participate beyond that.) Yet even without the physical handwriting, IBM says its main AI model was able to detect linguistic features that are sometimes related to early signs of cognitive impairment. They include certain misspellings, repeated words and the use of simplified phrases rather than grammatically complex sentences. This evidence is in line with clinicians' understanding of how Alzheimer's disease can impact language, Royyuru says.

The main model achieved 70 percent accuracy in predicting which of the Framingham participants eventually developed dementia associated with Alzheimer's disease before the age of 85. This result was based on historical data rather than actually predicting future events, however—and there are other

caveats to the new paper as well.

The AI focused on the oldest group of Framingham study participants, who mostly represent a non-Hispanic white population. This limits how much the results can be generalized to more diverse communities in the U.S. and the rest of the world, Au notes. It also remains unclear how the AI would perform in larger populations: the *EClinicalMedicine* study's data set involved just 40 people who eventually developed dementia and 40 "controls" who did not, notes Jekaterina Novikova, director of machine learning at Winterlight Labs in Toronto. Novikova, who was not involved in the new study, also questions whether the performance of IBM's AI would change when predicting the onset of Alzheimer's at different points in time prior to diagnosis.

Still, she and Au praise the paper as a solid contribution to the field that might draw more attention and resources to AI detection of Alzheimer's. "What I like personally about the [study] is that it's one of the very few works that analyzes the big-scale, real-life data that was collected over a very long period of time," Novikova says.

The new models might have been more accurate if it could have incorporated handwriting, Au suggests. This ability could have provided additional clues, such as evidence of tiny tremors, switching between print and cursive, and very tiny letters. "There are a lot of ... features that [the researchers] did not account for, which, combined with linguistic features, would have probably created an even more predictive model," Au says. The IBM models also did not include data from spoken language. Using AI speech analysis to diagnose Alzheimer's is a growing area of research, and other systems have focused on detecting changes in audio samples. These contain clues such as speech pauses, which are not found in writing.

Whether written or spoken, language samples offer a relatively noninvasive source of information for monitoring people's cognitive health, compared with brain scans and other laboratory tests. Collecting such language data could be done cheaply and remotely—though doing so would still require strict informed consent and privacy safeguards for the individuals creating the samples, Royyuru says. This is especially true

because some people may not want to even know how likely they are to develop Alzheimer's disease—a condition that is currently irreversible.

Training models on spoken rather than written samples might prove more practical for achieving the broadest reach in the long run, given that writing requires literacy while speech does not. Novikova and her colleagues at Winterlight Labs have been focusing heavily on teaching AI to analyze the acoustic and linguistic characteristics in spoken words. And Au has been recording both speech and handwriting, using digital pens to capture the latter, for her research. IBM seems to be thinking along the same lines for its own future work.

"We are in the process of leveraging this technology to better understand diseases such as schizophrenia, [amyotrophic lateral sclerosis] and Parkinson's disease and are doing so in prospective studies [that] analyze spoken speech samples, given with consent from similar cognitive verbal tests," says Guillermo Cecchi, a co-author of the new study and a principal researcher for computational psychiatry and neuroimaging at IBM.

—Jeremy Hsu

Our Brain Is Better at Remembering Where to Find Brownies Than Cherry Tomatoes

Humans' spatial recall makes mental notes about the location of high-calorie foods

The human brain is hardwired to map our surroundings. This trait is called spatial memory—our ability to remember certain locations and where objects are in relation to one another. New findings published in October in *Scientific Reports* suggest that one major feature of our spatial recall is efficiently locating high-calorie, energy-rich food. The study's authors believe human spatial memory ensured that our hunter-gatherer ancestors could prioritize the location of reliable nutrition, giving them an evolutionary leg up.

In the study, researchers at Wageningen University & Research in the Netherlands observed 512 participants follow a fixed path through a room where either eight food sam-

ples or eight food-scented cotton pads were placed in different locations. When they arrived at a sample, the participants would taste the food or smell the cotton and rate how much they liked it. Four of the food samples were high-calorie, including brownies and potato chips, and the other four, including cherry tomatoes and apples, were low in calories—diet foods, you might call them.

After the taste test, the participants were asked to identify the location of each sample on a map of the room. They were nearly 30 percent more accurate at mapping the high-calorie samples versus the low-calorie ones, regardless of how much they liked those foods or odors. They were also 243 percent more accurate when presented with actual foods, as opposed to the food scents.

“Our main takeaway message is that human minds seem to be designed for efficiently locating high-calorie foods in our environment,” says Rachelle de Vries, a Ph.D. candidate in human nutrition and health at Wageningen University and lead author of the new paper. De Vries feels her team's findings support the idea that locating valuable caloric resources was an



important and regularly occurring problem for early humans weathering the climate shifts of the Pleistocene epoch. “Those with a better memory for where and when high-calorie food resources would be available were likely to have a survival—or fitness—advantage,” she explains.

“This looks like a nice piece of work,” says James Nairne, a cognitive psychology professor at Purdue University, who was not involved in the new research. “Memory evolved so that we can remember things that aid our survival or reproduction—hence, it's not surprising that we

remember fitness-relevant information particularly well, [including] high caloric content.”

We tend to think of primates such as ourselves as having lost the acute sense of smell seen in many other mammals in favor of sharp eyesight. And to a large degree, we humans have developed that way. But the new findings support the notion that our sniffer is not altogether terrible: “These results suggest that human minds continue to house a cognitive system optimized for energy-efficient foraging within erratic food habitats of the past and highlight the

often underestimated capabilities of the human olfactory sense,” the authors wrote.

One drawback of our spatial skills, as they relate to sustenance, is our modern taste for junk food. With a life span of not much more than 30—as was the case for humans until relatively recently—chronic diseases such as diabetes were not a concern for our ancestors. If you came across a rich grove of fruit trees, you consumed all the sugar you could to help ensure your survival. Now our taste for sweets and fats contributes to a global obesity epidemic and has us reaching for candy over kale. “In a way, our minds (and bodies) may be mismatched to our current ‘obesogenic’ food-rich circumstances,” de Vries says. “We have reason to suspect that the high-calorie spatial memory bias could stimulate people to choose high-calorie foods by making high-calorie options easier or more convenient to find and obtain.”

“We’re more likely to remember sweet things, which was a real plus for most of our evolutionary history,” Nairne adds. “But this is problematic in today’s world.... We’re still walking around with Stone Age brains.”

—Bret Stetka

Why Hatred and “Othering” of Political Foes Has Spiked to Extreme Levels

The new political polarization casts rivals as alien, unlikable and morally contemptible

In 1950 the American Political Science Association issued a report expressing concern that Americans exhibited an insufficient degree of political polarization. What a difference a new millennium makes. As we approached 2020’s Election Day, the U.S. political landscape had become a Grand Canyon separating blue and red Americans.

So why is this happening? In a review of studies published in October in the journal *Science*, 15 prominent researchers from across the country characterize a new type of polarization that has gripped the U.S. This phenomenon differs from the familiar divergence each party holds on policy issues related to the economy, foreign policy and the role of social safety nets. Instead it centers on members of one party holding a basic abhorrence for their opponents—an “othering” in



Donald Trump supporter argues with a Joe Biden supporter on the street outside Sacramento McClellan Airport as President Trump was being briefed on wildfires in a hangar in Sacramento, Calif., on September 14, 2020.

which a group conceives of its rivals as wholly alien in every way.

This toxic form of polarization has fundamentally altered political discourse, public civility and even the way politicians govern. It can be captured in Republicans’ admiration for Donald Trump’s ability to taunt and “dominate” liberals—distilled to the expression “own the libs.”

The *Science* paper addresses the rise of political sectarianism—the growing tendency of one political

group to view its opponents as morally repugnant. This level of political divisiveness on both sides creates a feedback loop of hatred and leaves the U.S. open to manipulation by foreign powers that wish to further these internal rifts. On the horizon, however, are a few ideas about how to address these social and political divisions.

Scientific American delved into these issues with Eli J. Finkel, a psychology professor at Northwest-

ern University and lead author of the new *Science* paper. [An edited transcript of the interview follows.]

There’s a sense in the U.S. today that the country is more divided than ever before. Does the research bear out this impression?

No, 1861 was worse—with many, many hundreds of thousands of people dying in an extraordinarily bloody war. In some ways, 1968 was scarier, with all those assassinations and the protests at the Democratic [National] Convention in Chicago. But there is something new about the current type of polarization. What used to happen was: there were lots of conservatives in the Democratic party and lots of liberals in the Republican party. What we have [now] is an alignment of social identities that correspond to our political identities in a way that we’ve never seen before. In the paper, we talk about political polarization as a kind of mega identity that encompasses a whole bunch of other identities, so that African-American people and nonheterosexual people are overwhelmingly in the Democratic Party. You have this alignment in a way that the two sides feel increasingly different from one another.

Your paper proposes a new way of framing polarization, which you call political sectarianism. Can you explain what this is and the three core ingredients you have identified?

Sectarianism is a highly moralized political identity that views the other side as contemptible. The moral component is foundational. You can imagine that you are a member of a religious sect, and you very, very strongly believe that you possess the full moral truth and that the other people aren’t going to heaven or are evil. That is the tenor of the thinking that we see across the political divide these days.

The three key components: The first one is what we call “othering”—[labeling] these people as so different from us that they’re almost incomprehensible. The second part we call “aversion”—this idea that they’re not just different, but they’re dislikable. The third part is this “moralization,” where they’re morally bankrupt.

And when you face a situation like that, is it acceptable to suppress the vote a little bit or to engage in some sort of political chicanery that isn’t really best for democracy? Well, when those are the stakes, of course.

I live in a red county in a blue state, and this election cycle, I’m seeing something new. People aren’t just displaying political signs. They are flying Trump flags on flagpoles and from the back of their pickup trucks. Do you have any thoughts about the symbolism of the flag and this display of allegiance?

The debate going on is increasingly divorced from ideas. One of the things people on the right love about Trump is that he “owns the libs.” I mean, he drives liberals absolutely bonkers. That is very, very satisfying. That’s not about ideas. That’s about conquest. That’s about defeating the bad people on the other side. These identities are becoming more central to who we are as people. In the 1960s nobody cared if you married somebody from the other party. But how would you feel if your kid married somebody from the other party now? These days it’s sort of a horrifying idea.

Polarization also seems to be warping people’s beliefs about members of the other party. What is happening?

Knowing about people’s political identity now tells you a lot about what their other social identities are likely

to be, and there’s a vast exaggeration in our minds about what the other party looks like. Republicans vastly overestimated the proportion of Democrats that are sexual minorities, such as LGBT [individuals], and Democrats overestimated the percentage of Republicans that make at least \$250,000 a year. And so you end up with a situation where you think, “I can’t relate to them, and they hate people like me.” So of course, you feel like it’s reasonable to lash out at them or perhaps deny them some amount of democratic liberties if the stakes are high in terms of your political goals. But even just alerting people that actually that other group is far less different or hates you far less than you think [it does] can soften the tendency to sacrifice democratic norms for partisan goals.

What role has the changing media landscape and the rise of social media played in this polarization?

Well, the effect appears to be large, and the research is still figuring out exactly what it is. One of the most interesting findings directly challenges the conventional wisdom that part of the reason we have so much othering is that people are literally no

longer living in the same information ecosystems, in contrast to an era where there were three broadcast news stations. A 2018 study had people who were partisan get exposed to some information on the other side. So if you're Republican, you get to see what Hillary Clinton is saying, or if you're a Democrat, you're exposed to what Donald Trump is saying. And that actually made it worse. So the idea that if we expose people to what the other side is seeing, things will get better does not appear to be true. And I think that the science just hasn't figured out how we can tweak algorithms in ways that get to something closer to a common worldview across the population without further sectarianizing the populace.

We know that Russia had an elaborate campaign to influence the outcome of the 2016 election and that it is continuing these efforts in 2020. Has political sectarianism made the U.S. more vulnerable to meddling from foreign actors?

Completely. [Russian agents] didn't try to bomb us, and they didn't even try to infect our computers. They knew that we hate each other—at least highly

sectarianized partisans hate each other—and so they didn't have to do any of that fancy stuff. They just created avatars that were called things such as “Blacktivist” or “Army of Jesus,” and then they painted the other side as diabolical, and then they just let it go. And then we did it! We opened up this vulnerability, and all this geopolitical adversary has to do is to put the content and social media where people are likely to see it. We tweet it; we retweet it.

An important caveat here: research is ambiguous about how effective the campaign was, but there is no question at all that [Russia] tried to do it—and that extremists on both sides, especially on the conservative side, were especially likely to play exactly into Russia's hands.

One solution you propose is to get individuals to talk to people from the opposite party. But how do we talk across the divide? How do you talk to someone whose party has called you the “enemy of the people”?

The pictures that we carry around in our head about the other side are nothing other than characters. One of the things that I think holds promise is

that if we can just get through all the people who are profiting from all the divisions and get the truth out there, then, I think, some of the worst elements of the sectarianism will go away, because people [will] realize that they hate people who aren't that different from them after all.

But how do you get people those facts? How do you get them to even come to the table and listen?

There are no silver bullets. One of the lines of work that holds some promise is some research showing that if you just remind everybody that Democrats and Republicans are all Americans, that can make them a little bit more open-minded.

How has sectarianism changed the way that politicians are governing? They're not really doing so for all of their constituents anymore, are they?

No. I mean, why would they? We're so deeply immersed in our ... side, and that's how you get people like Donald Trump and other people saying, “We're not going to pass a law that's going to help blue states.” That's not the way the government was supposed to function, but it is the logical end point

of the highly sectarian world. In the highly sectarian political ecosystem, politicians lose the incentive to be responsive to the entire populace. And they also lose the incentive to compromise, because you're much more likely to get accused of apostasy and lack of sufficient purity by your side. So you get this increasing emphasis on the most extreme candidates. This has been more true on the right than on the left, but to some degree, it has been true on both sides.

We have a pandemic response that has become extremely polarized, and the science has become a partisan thing. Do you see any solutions?

Look, I am not hugely optimistic about this, but what I would love to pose to your readers is that they should take personal responsibility for this. There are no longer people who speak to the middle. There's no longer a Walter Cronkite. So to some degree, each individual person is going to have to take some amount of responsibility to say, “I'm going to debate ideas, and I'm going to debate them in ways that don't talk about evil or hatred or shame but really understand the nuance and complexities.” —*Christie Aschwanden*



Secrets to Surviving Stressful Times

Stanford neurobiologist Andrew Huberman discusses the two things we can always control, even during stressful political times and scary COVID pandemic

By Jessica Wapner

WE ARE LIVING THROUGH AN INARGUABLY CHALLENGING TIME.

The U.S. has been facing its highest daily COVID-19 case counts yet. Uncertainty and division continue to dog the aftermath of the presidential election. We've begun a long, cold winter, when socializing outdoors will be less of an option. We are a nation and a world under stress.

But Andrew Huberman, a neuroscientist at Stanford University who studies the visual system, sees matters a bit differently. Stress, he says, is not just about the content of what we are reading or the images we are seeing. It is about how our eyes and breathing change in response to the world and the cascades of events that follow. And both of these bodily processes also offer us easy and accessible releases from stress.

Huberman's assertions are based on both established and emerging science. He has spent the past 20 years unraveling the inner workings of the visual system. In 2018, for example, his laboratory reported its discovery of brain pathways connected with fear and paralysis that respond specifically to visual threats. And a small but growing body of research makes the case that altering our breathing can alter our brain. In 2017 Mark Krasnow of Stanford, Jack Feldman of the University of California, Los Angeles, and their colleagues identified a tight link between neurons responsible for controlling breathing and the region of the brain responsible for

arousal and panic.

This growing understanding of how vision and breathing directly affect the brain—rather than the more nebulous categories of the mind and feelings—can come in handy as we continue to face mounting challenges around the globe, across the U.S. and in our own lives. *Scientific American* spoke with Huberman about how it all works. [An edited transcript of the interview follows.]

What is stress?

Stress is one position along the continuum of what we call autonomic arousal. At one end of this continuum would be somebody in a coma. At the very other end of that continuum is a full-blown panic attack: heart racing, pupils dilating, hyperventilating. In between, we have lower levels of stress, [and the states of being] alert and focused, sleepy, and asleep. Stress is generally a high level of autonomic arousal. It was designed to be a generic response to mobilize the body.

Sometimes that's well matched to the demands of life.

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If you need to run and catch your train, you want all the things that go along with stress to go pursue that train. But if the stress response is spontaneous or excessive, it can start to feel pathological.

What is stress's relationship to vision?

When you see something exciting or stressful—a news headline, a fraudulent credit-card charge—heart rate increases; breathing increases. One of the most powerful changes is with vision. The pupils dilate, and there's a change in the position of the lens in the eye. Your visual system goes into the equivalent of portrait mode on a smartphone. Your field of vision narrows. You see one thing in sharper relief, and everything else becomes blurry. Your eyeballs rotate just slightly toward your nose, which sets your depth of field and focus on a single location. This is a primitive and ancient mechanism by which stress controls the visual field.

How does this visual mode affect the body?

This focal vision activates the sympathetic nervous system. All the neurons from your neck to the top of your pelvis get activated at once and deploy a bunch of transmitters and chemicals that make you feel agitated and want to move.

Why is the visual field so connected to this brain state?

Something that most people don't appreciate is that the

eyes are actually two pieces of brain. They are not connected to the brain; they are brain. During development, the eyes are part of the embryonic forebrain. Your eyes get extruded from the skull during the first trimester, and then they reconnect to the rest of the brain. So they're part of the central nervous system.

Having the eyes outside the skull orients the organism to the time of day. But it also means that you've got two pieces of brain that can register events in the environment at a distance in order to adjust the overall state of alertness in the rest of the brain and body. It would be terrible if we had to wait until things were in contact with us before we could prepare to react to them.

Is there a visual mode associated with calmness that can change our stress levels?

Yes: panoramic vision, or optic flow. When [you] look at a horizon or at a broad vista, you don't look at one thing for very long. If you keep your head still, you can dilate your gaze so you can see far into the periphery—above, below and to the sides of you. That mode of vision releases a mechanism in the brain stem involved in vigilance and arousal.

One can actually turn off the stress response by changing the way that we are viewing our environment, regardless of what's in that environment.

You are also researching breathing as a way to regulate autonomic arousal.

Yes. Vision and breathing are, without question, the fastest and most obvious ways to control autonomic arousal. The way we breathe impacts our states of stress very strongly.

Data show that during sleep and claustrophobic states, people and animals generate what are called "physiological sighs," double inhales followed by

exhales. Children also do this when they are sobbing. A physiological sigh, two or three times, is the fastest way that we are aware of to bring the level of autonomic arousal back down to baseline.

Why does this breathing pattern work to reduce stress?

Our lungs consist of tons of tiny little sacs of air, millions of sacs of air. As we get stressed, these little sacs collapse. They deflate like a balloon. Physiological sighs cause the sacs to reinflate. Carbon dioxide is the trigger for breathing: We don't breathe because we need oxygen. We breathe because carbon dioxide levels get too high. Physiological sighs offload the maximum amount of carbon dioxide.

How are you studying the link between breathing and stress?

David Spiegel, associate chair of psychiatry at Stanford, and I are currently leading a study of breathing in which 125 participants have been wearing wrist monitors that measure breathing, sleep duration, heart rate variability and heart rate. The participants are divided into four groups of different breathing modalities: meditation for five minutes a day; repeated physiological sighs; box breathing (equal durations of inhale, hold, exhale, hold, repeated for five minutes); and deliberate hyperventilation repeated a few times. We want to see which patterns of breathing most rapidly reduce the stress response. We're analyzing the data now.

How are breathing and the brain connected?

The relationship is anchored through the diaphragm, the only organ in the body that is skeletal muscle designed for voluntary movement. You can immediately take control of the diaphragm. So breathing represents

a bridge between the conscious and unconscious control of the body.

When you inhale, the diaphragm moves down, and the heart gets a little bigger because it has more space. Blood flows a little more slowly through the heart under that condition. So the heart then signals to the brain, and the brain says, "Oh, we'd better speed up the heart." So if you want to increase your heart rate, you inhale more than you exhale. The opposite is also true. Every time you exhale, you're slowing down the heart rate.

So with vision and breathing, you are looking at physiological processes that are automatic but that we can also control.

Yes. If I make you stressed, you'll perspire. But you wouldn't say, "I'm going to make myself sweat, and therefore I'll be stressed." You can't control your heart rate directly. You can't control your adrenals with your mind. But you can control your diaphragm, which means you control your breathing, which means you control your heart rate, which means you control your alertness. You can control your vision, which thereby controls your level of alertness, your level of stress and your level of calmness.

Vision and breathing are essential as levers or entry points to autonomic arousal because they are available for conscious control at any point. **M**

Conservative and Liberal Brains Might Have Some Real Differences

Scanners try to watch the red-blue divide
play out underneath the skull

By Lydia Denworth



In 1968 a debate was held between conservative thinker William F. Buckley, Jr., and liberal writer Gore Vidal. It was hoped that these two members of opposing intellectual elites would show Americans living through tumultuous times that political disagreements could be civilized. That idea did not last for long. Instead Buckley and Vidal descended rapidly into name-calling. Afterward, they sued each other for defamation.

The story of the 1968 debate opens a well-regarded 2013 book called *Predisposed*, which introduced the general public to the field of political neuroscience. The authors, a trio of political scientists at the University of Nebraska–Lincoln and Rice University, argued that if the differences between liberals and conservatives seem profound and even unbridgeable, it is because they are rooted in personality characteristics and biological predispositions.

On the whole, the research shows, conservatives desire security, predictability and authority more than liberals do, and liberals are more comfortable with novelty, nu-

ance and complexity. If you had put Buckley and Vidal in a magnetic resonance imaging machine and presented them with identical images, you would likely have seen differences in their brain, especially in the areas that process social and emotional information. The volume of gray matter, or neural cell bodies, making up the anterior cingulate cortex, an area that helps detect errors and resolve conflicts, tends to be larger in liberals. And the amygdala, which is important for regulating emotions and evaluating threats, is larger in conservatives.

While these findings are remarkably consistent, they are probabilities, not certainties—meaning there is plenty of individual variability. The political landscape includes lefties who own guns, right-wingers who drive Priuses and everything in between. There is also an unresolved chicken-and-egg problem: Do brains start out processing the world differently, or do they become increasingly different as our politics evolve? Furthermore, it is still not entirely clear how useful it is to know that a Republican’s brain lights up over X while a Democrat’s responds to Y.

So what can the study of neural activity suggest about political behavior? The still emerging field of political neuroscience has begun to move beyond describing basic structural and functional brain differences between people of different ideological persuasions—gauging who has the biggest amygdala—to more nuanced investigations of how certain cognitive processes underlie our political thinking and decision-making. Partisanship does not just affect our vote; it influences our mem-

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ory, reasoning and even our perception of truth. Knowing this will not magically bring us all together, but researchers hope that continuing to understand the way partisanship influences our brain might at least allow us to counter its worst effects: the divisiveness that can tear apart the shared values required to retain a sense of national unity.

Social scientists who observe behaviors in the political sphere can gain substantial insight into the hazards of errant partisanship. Political neuroscience, however, attempts to deepen these observations by supplying evidence that a belief or bias manifests as a measure of brain volume or activity—demonstrating that an attitude, conviction or misconception is, in fact, genuine. “Brain structure and function provide more objective measures than many types of survey responses,” says political neuroscientist Hannah Nam of Stony Brook University. “Participants may be induced to be more honest when they think that scientists have a ‘window’ into their brains.” That is not to say that political neuroscience can be used as a tool to “read minds,” but it can pick up discrepancies between stated positions and underlying cognitive processes.

Brain scans are also unlikely to be used as a biomarker for specific political results because the relationship between the brain and politics is not one-to-one. Yet “neurobiological features could be used as a predictor of political outcomes—just not in a deterministic way,” Nam says.

To study how we process political information, in a [2017 paper](#) political psychologist Ingrid Haas of the Uni-

versity of Nebraska-Lincoln and her colleagues created hypothetical candidates from both major parties and assigned each candidate a set of policy statements on issues such as school prayer, Medicare and defense spending. Most statements were what you would expect: Republicans, for instance, usually favor increasing defense spending, and Democrats generally support expanding Medicare. But some statements were surprising, such as a conservative expressing a pro-choice position or a liberal arguing for invading Iran.

Haas put 58 people with diverse political views in a brain scanner. On each trial, participants were asked whether it was good or bad that a candidate held a position on a particular issue and not whether they personally agreed or disagreed with it. Framing the task that way allowed the researchers to look at neural processing as a function of whether the information was expected or unexpected—what they termed congruent or incongruent. They also considered participants' own party identification and whether there was a relationship between ideological differences and how the subjects did the task.

Liberals proved more attentive to incongruent information, especially for Democratic candidates. When they encountered such a position, it took them longer to make a decision about whether it was good or bad. They were likely to show activation for incongruent information in two brain regions: the insula and anterior cingulate cortex, which “are involved in helping people form and think about their attitudes,” Haas says. How do out-of-the-ordinary positions affect later voting? Haas suspects that engaging more with such information might make voters more likely to punish candidates for it later. But she acknowledges that they may instead exercise a particular form of bias called “motivated reasoning” to downplay the incongruity.

Motivated reasoning, in which people work hard to justify their opinions or decisions, even in the face of

“Brain structure and function provide more objective measures than many types of survey responses.”

—*Hannah Nam*

conflicting evidence, has been a popular topic in political neuroscience because there is a lot of it going around. While partisanship plays a role, motivated reasoning goes deeper than that. Just as most of us like to think we are good-hearted human beings, people generally prefer to believe that the society they live in is desirable, fair and legitimate. “Even if society isn’t perfect, and there are things to be criticized about it, there is a preference to think that you live in a good society,” Nam says. When that preference is particularly strong, she adds, “that can lead to things like simply rationalizing or accepting long-standing inequalities or injustices.” Psychologists call the cognitive process that lets us do so “system justification.”

Nam and her colleagues set out to understand which brain areas govern the affective processes that underlie system justification. They found that the volume of gray matter in the amygdala is linked to the tendency to perceive the social system as legitimate and desirable. Their interpretation is that “this preference to system justify is related to these basic neurobiological predispositions to be alert to potential threats in your environment,” Nam says.

After the original study, Nam’s team followed a subset of the participants for three years and found that their brain structure predicted the likelihood of whether they participated in political protests during that time. “Larg-

er amygdala volume is associated with a lower likelihood of participating in political protests,” Nam says. “That makes sense in so far as political protest is a behavior that says, ‘We’ve got to change the system.’” Understanding the influence of partisanship on identity, even down to the level of neurons, “helps to explain why people place party loyalty over policy, and even over truth,” argued psychologists Jay Van Bavel and Andrea Pereira, both then at New York University, in *Trends in Cognitive Sciences* in 2018. In short, we derive our identities from both our individual characteristics, such as being a parent, and our group memberships, such as being a New Yorker or an American. These affiliations serve multiple social goals: they feed our need to belong and desire for closure and predictability, and they endorse our moral values. And our brain represents them much as it does other forms of social identity.

Among other things, partisan identity clouds memory. In a 2013 study, liberals were more likely to misremember George W. Bush remaining on vacation in the aftermath of Hurricane Katrina, and conservatives were more likely to falsely recall seeing Barack Obama shaking hands with the president of Iran. Partisan identity also shapes our perceptions. When they were shown a video of a political protest in a 2012 study, liberals and conservatives were more or less likely to favor calling police depending on their interpretation of the protest’s goal. If the objective was liberal (opposing the military barring openly gay people from service), the conservatives were more likely to want the cops. The opposite was true when participants thought it was a conservative protest (opposing an abortion clinic). The more strongly we identify with a party, the more likely we are to double down on our support for it. That tendency is exacerbated by rampant political misinformation, and too often identity wins out over accuracy.

If we understand what is at work cognitively, we might

be able to intervene and try to ease some of the negative effects of partisanship. The tension between accuracy and identity probably involves a brain region called the orbitofrontal cortex, which computes the value of goals and beliefs and is strongly connected to memory, executive function and attention. If identity helps determine the value of different beliefs, it can also distort them, Van Bavel says. Appreciating that political affiliation fulfills an evolutionary need to belong suggests we should create alternative means of belonging—depoliticizing the novel coronavirus by calling on us to come together as Americans, for instance. And incentivizing the need to be accurate could increase the importance accorded that goal: paying money for accurate responses or holding people accountable for incorrect ones have been shown to be effective.

The partisan influences before the November 3 election were nearly impossible to ignore because the volume of political information only increased, reminding us of our political identities daily. But here is some good news: a [large 2020 study](#) at Harvard University found that participants consistently overestimated the level of out-group negativity toward their in-group. In other words, the other side may not dislike us quite so much as we think. Inaccurate information heightened the negative bias, and (more good news) correcting inaccurate information significantly reduced it.

“The biology and neuroscience of politics might be useful in terms of what is effective at getting through to people,” Van Bavel says. “Maybe the way to interact with someone who disagrees with me politically is not to try to persuade them on the deep issue, because I might never get there. It’s more to try to understand where they’re coming from and shatter their stereotypes.” **M**

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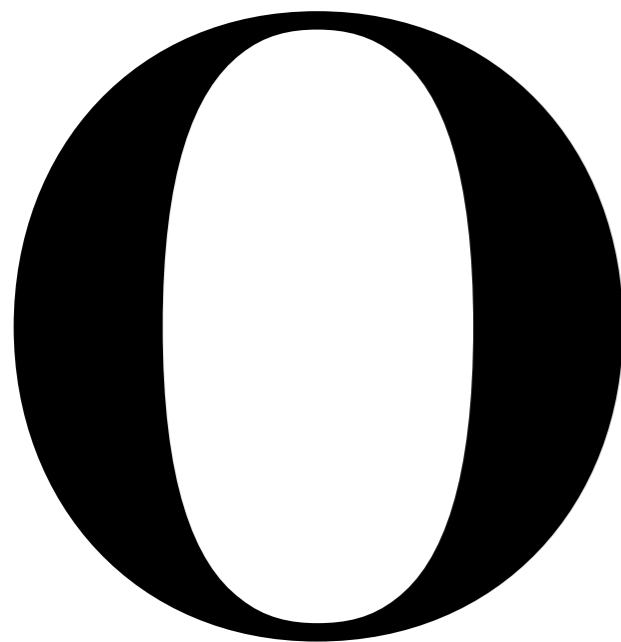
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Has the Drug-Based Approach to Mental Illness Failed?

Journalist Robert Whitaker is more concerned than ever that psychiatric medications do more harm than good

By John Horgan





ne of the most impressive, disturbing works of science journalism I've encountered is *Anatomy of an Epidemic: Magic Bullets, Psychiatric Drugs, and the Astonishing Rise of Mental Illness in America*, published in 2010. In the book, which I review here,

award-winning journalist Robert Whitaker presents evidence that medications for mental illness, over time and in the aggregate, cause net harm.

In 2012 I brought Whitaker to my school to give a talk, in part to check him out. He struck me as a smart, sensible, meticulous reporter whose in-depth research had led him to startling conclusions. Since then, far from encountering persuasive rebuttals of Whitaker's thesis, I keep finding corroborations of it. If Whitaker is right, modern psychiatry, together with the pharmaceutical industry, has inflicted iatrogenic harm on millions of people.

Reports of surging mental distress during the pandemic have me thinking once again about Whitaker's views and wondering how they have evolved.

Below he answers some questions. —*John Horgan*

John Horgan directs the Center for Science Writings at the Stevens Institute of Technology. His books include *The End of Science*, *The End of War* and *Mind-Body Problems*, available for free at mindbodyproblems.com. For many years, he wrote the immensely popular blog Cross Check for *Scientific American*.

Horgan: When and why did you start reporting on mental health?

Whitaker: It came about in a very roundabout way. In 1994 I had co-founded a publishing company called CenterWatch that covered the business aspects of the “clinical trials industry,” and I soon became interested in writing about how financial interests were corrupting drug trials. Risperdal and Zyprexa had just come to market, and after I used a Freedom of Information request to obtain the FDA's review of those two drugs, I could see that psychiatric drug trials were a prime example of that corruption. In addition, I had learned of NIMH-funded research that seemed abusive of schizophrenia patients, and in 1998 I co-wrote a series for the *Boston Globe* on abuses of patients in psychiatric research.

My interest was in that broader question of corruption and abuse in research settings and not specific to psychiatry.

At that time, I still had a conventional understanding of psychiatric drugs. My understanding was that researchers were making great advances in understanding mental disorders and that they had found that schizophrenia and depression were due to chemical imbalances in the brain, which psychiatric medications then put back in balance. But while reporting that series, I stumbled upon studies that didn't make sense to me, for they belied what I knew to be “true,” and that was what sent me down this path of reporting on mental health.

First, there were two studies by the World Health Organization that found that longer-term outcomes for

schizophrenia patients in three “developing” countries were much better than in the U.S. and five other “developed” countries. This didn’t really make sense to me, and then I read this: in the developing countries, they used antipsychotic drugs acutely but not chronically. Only 16 percent of patients in the developing countries were regularly maintained on antipsychotics, whereas in the developed countries this was the standard of care. That didn’t fit with my understanding that these drugs were an essential treatment for schizophrenia patients.

Second, a study by Harvard researchers found that schizophrenia outcomes had declined in the previous 20 years and were now no better than they had been in the first third of the 20th century. That didn’t fit with my understanding that psychiatry had made great progress in treating people so diagnosed.

Those studies led to my questioning the story that our society told about those we call “mad,” and I got a book contract to dig into that question. That project turned into *Mad in America*, which told of the history of our society’s treatment of the seriously mentally ill, from colonial times until today—a history marked by bad science and societal mistreatment of those so diagnosed.

Horgan: Do you still see yourself as a journalist, or are you primarily an activist?

Whitaker: I don’t see myself as an “activist” at all. In my own writings and in the webzine I direct, *Mad in America*, I think you’ll see journalistic practices at work, albeit in the service of an “activist” mission.

Here is our mission statement: “*Mad in America’s* mission is to serve as a catalyst for rethinking psychiatric care in the United States (and abroad). We believe that the current drug-based paradigm of care has failed our society and that scientific research, as well as the lived experience of those who have been diagnosed with a psychiatric disorder, calls for profound change.”

Thus, our starting point is that “change” is needed, and while that does have an activist element, I think journalism—serving as an informational source—is fundamental to that effort. As an organization, we are not asserting that we have the answers for what that change should be, which would be the case if we were striving to be activists. Instead we strive to be a forum for promoting an informed societal discussion about this subject.

Here’s what we do:

- We publish daily summaries of scientific research with findings that are rarely covered in the mainstream media. You’ll find, in the archives of our research reports, a steady parade of findings that counter the conventional narrative. For instance, there are reports of how the effort to find genes for mental disorders has proven rather fruitless, or of how social inequalities trigger mental distress, or of poor long-term outcomes with our current paradigm of care. And so forth—we simply want these scientific findings to become known.
- We regularly feature interviews with researchers and activists and podcasts that explore these issues.
- We launched MIA Reports as a showcase for our print journalism. We have published in-depth articles on promising new initiatives in Europe; investigative pieces on such topics as compulsory outpatient treatment; coverage of “news” related to mental health policy in the United States; and occasional reports on how the mainstream media is covering mental health issues.
- We also publish blogs by professionals, academics, people with lived experience, and others with a particular interest in this subject. These blogs and personal stories are meant to help inform society’s “rethinking” of psychiatric care.

All of these efforts, I think, fit within the framework of “journalism.”

However, I do understand that I am going beyond the boundaries of usual “science journalism” when I publish critiques of the “evidence base” related to psychiatric drugs. I did this in my books *Mad in America* and *Anatomy of an Epidemic*, as well as a book I co-wrote, *Psychiatry under the Influence*. I have continued to do this with MIA Reports.

The usual practice in “science journalism” is to look to the “experts” in the field and report on what they tell about their findings and practices. While reporting and writing *Mad in America*, however, I came to understand that when “experts” in psychiatry spoke to journalists they regularly hewed to a story that they were expected to tell, which was a story of how their field was making great progress in understanding the biology of disorders and of drug treatments that—as I was told over and over when I co-wrote the series for the *Boston Globe*—fixed chemical imbalances in the brain. But their own science, I discovered, regularly belied the story they were telling to the media. That’s why I turned to focusing on the story that could be dug out from a critical look at their own scientific literature.

So what I do in these critiques—such as suicide in the Prozac era and the impact of antipsychotics on mortality—is review the relevant research and put those findings together into a coherent report. I also look at research cited in support of mainstream beliefs and see if the data, in those articles, actually support the conclusions presented in the abstract. None of this is really that difficult, and yet I know it is unusual for a journalist to challenge conventional “medical wisdom” in this way.

Horgan: *Anatomy of an Epidemic* argues that medications for mental illness, although they give many people short-term relief, cause net harm. Is that a fair summary?

Whitaker: Yes, although my thinking has evolved somewhat since I wrote that book.

I am more convinced than ever that psychiatric medications, over the long term, cause net harm. I wish that weren't the case, but the evidence just keeps mounting that these drugs, on the whole, worsen long-term outcomes.

My thinking has evolved in this way: I am not so sure anymore that the medications provide a short-term benefit for patient populations as a whole. When you look at the short-term studies of antidepressants and antipsychotics, the evidence of efficacy in reducing symptoms compared with placebo is really pretty marginal and fails to rise to the level of a "clinically meaningful" benefit.

Furthermore, the problem with all of this research is that there is no real placebo group in the studies. The placebo group is composed of patients who have been withdrawn from their psychiatric medications and then randomized to placebo. Thus, the placebo group is a drug-withdrawal group, and we know that withdrawal from psychiatric drugs can stir myriad negative effects. A medication-naïve placebo group would likely have much better outcomes, and if that were so, how would that placebo response compare with the drug response?

In short, research on the short-term effects of psychiatric drugs is a scientific mess. In fact, a [2017 paper](#) that was designed to defend the long-term use of antipsychotics nevertheless acknowledged, in an off-hand way, that "no placebo-controlled trials have been reported in first-episode psychosis patients." Antipsychotics were introduced 65 years ago, and we still don't have good evidence that they work over the short term in first-episode patients. Which is rather startling, when you think of it.

Horgan: Have any of your critics—E. Fuller Torrey, for example—made you rethink your thesis?

Whitaker: When the first edition of *Anatomy of an Epidemic* was published in 2010, I knew there would be critics, and I thought, this will be great. This is just what is

needed, a societal discussion about the long-term effects of psychiatric medications.

I have to confess that I have been disappointed in the criticism. They mostly have been ad hominem attacks—I cherry-picked the data, or I misunderstood findings, or I am just biased, but the critics don't then say what data I missed or point to findings that tell of medications that improve long-term outcomes. I honestly think I could do a much better job of critiquing my own work.

You mention [E. Fuller Torrey's criticism](#), in which he states that I both misrepresented and misunderstood some of the research I cited. I took this seriously and [answered it at great length](#).

Now if your own "thesis" is indeed flawed, then a critic should be able to point out its flaws while accurately detailing what you wrote. If that is the case, then you have good reason to rethink your beliefs. But if a critique doesn't meet that standard but rather relies on misrepresenting what you wrote, then you have reason to conclude that the critic lacks the evidence to make an honest case. And that is how I see Torrey's critique.

For example, Torrey said that I misunderstood Martin Harrow's research on long-term outcomes for schizophrenia patients. Harrow reported that the recovery rate was eight times higher for those who got off antipsychotic medication compared with those who stayed on the drugs. However, [in his 2007 paper](#), Harrow stated that the better outcomes for those who got off medication were because they had a better prognosis and not because of negative drug effects. If you read *Anatomy of an Epidemic*, you'll see that I present his explanation.

Yet in my interview with Harrow, I noted that his own data showed that those who were diagnosed with milder psychotic disorders who stayed on antipsychotics fared worse over the long term than schizophrenia patients who stopped taking the medication. This was a comparison that showed the less ill maintained on antipsychotics

doing worse than the more severely ill who got off these medications. And I presented that comparison in *Anatomy of an Epidemic*.

By doing that, I was going out on a limb: I was saying that maybe Harrow's data led to a different conclusion than he had drawn, which was that the antipsychotic medication, over the long-term, had a negative effect.

After *Anatomy* was published, Harrow and his colleague Thomas Jobe went back to their data and investigated this very possibility. They have subsequently written several papers [exploring this theme](#), citing me in one or two instances for raising the issue, and they found reason to conclude that it might be so. [They wrote](#): "How unique among medical treatments is it that the apparent efficacy of antipsychotics could diminish over time or become harmful? There are many examples for other medications of similar long-term effects, with this often occurring as the body readjusts, biologically, to the medications."

Thus, in this instance, I did the following: I accurately reported the results of Harrow's study and his interpretation of his results, and I accurately presented data from his research that told of a possible different interpretation. The authors then revisited their own data to take up this inquiry. And yet Torrey's critique is that I misrepresented Harrow's research.

This same criticism, by the way, is still being flung at me. Here is [a recent article in Vice](#), which, once again, quotes people saying I misrepresent and misunderstand research, with Harrow cited as an example.

I do want to emphasize that critiques of "my thesis" regarding the long-term effects of psychiatric drugs are important and to be welcomed. See two papers in particular that take this on ([here](#) and [here](#)), and my response [in general](#) to such criticisms, and to the [second one](#).

Horgan: When I criticize psychiatric drugs, people sometimes tell me that meds saved their lives. You must get this reaction a lot. How do you respond?

Whitaker: I do hear that, and when I do, I reply, “Great! I am so glad to know that the medications have worked for you!” But of course, I also hear from many people who say that the drugs ruined their lives.

I do think that the individual’s experience of psychiatric medication, whether good or bad, should be honored as worthy and “valid.” They are witnesses to their own lives, and we should incorporate those voices into our societal thinking about the merits of psychiatric drugs.

But for the longest time, we’ve heard mostly about the “good” outcomes in the mainstream media, while those with “bad” outcomes were resigned to telling their stories on Internet forums. What *Mad in America* has sought to do, in its efforts to serve as a forum for rethinking psychiatry, is provide an outlet for this latter group, so their voices can be heard too.

The personal accounts, of course, do not change the bottom-line “evidence” that shows up in outcome studies of larger groups of patients. Unfortunately, that tells of medications that, on the whole, do more harm than good.

As a case in point, in regard to this “saving lives” theme, this benefit does not show up in public health data. The “standard mortality rate” for those with serious mental disorders, compared with the general public, has notably increased in the past 40 years.

Horgan: Do you see any promising trends in psychiatry?

Whitaker: Yes, definitely.

You have the spread of Hearing Voices networks, which are composed of people who hear voices and offer support for learning to live with voices as opposed to squashing them, which is what the drugs are supposed to do. These networks are up and running in the U.S. and in many countries worldwide.

You have Open Dialogue approaches, which were pioneered in northern Finland and proved successful there, being adopted in the United States and many European countries (and beyond). This practice puts much less

emphasis on treatment with antipsychotics and much greater emphasis on helping people reintegrate into family and community.

You have many alternative programs springing up, even at the governmental level. Norway, for instance, ordered its hospital districts to offer “medication-free” treatment for those who want it, and there is now a private hospital in Norway that is devoted to helping chronic patients taper down from their psychiatric medications. In Israel, you have Soteria houses that have sprung up (sometimes they are called stabilizing houses), where use of antipsychotics is optional, and the environment—a supportive residential environment—is seen as the principal “therapy.”

You have the U.N. Special Rapporteur for Health, Dainius Puras, calling for a “revolution” in mental health, one that would supplant today’s biological paradigm of care with a paradigm that paid more attention to social justice factors—poverty, inequality, etc. as a source of mental distress.

All of those initiatives tell of an effort to find a new way. But perhaps most important, in terms of “positive trends,” the narrative that was told to us starting in the 1980s has collapsed, which is what presents the opportunity for a new paradigm to take hold.

More and more research tells of how the conventional narrative, in all its particulars, has failed to pan out. The diagnoses in the *Diagnostic and Statistical Manual (DSM)* have not been validated as discrete illnesses; the genetics of mental disorders remain in doubt; MRI scans have not proven to be useful; long-term outcomes are poor; and the notion that psychiatric drugs fix chemical imbalances has been abandoned. Ronald Pies, the former editor in chief of *Psychiatric Times*, has even sought to distance psychiatry, as an institution, from ever having made such a claim.

Horgan: Do brain implants or other electrostimulation devices show any therapeutic potential?

Whitaker: I don’t have a ready answer for this. We have

published two articles about the spinning of results from a trial of deep-brain stimulation and the suffering of some patients so treated over the long term. Those articles tell of why it may be difficult to answer that question: there are financial influences that push for published results that tell of a therapeutic success, even if the data don’t support that finding, and we have a research environment that fails to study long-term outcomes.

The history of somatic treatments for mental disorders also provides a reason for caution. It’s a history of one somatic treatment after another being initially hailed as curative, or extremely helpful, and then failing the test of time. The inventor of frontal lobotomy, Egas Moniz, was awarded a Nobel Prize for inventing that surgery, which today we understand as a mutilation.

It’s important to remain open to the possibility that somatic treatments may be helpful, at least for some patients. But there is plenty of reason to be wary of initial claims of success.

Horgan: Should psychedelic drugs be taken seriously as treatments?

Whitaker: I think caution applies here, too. Surely there are many risks with psychedelic drugs, and if you were to do a study of first-episode psychosis today, you would find a high percentage of the patients had been using mind-altering drugs before their psychotic break—antidepressants, marijuana, LSD, and so forth. At the same time, we’ve published reviews of papers that have reported positive results with use of psychedelics. What are the benefits versus the risks? Can possible benefits be realized while risks are minimized? It is a question worth exploring but carefully so.

Horgan: What about meditation?

Whitaker: I know that many people find meditation helpful. I also know other people find it difficult—and even threatening—to sit with the silence of their minds. *Mad in America* has published reviews of research about

meditation, we have had a few bloggers write about it, and in our resource section on “non-drug therapies,” we have summarized [research findings](#) regarding its use for depression. We concluded that the research on this is not as robust as one would like.

However, I think your question leads to this broader thought: People struggling with their minds and emotions may come up with many different approaches they find helpful. Exercise, diet, meditation, yoga, and so forth all represent efforts to change one’s environment, and ultimately I think that can be very helpful. But the individual has to find his or her way to whatever environmental change that works best for them.

Horgan: Do you see any progress toward understanding the causes of mental illness?

Whitaker: Yes, and that progress might be summed up in this way: researchers are returning to investigations of how we are impacted by what has “happened to us.”

The [Adverse Childhood Experiences](#) study provides compelling evidence of how traumas in childhood—divorce, poverty, abuse, bullying, and so forth—exact a long-term toll on physical and mental health. Interview any group of women diagnosed with a serious mental disorder, and you’ll regularly find accounts of sexual abuse. Racism exacts a toll. So, too, poverty, oppressive working conditions, and so forth. You can go on and on, but all of this is a reminder that we humans are designed to respond to our environment, and it is quite clear that mental distress, in large part, arises from difficult environments and threatening experiences, past and present.

And with a focus on life experiences as a source of “mental illness,” a related question is now being asked: What do we all need to be mentally well? Shelter, good food, meaning in life, someone to love, and so forth—if you look at it from this perspective, you can see why, when those supporting elements begin to disappear, psychiatric difficulties appear.

I am not discounting that there may be biological factors that cause “mental illness.” While biological markers that tell of a particular disorder have not been discovered, we are biological creatures, and we do know, for instance, that there are physical illnesses and toxins that can produce psychotic episodes.

However, the progress that is being made at the moment is a moving away from the robotic “it’s all about brain chemistry” toward a rediscovery of the importance of our social lives and our experiences.

Horgan: Do we still have anything to learn from [Sigmund Freud](#)?

Whitaker: I certainly think so. Freud is a reminder that so much of our mind is hidden from us and that what spills into our consciousness comes from a blend of the many parts of our mind, our emotional centers and our more primal instincts. You can still see merit in Freud’s descriptions of the id, ego and superego as a conceptualization of different parts of the brain. I read Freud when I was in college, and it was a formative experience for me.

Horgan: I fear that American-style capitalism [doesn’t produce good health care](#), including mental health care. What do you think?

Whitaker: It’s clear that it doesn’t.

First, we have for-profit health care that is set up to treat “disease.” With mental health care, that means there is a profit to be made from seeing people as “diseased” and treating them for that “illness.” Take a pill! In other words, American-style capitalism, which works to create markets for products, provides an incentive to create mental patients, and it has done this to great success over the past 35 years.

Second, without a profit to be made, you don’t have as much investment in psychosocial care that can help a person remake his or her life. There is a societal expense but little corporate profit in psychosocial care, and Ameri-

can-style capitalism doesn’t lend itself to that equation.

Third, with our American-style capitalism (think neoliberalism), it is the individual who is seen as “ill” and needs to be fixed. Society gets a free pass. This, too, is a barrier to good mental health care, for it prevents us from thinking about what changes we might make to our society that would be more nurturing for us all. With our American-style capitalism, we now have a grossly unequal society, with more and more wealth going to the select few and more and more people struggling to pay their bills. That is a prescription for psychiatric distress. Good mental health care starts with creating a society that is more equal and just.

Horgan: How might the COVID-19 pandemic affect care of the mentally ill?

Whitaker: That is something *Mad in America* has reported on. The pandemic, of course, can be particularly threatening to people in mental hospitals or in group homes.

The threat is more than just the exposure to the virus that may come in such settings. People who are struggling in this way often feel terribly isolated, alone and fearful of being with others. COVID-19 measures, with calls for social distancing, can exacerbate that. I think this puts hospital staff and those who run residential homes into an extraordinarily difficult position—how can they help ease the isolation of patients even as they are being expected to enforce a type of social distancing?

Horgan: If the next president named you mental health czar, what would be at the top of your to-do list?

Whitaker: Well, I am pretty sure that’s not going to happen, and if it did, I would quickly confess to my being utterly unqualified for the job. But from my perch at *Mad in America*, here is what I would like to see happen in our society.

As you can see from my answers above, I think the fundamental problem is that our society has organized itself around a false narrative, which was sold to us as a narra-

tive of science. In the early 1980s we began to hear that psychiatric disorders were discrete brain illnesses, which were caused by chemical imbalances in the brain and that a new generation of psychiatric drugs fixed those imbalances, like insulin for diabetes. That is a story of an amazing medical breakthrough: researchers had discovered the very chemicals in our brain that cause madness, depression, anxiety or ADHD, and they had developed drugs that could put brain chemistry back into a normal state. Given the complexity of the human brain, if this were true, it would arguably be the greatest achievement in medical history.

And we understood it to be true. We came to believe that there was a sharp line between the “normal” brain and the “abnormal” brain, and that it was medically helpful to screen for these illnesses, and that psychiatric drugs were very safe and effective and often needed to be taken for life.

But what can be seen clearly today is that this narrative was a marketing story, not a scientific one. It was a story that psychiatry, as an institution, promoted for guild purposes, and it was a story that pharmaceutical companies promoted for commercial reasons. Science actually tells a very different story: the biology of psychiatric disorders remains unknown; the disorders in the *DSM* have not been validated as discrete illnesses; the drugs do not fix chemical imbalances but rather perturb normal neurotransmitter functions; and even their short-term efficacy is marginal at best.

As could be expected, organizing our thinking around a false narrative has been a societal disaster: a sharp rise in the burden of mental illness in our society; poor long-term functional outcomes for those who are continuously medicated; the pathologizing of childhood; and so on.

What we need now is a new narrative to organize ourselves around, one steeped in history, literature, philosophy and good science. I think step one is ditching the

“If we embraced that literary understanding of what it is to be human, then a 'mental health' policy could be forged that would begin with this question: How do we create environments that are more nurturing for us all?”

—Robert Whitaker

DSM. That book presents the most impoverished “philosophy of being” imaginable. Anyone who is too emotional, or struggles with his or her mind, or just doesn’t like being in a boring environment (think ADHD) is a candidate for a diagnosis. We need a narrative that, if truth be told, can be found in literature. Novels, Shakespeare, the Bible—they all tell of how we humans struggle with our minds, our emotions and our behaviors. That is the norm; it is the human condition. And yet the characters we see in literature, if they were viewed through the *DSM* lens, would regularly qualify for a diagnosis.

At the same time, literature tells of how humans can be so resilient and that we change as we age and move through different environments. We need that to be part of a new narrative, too; our current disease-model narrative tells of how people are likely going to be chronically ill. Their brains are defective, and so the therapeutic goal is to manage the symptoms of the “disease.” We need a narrative that replaces that pessimism with hope.

If we embraced that literary understanding of what it is to be human, then a “mental health” policy could be forged that would begin with this question: How do we create environments that are more nurturing for us all? How do we create schools that build on a child’s curiosi-

ty? How do we bring nature back into our lives? How do we create a society that helps provide people with meaning, a sense of community and a sense of civic duty? How do we create a society that promotes good physical health and provides access to shelter and medical care?

Furthermore, with this conception in mind, individual therapy would help people change their environments. You could encourage walks in nature; recommend volunteer work; provide settings where people could go and recuperate, and so forth. Most important, in contrast to a “disease-based” paradigm of care, a “wellness-based” paradigm would help people feel hopeful and help them find a way to create a different future for themselves. This is an approach, by the way, that can be helpful to people who have suffered a psychotic episode. Soteria homes and Open Dialogue are “therapies” that strive to help psychotic patients in this manner.

Within this “wellness” paradigm of care, there would still be a place for use of medications that help people feel differently, at least for a time: sedatives, tranquilizers, and so forth. And you would still want to fund science that seeks to better understand the many pathways to debilitating mood states and to “psychosis”—trauma, poor physical health, physical disease, lack of sleep, setbacks in life, isolation, loneliness, and, yes, whatever biological vulnerabilities that may be present. At the same time, you would want to fund science that seeks to better understand the pillars of “wellness.”

Horgan: What’s your utopia?

Whitaker: My “utopia” would be a world like the one I just described, based on a new narrative about mental illness, rooted in an understanding of how emotional we humans are, of how we struggle with our minds, and of how we are built to be responsive to our environments. And that really is the mission of *Mad in America*. We want it to be a forum for creating a new societal narrative for mental health. **M**



The Disturbing History *of* Research into Transgender Identity

Research into the determinants of gender identity
may do more harm than good

By Jack Turban

IN 1975 PSYCHIATRIST ROBERT STOLLER of the University of California, Los Angeles, wrote something bizarre in his textbook on sex and gender. He asserted that people who were assumed to be boys when they were born but whose gender identity or expression did not match that assumption “often have pretty faces, with fine hair, lovely complexions, graceful movements, and—especially—big, piercing, liquid eyes.” Based on this observation, he suggested a theoretical model in which transgender girls become transgender because they are especially cute. Society treats them more like girls, he reasoned, and because of this experience, they start to identify as female.

As a physician-scientist, I’m generally of the opinion that knowledge leads to progress. But studies focused on this particular question—those asking what determines someone’s gender identity—have led us down some strange and dangerous paths. Researchers in this area appear to be in search of some objective truth, but the science is rooted in a subjective assumption: that we need to

know what makes someone transgender so that they can be “fixed.” As a result, scientists have relentlessly pursued such questions, launching studies that promoted ideas that could hurt transgender children and their families.

Stoller’s observations motivated many of the psychological theories behind what makes people transgender. In 1993 a group of researchers at the Clarke Institute of

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Psychiatry in Toronto set out to test his hypothesis that beauty and what was then called “gender identity disorder” were linked. They recruited 17 birth-assigned boys with the diagnosis and 17 birth-assigned boys without it, all around the age of eight. The researchers then took headshots of the children and showed them to 36 college students. The students were asked to rate the youngsters’ physical appearance on a scale from one to five with categories such as “attractive,” “handsome” and “beautiful.” In the end, the college students found the children with gender identity disorder to be “prettier” than the cisgender boys. The findings seem to suggest Stoller was right: perhaps, because of their appearance, people treated the youngsters in the former group more like girls, and consequently, they became transgender. Although as the authors mention later in the paper, an equally plausible theory is that these children could have altered their appearance (long hair, et cetera) in ways that matched their identity, leading the college students to associate them with more feminine descriptions such as “pretty.”

A few years later researchers revived this line of investigation, using the headshots of young birth-assigned girls with gender identity disorder. A group of college students again rated how “ugly” or “pretty” these children appeared, compared with cisgender girls. The children with gender identity disorder were rated as less beautiful, prompting the researchers to suggest that they may have been treated more like boys and thus identified as male. It seems more likely that these children simply cut their hair shorter, so the participants

attached more masculine words to them. In the end, the study didn't reveal much about what makes someone transgender, but it did promote an offensive theory with the potential to diminish the self-esteem of vulnerable transgender youth.

Researchers also studied the parents of such children. Psychiatry has long been enamored with the theory of mothers harming the development of their children (for example, the refrigerator mother theory posited that autism was caused by a lack of maternal warmth). These studies similarly asked if perhaps parents were to “blame” for their kids' gender identity. In one paper, researchers assessed whether the mothers of children with gender identity disorder had more symptoms of either depression or a condition called borderline personality disorder. They found these mothers had more symptoms of both. Sounds convincing, right? Children must become transgender because their mothers are mentally ill.

What the researchers failed to discuss was that the mothers' symptoms could easily have been caused by the way society treated their children. The subscale of borderline personality disorder that was higher among them was “interpersonal conflict.” You don't need to be the parent of a transgender child to imagine that raising your kid in an unaccepting community could create substantial conflict.

In another study, researchers noted that parents of children with gender identity disorder did not place strong limits on stereotypically gender-atypical behaviors such as birth-assigned boys playing with dolls or birth-assigned girls playing with blocks or transportation toys. Perhaps this was the cause of the “problem”? If these parents had simply cracked down on this behavior early on—ripped the Barbie out of their toddler's hands, say—they may have prevented it, the authors posited. The more likely explanation is that it's difficult to take a doll away from a child who desperately wants to

You don't need to be the parent of a transgender child to imagine that raising your kid in an unaccepting community could create substantial conflict.

play with it. And that doing so makes them sad and impacts their self-esteem.

In each case, researchers were hyperfocused on finding a problem with either the kids or their parents. But in the end, these scientists failed to establish one. They seemed less interested in a vital reframing: perhaps the issue was not the children's identity but the way society treated them. Instead of supporting these kids, the researchers labeled them unattractive or painted their parents as mentally unstable.

These theories on the origins of gender identity have only added to the misguided, and increasingly illegal, calls for “therapies” designed to make transgender people cisgender. The logic of so-called gender identity conversion therapy is that if the environment is the cause, then we can simply alter the environment to nip things in the bud. Most of the “conversion” manuals have not been released to the public, but in 2002 a psychologist at Columbia University published “Gender Identity Disorder in Young Boys: A Parent and Peer-Based Protocol,” which included parenting techniques such as “letting go of [the] boy by [the] mother,” forcing the child to play with same-sex friends, and removing the youngster from stereotypically gender-atypical activities such as gymnastics or ballet. Notably, a recent study my colleagues and I conducted showed that attempts to change a child's gender identity from transgender to cisgender are associated with greater odds of attempting suicide. Several U.S. states have banned conversion therapy, but in much of the U.S., these practices continue.

Similar research into the psychological causes of transgender identity continues even today. A physician at Brown University recently conducted an anonymous survey of respondents recruited via Web sites for parents who believe peer pressure and online influences have made their children transgender. The survey essentially asked the parents if they thought the Internet made their children trans, and the parents, not surprisingly, given that they were visiting Web sites about this idea, answered yes. Conservative media latched onto the study, suggesting that transgender children are really just confused kids tricked into being transgender after reading something on Reddit. The implication is that we need to take these kids away from supportive online LGBTQ communities so that they can be made cisgender again. Reading through this literature, we need to ask ourselves some questions: What is the reason for this research? What does it hope to accomplish? The tireless search reveals a thinly veiled dogma: that being transgender is a pathology to be fixed. This belief not only harms transgender people but also undermines good science.

What good science shows us is that when we accept transgender people, they thrive. Instead of trying to figure out what went “wrong,” we should be investing our time and energy into advocating for nondiscrimination laws, increasing access to health care and raising transgender voices in the media so that society realizes they are vital members of our communities. Maybe Stoller was right when he noted that those children were exceptional. It's time we celebrate that and move on. **M**

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MENTAL HEALTH

What if a Pill Can Change Your Politics or Religious Beliefs?

A new mental health treatment using the psychedelic compound psilocybin raises questions about medicine and values

How would you feel about a new therapy for your chronic pain, which—though far more effective than any available alternative—might also change your religious beliefs? Or a treatment for lymphoma that brings one in three patients into remission, but also made them more likely to vote for your least preferred political party?

These seem like idle hypothetical questions about impossible side effects. After all, this is not how medicine works. But a new mental health treatment, set to be licensed next year, poses just this sort of problem. Psychotherapy assisted by psilocybin, the psychedelic compound in “magic mushrooms,” seems to be remarkably effective in treating a wide range of psychopathologies but also causes a raft of unusual



“Magic” mushrooms, a source of psilocybin.

nonclinical changes not seen elsewhere in medicine. Although its precise therapeutic mechanisms remain unclear, clinically relevant doses of psilocybin can induce powerful mystical experiences more commonly associated with extended periods of fasting, prayer or meditation. Arguably, then, it is unsurprising that it can generate long-lasting changes in patients: studies report increased prosociality and aesthetic

appreciation, plus robust shifts in personality, values and attitudes to life, even leading some atheists to find God. What's more, these experiences appear to be a feature, rather than a bug, of psilocybin-assisted psychotherapy, with the intensity of the mystical experience correlating with the extent of clinical benefit.

These are undoubtedly interesting findings, but should any of it matter? However unusual a treat-

ment's consequences, shouldn't we prioritize the preferences of an informed, consenting patient? Yes, I understand that this might change me in strange ways. But my depression is debilitating. I will roll that dice. Putting aside the matter of how well informed one could really be about such radical transformations, political realities make things more complicated, with the case of psilocybin—currently a Schedule 1, highly illicit drug—showing vividly how values, politics and social narratives can influence the development of biomedical science.

The taboo of the illicit is not an insuperable obstacle. The Multidisciplinary Association for Psychedelic Studies (MAPS), an organization that advocates for “careful uses” of psychedelics, has gone an impressive way in rehabilitating MDMA (that is ecstasy) into a legitimate medicine. MAPS's masterstroke was to focus on demonstrating its potential for treating PTSD. By articulating how MDMA-assisted therapy could help veterans, support for whom enjoys a rare level of bipartisan agreement, MAPS has attracted supporters from across the political spectrum, receiving positive coverage from MSNBC and Fox News alike.

Advocates of psilocybin-assisted therapy tout it as the solution to the burgeoning mental health crisis. But, like MDMA, psilocybin is far from a culturally neutral drug, carrying both the shame of Schedule 1 status and a checkered social history. It, too, may need to build the kind of politically heterogeneous coalition of supporters that MDMA-assisted therapy enjoys.

But to generate a breadth of appeal, one challenge stands out: psilocybin seems to make people more liberal. Scientific reports associating psychedelic use and liberal values stretch back as far as 1971,

and although these findings have been replicated more recently, a noncausal explanation is readily available. Those with conservative attitudes tend to look more disapprovingly on illicit drug use, making them less likely than liberals to try a psychedelic drug in the first place.

Yet emerging evidence suggests the relationship could be causal, with clinically administered psilocybin actively shifting political values, just as it shifts many other nonclinical characteristics. Notably, one study of psilocybin for treatment-resistant depression reported that the treatment decreased authoritarian political views in patients. That clinical trial also detected another effect that had previously been reported in healthy participants: psilocybin use leads to increases in the personality domain of openness, itself a predictor of liberal values.

If psilocybin does change political values, the significance of this effect goes deeper than which politicians or media outlets will seek to support or impede psilocybin-assisted therapy. A well-established consensus on the secular democratic state is that it should remain neutral and agnostic on a number of matters, allowing a diversity of values, political attitudes and religious beliefs among its citizens. Where such states have universal health care systems, is it permissible to not only endorse, but fund through taxpayer contributions, a treatment which shifts values in one direction?

With sample sizes currently small, more research is needed to understand whether there truly is a causal relationship at work and, if so, what its nature might be. Perhaps psilocybin doesn't so much induce liberal values but rather consolidates whatever values

were present before treatment. A health care modality that entrenches preexisting political sentiments is, at the least, unlikely to make enemies. The same could not be said of a treatment that shifts patients in one direction along the political spectrum.

To overcome this obstacle, advocates of psilocybin-assisted therapy need an inspiring banner that members of any political tribe could rally around. With few things that unite us as powerfully as politics can divide us, perhaps the most alluring banner will be the one thing that unites us all: death. While psilocybin is neither a cure for nor a prophylactic against death, studies have repeatedly demonstrated that it could play a profound role in the future of palliative care. The existential distress experienced when faced with a life-threatening or terminal illness can steal away what little quality of life remains for the dying. Such distress responds poorly to our standard pharmaceutical approaches, but the powerful mystical experiences induced by psilocybin consistently transmute demoralization, anxiety and depression into acceptance, peacefulness and meaning, as patients prepare to meet their death.

However else they differ, conservatives and liberals are united in knowing that they, and their loved ones, will eventually die. And for conservatives and liberals alike, psilocybin could help them welcome the end with greater acceptance and less fear. Psilocybin looks set to become a licensed medicine by 2022. But how many ultimately benefit from it will be a matter not just of how well it works but also the narrative surrounding it when it arrives: Does psilocybin underline how we are different or how we are the same?

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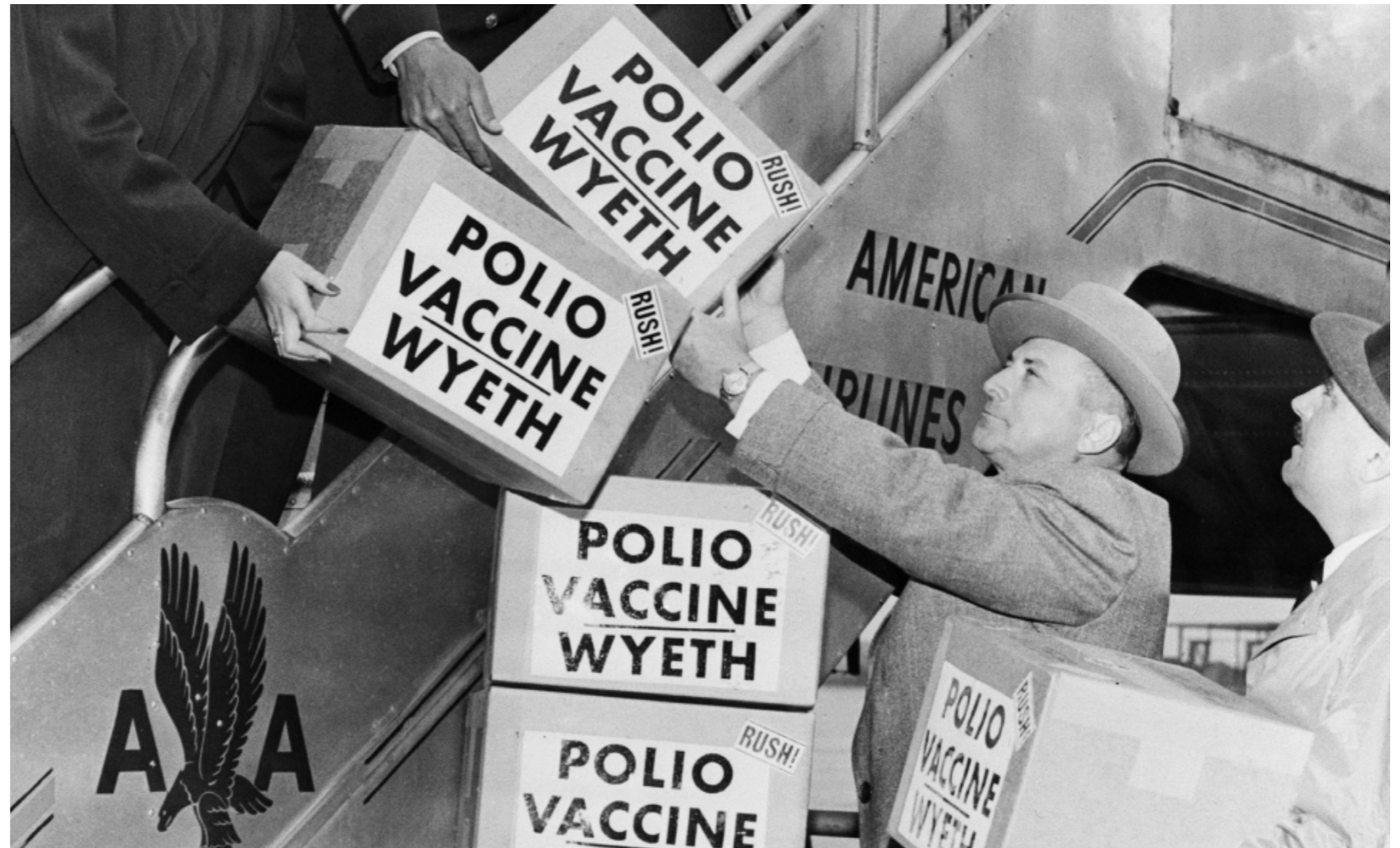
POLICY & ETHICS

The Denialist Playbook

On vaccines, evolution, and more, rejection of science has followed a familiar pattern

Once upon a time, in a land not far away, there was a horrible virus that instilled terror in every town and home. Although most people who became infected showed no symptoms or recovered within a week, in a small fraction of cases the illness progressed, causing loss of reflexes and muscle control, paralysis and, sometimes, death.

Children were especially vulnerable, so parents watched anxiously for any sign of infection, often keeping them away from swimming pools, movie theaters, bowling alleys, anywhere where there were crowds and the dreaded microbe might lurk. Travel and business were sometimes curtailed between places with outbreaks, and public health authorities imposed quarantines on healthy people who may have been exposed, in order to halt the spread of the disease. In the first half of the 1950s, with no cure and no vaccine, more than 200,000 Americans were disabled by the poliovirus. The virus was second only to the atomic bomb as to what Americans feared most.



Science denial goes back at least as far as the polio vaccine in the 1950s.

Then, on April 12, 1955, public health officials at the University of Michigan announced that a “safe, effective, and potent” vaccine had been found. This set off a national celebration that recalled the end of World War II. Church bells rang, car horns honked, people wept with relief. President Dwight Eisenhower invited the vaccine’s inventor, Jonas Salk, to the White House. In a Rose Garden ceremony, the for-

mer Supreme Allied Commander told the scientist in a trembling voice, “I should like to say to you that when I think of the countless thousands of American parents and grandparents who are hereafter to be spared the agonizing fears of the annual epidemic of poliomyelitis, when I think of all the agony that these people will be spared seeing their loved ones suffering in bed, I must say to you I have no words in

which adequately to express the thanks of myself and all the people I know—all 164 million Americans, to say nothing of all the people in the world that will profit from your discovery.”

But, alas, not everyone joined the party and expressed such gratitude. One group in particular did not welcome the vaccine as a breakthrough. Chiropractors actively opposed the vaccination campaign that followed Salk’s triumph. Many practitioners dismissed the role of contagious pathogens and adhered to the founding principle of chiropractic that all disease originated in the spine. Just a few years after the introduction of the vaccine, as the number of polio cases was declining rapidly, an article in the *Journal of the National Chiropractic Association* asked, “Has the Test Tube Fight against Polio Failed?” It recommended that, rather than take the vaccine, once stricken, “Chiropractic adjustments should be given of the entire spine during the first three days of polio.”

Opposition to the polio vaccine and to vaccination in general continued in the ranks such that even four decades later, long after polio had been eradicated from the U.S., as many as one third of chiropractors still believed that there was no scientific proof that vaccination prevents any disease, including polio. That belief and resistance continue to this day, with some chiropractors campaigning against state vaccination mandates.

I was shocked when I first learned about chiropractors’ opposition to the polio vaccine. The vaccine is widely viewed as one of medicine’s greatest success stories: Why would anyone have opposed it? My shock turned into excitement, however, when I

began to recognize the chiropractors’ pattern of arguments was uncannily similar to those I was familiar with from creationists who deny evolutionary science.

And once I perceived those parallels, my excitement became an epiphany when I realized that the same general pattern of arguments—a denialist playbook—has been deployed to reject other scientific consensus from the health effects of tobacco to the existence and causes of climate change. The same playbook is now being used to deny facts concerning the COVID-19 pandemic.

In brief, the six principal plays in the denialist playbook are:

1. Doubt the Science
2. Question Scientists’ Motives and Integrity
3. Magnify Disagreements among Scientists and Cite Gadflies as Authorities
4. Exaggerate Potential Harm
5. Appeal to Personal Freedom
6. Reject Whatever Would Repudiate a Key Philosophy

The purpose of the denialism playbook is to advance rhetorical arguments that give the appearance of legitimate debate when there is none. My purpose here is to penetrate that rhetorical fog and to show that these are the predictable tactics of those clinging to an untenable position. If we hope to find any cure for (or vaccine against) science denialism, scientists, journalists and the public need to be able recognize, understand and anticipate these plays.

To illustrate how the playbook works—and sadly,

it is very effective—I will break down the chiropractor and creationist versions, which have endured for many decades in spite of overwhelming evidence, and point out parallels to the coronavirus rhetoric.

THE PLAYBOOK

1. Doubt the Science

The first tactic of denialism is to raise objections to scientific evidence or interpretations. This may take the form of seemingly legitimate specific arguments against a scientific claim. For example, chiropractors sought other explanations besides vaccine efficacy to account for the decline of infectious diseases: “The Center for Disease Control statistics make it clear that the majority of diseases that are now routinely vaccinated against were disappearing before either the cause was discovered or the vaccine developed,” stated a 1995 letter to the editor of *Dynamic Chiropractic* magazine. In polio’s case, this argument does not hold up against the facts that: (a) the disease was surging in the 1950s; (b) the vaccine was proven effective in a massive double-blind, placebo-controlled trial; and (c) infections declined precipitously after the introduction of the vaccine.

Alternatively, some statements are blanket arguments against an entire scientific discipline. For example, Henry Morris, whose 1961 book *The Genesis Flood* is credited with reviving the creationism movement, alleged: “Since there is no real scientific evidence that evolution is occurring at present or ever occurred in the past, it is reasonable to conclude that evolution is not a fact of science, as many claim. In fact, it is not even science at all, but an arbitrary system built upon faith in universal naturalism.”

2. Question Scientists' Motives and Integrity

As a growing body of consistent evidence can be hard to explain away, one fallback is to impugn the source. In the vaccination arena, this often takes the form of alleging financial conflicts of interest on the part of scientists, greed on the part of manufacturers, and complicity of government officials. "It appears that the scientific foundation on which these vaccines have been erected is fragile enough that only compulsory laws, expensive public relations efforts, outrageous propaganda, and expensive advertising must ensue for compliance to be maintained," wrote one author in *American Chiropractor*. Salk, by the way, filed no patent.

In the evolution arena, scientists are often accused of being part of a conspiracy to undermine religion through educational systems. Kenneth Cumming of the Institute for Creation Research objected to a PBS series on evolution by drawing a parallel to the 9/11 attackers: "America is being attacked from within through its public schools by a militant religious movement of philosophical naturalists (i.e., atheists) under the guise of secular Darwinism. Both desire to alter the life and thinking of our nation." One noteworthy counter to such assertions is the Clergy Letter Project, which has gained the support of more than 15,000 Christian clergy for the teaching of evolution.

3. Magnify Disagreements among Scientists and Cite Gadflies as Authorities

In all scientific arenas, there is honest disagreement about the interpretation of evidence. But these differences are deliberately inflated by denialists to

imply a lack of consensus on more fundamental points, while often propounding the contradictory views of a few unqualified outliers. An example of the latter is how some chiropractors have seized on the antivaccination stance of one critic, Viera Scheibner. Her claim that there is no evidence for vaccine efficacy or safety is cited repeatedly, while overlooking the fact that her training and expertise is in geology, not medicine.

In the evolution arena, differences of interpretation among scientists are relished by antievolution voices. For example, the initial discovery of a new fossil hominid usually elicits some different interpretations and expressions of uncertainty in the scientific community. Creationists often mischaracterize these normal dynamics of scientific discourse as "skepticism" over the significance of such finds so as to discount them. By overblowing legitimate disagreements and propounding "alternatives" to evolution, denialists often make appeals to "teach the controversy," when no such controversy exists in the scientific community. Different interpretations of a fossil do not negate the discomfiting evidence for the antiquity of human ancestors.

Antievolution leaders in the U.S. also include a small number of scholars whose credentials are in other disciplines. For example, the abovementioned Henry Morris was an engineer, not a biologist. Phillip E. Johnson, whose book *Darwin on Trial* inspired many adherents to the intelligent design movement, was a law professor with no formal training in biology.

A lack of credentials or status within the scientific community is often seen not as a liability but as a virtue. Scientists Pascal Diethelm and Martin McKee

note, "Denialists are usually not deterred by the extreme isolation of their theories, but rather see it as the indication of their intellectual courage against the dominant orthodoxy and the accompanying political correctness, often comparing themselves to Galileo."

4. Exaggerate Potential Harm

When the evidence contradicts a position, another recourse is to try to incite fear. No vaccine or medicine is 100 percent safe, without any risk of side effects. Chiropractors have long emphasized the potential side effects of vaccines, for example, in a statement in Dynamic Chiropractic offering a litany of possible effects: "death, encephalopathy, demyelinating diseases, brachial neuritis, Guillain-Barré syndrome, infections generated by vaccine agents, anaphylaxis, subacute sclerosing panencephalitis, seizure disorder, optic neuritis, arthritis," and so on. They generally fail to acknowledge, however, the serious consequences of infections that would be prevented by vaccination.

But what harm could arise from knowing a bit about evolution? Well, Hitler, of course! "Of the many factors that produced the Nazi Holocaust and World War II," wrote one critic in the *Journal of Creation*, "one of the most important was Darwin's notion that evolutionary progress occurs mainly as a result of the elimination of the weak in the struggle for survival." It is an oft-repeated argument that has no bearing, of course, on the veracity of Darwin's theory.

Vaccination foes have lobbed similar accusations, likening physicians who administer vaccines to Nazi doctors and alleging that vaccines violate the 1947 Nuremberg Code of medical ethics.

5. Appeal to Personal Freedom

If fear is not persuasive, there is another fallback position that resonates strongly with Americans: the freedom of choice. The American Chiropractic Association leaned on this cherished notion when it established its official vaccination policy:

“Since the scientific community acknowledges that the use of vaccines is not without risk, the American Chiropractic Association supports each individual’s right to freedom of choice in his/her own health care based on an informed awareness of the benefits and possible adverse effects of vaccination. The ACA is supportive of a conscience clause or waiver in compulsory vaccination laws... providing an elective course of action regarding vaccination.”

Likewise, the International Chiropractic Association “questions the wisdom of mass vaccination programs” and views compulsory programs as an infringement of “the individual’s right to freedom of choice.”

Similarly, the teaching of evolution in public schools is viewed as an assault on the religious freedom of those who oppose it. Those holding this view advocate for disclaimers on textbooks (“just a theory”), the teaching of “alternative” views of the history of life (Genesis or intelligent design), or the freedom to opt out of the evolution curriculum of biology classes.

Notably, the U.S. Supreme Court has rejected challenges to compulsory vaccination partly on the grounds that individual belief cannot subordinate the safety of an entire community. And U.S. courts have repeatedly struck down attempts to subvert the teaching of evolution as religiously motivated and

violations of the establishment clause of the First Amendment of the U.S. Constitution.

6. Reject Whatever Would Repudiate a Key Philosophy

Once the courts have spoken and the scientific evidence grows to be overwhelming, one might think that denialists would be out of plays. But there is one last line of defense that reveals the nucleus of denial: It is not that some scientific claim is untrue; it is that it is unacceptable in light of some philosophical commitment. The science must be summarily rejected.

Chiropractic was founded in the early 20th century on the assertion that all disease has its origins in misalignments of the spine. “Chiropractors have found in every disease that is supposed to be contagious, a cause in the spine,” claimed Bartlett Joshua Palmer, the son of chiropractic founder Daniel David Palmer. Acceptance of germ theory and vaccination would repudiate the founding premise of the profession that all disease stems from vertebral misalignments. Therefore, that premise cannot be questioned.

With respect to evolution, Henry Morris made it plain: “When science and the Bible differ, science has obviously misinterpreted its data.”

Any credence granted to evolutionary science is a threat to a worldview based on interpretation of the Bible; David Cloud, a publisher of Bible study materials, argues: “If the Bible does not mean what it says, there is no way to know what it does mean.”

Historian of science and author Naomi Oreskes has coined a term for this stance: “implicatory denial”—the rejection of scientific findings because we don’t like their implications.

As these positions are reinforced by family or community, they harden into part of one’s identity. “In this way, cultural identity starts to override facts,” Norwegian climate psychologist Per Espen Stoknes has said. “And my identity trumps truth any day.”

Psychologists Elliot Aronson and Carol Tavis write in the *Atlantic*: “[W]hen people feel a strong connection to a political party, leader, ideology, or belief, they are more likely to let that allegiance do their thinking for them and distort or ignore the evidence that challenges those loyalties.”

The denialist playbook is now erupting around the coronavirus. Although COVID-19 is new, the reactions to public health measures, scientific claims and expert advice are not. Attitudes and behaviors concerning the threat posed by the coronavirus (doubting the science), the efficacy of lockdowns and mask wearing (freedoms being eroded) and alternative treatments (gadflies over experts) are being driven as much or more by rhetoric than by evidence.

Polls indicate that despite the devastating health and economic impacts of the pandemic, with respect to a potential vaccine we are nowhere near as united as Americans were in 1955. But as epidemiologist Michael Osterholm noted in June, “Eventually there won’t be any blue states or red states. There won’t be any blue cities or red rural areas. It’ll all be COVID colored.”

Now, sadly, there is no denying that.

Stephen Macknik and **Susana Martinez-Conde** are professors of ophthalmology at the State University of New York and the organizers of the Best Illusion of the Year Contest. They have co-authored *Sleights of Mind: What the Neuroscience of Magic Reveals about Our Everyday Deceptions* and *Champions of Illusion: The Science behind Mind-Boggling Images and Mystifying Brain Puzzles*.

Out of the Woods

Using natural timbers to make the impossible tangible

In 1954 Nobel Laureate Roger Penrose, then a young mathematician, visited an exhibition on Dutch artist M.C. Escher. Inspired by Escher's art, Penrose devised the impossible figure known as the tribar (independently from Oscar Reutersvärd, its first creator) and sent his sketch to the artist. Escher then embedded Penrose's design into his work *Waterfall*, further blurring the line between math and art.

Following in Escher's footsteps, Australian artist Michael Cheshire routinely turns geometry into the art of the impossible, using one of the earliest and most concrete materials: wood. It all started in the early 1970s with a Rotring Rapidograph high-precision pen, says Cheshire at his workshop in Brisbane. Later, in the 1990s, a book on impossible figures provided "understanding and inspiration." That discovery, along with newly available computer-drawing software, allowed Cheshire to develop his

unique art style. "I made a table with small bits of veneer, and I was hooked," he recalls.

Cheshire thinks of his creations as wall sculptures that translate "the latest thinking to a tactile, primitive medium." His personal connection to the rain forests of the Australian Outback near Brisbane has been key to his artistry. Using the local timbers to build his own home, Cheshire found the wood tones delightful, ranging in brightness and color from pale yellow to brown to deep red. He discovered veneers and realized that he could arrange the natural timber colors in the correct sequences and patterns to achieve myriad geometric illusions.

Today Cheshire's creations start with an original design rendered in software, which determines the number, size and shape of the veneer chips he must make from each type of wood. He then cuts the veneers with a scroll saw, making manual adjustments to perfect the fit between the wood in each pattern. For the last step, Cheshire lays out the veneers and glues them on a medium-density fiberboard, which he finally backs with more veneers. "I do have a lot of setbacks as the wood can splinter easily," he explains.

Cubic Nonsense, Cheshire's most re-



● ILLUSIONS

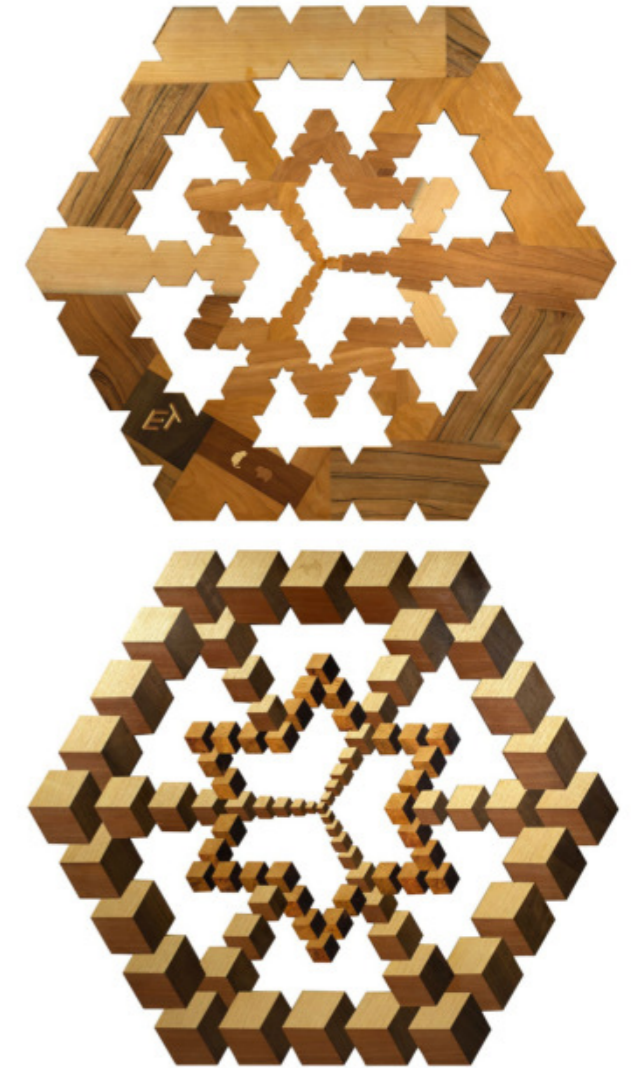
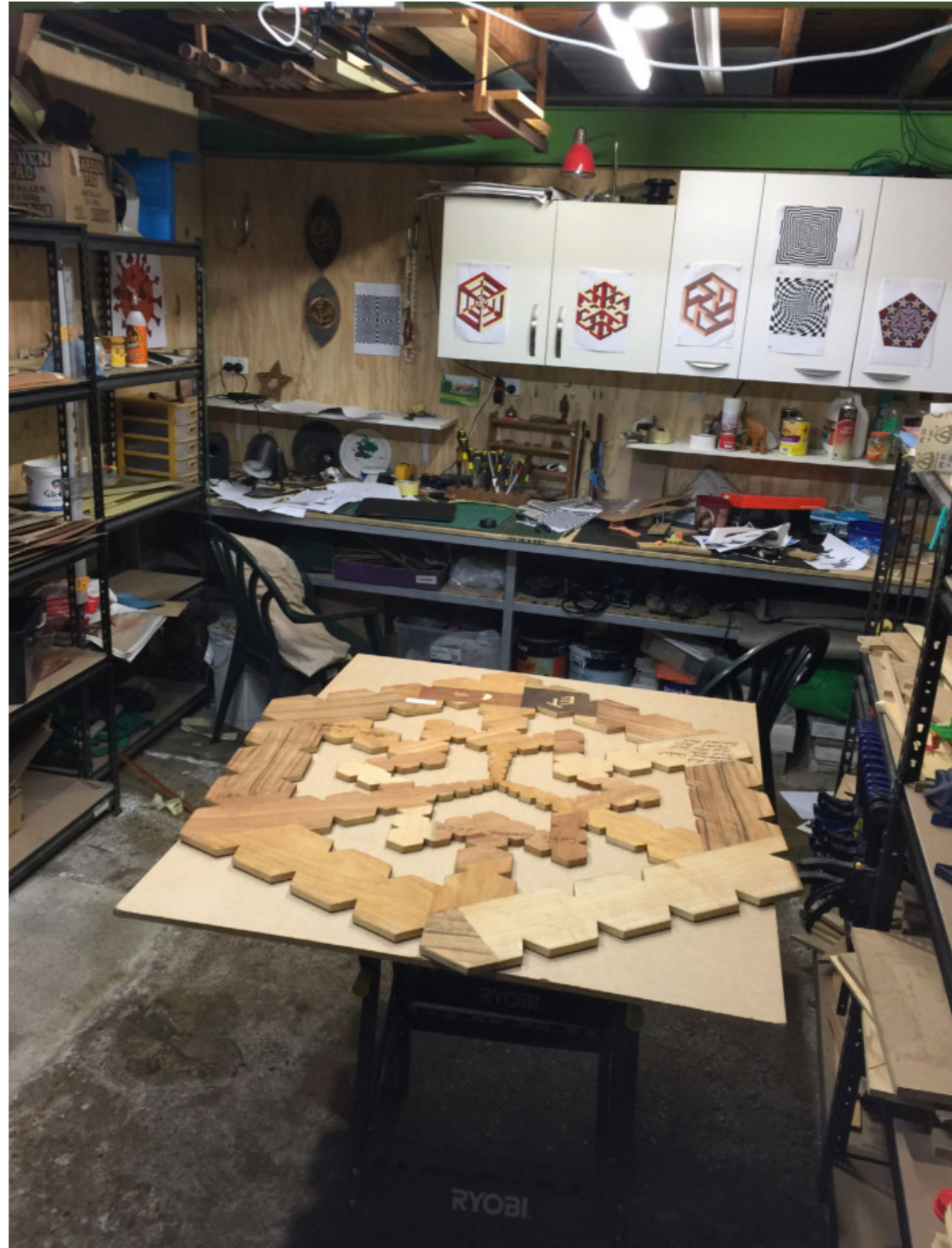
cent creation, featured [here](#), conjoins six different types of native woods into a locally reasonable, yet globally impossible figure. The unassuming, palpable pieces of veneer coalesce into a three-dimensional, emergent form that defies human comprehension.

Cheshire's impossible art exemplifies how our brains construct global percepts by sewing together multiple local percepts—in this case, individual veneers. If the relation between local elements is viable, our neural circuits will not hesitate to generate an overall form that is not.

On Facebook, Cheshire's followers grew so puzzled that they demanded to see the back of the artwork. Cheshire was only happy to comply, revealing that the ostensibly unsolvable, apparently hovering multicubed sculpture is made of a flat board.

"I love that people can look at a still picture and have strong experiences, sometimes feeling nauseous. With impossible figures not having a focal point people tend to go round and round," he says.

Cubic Nonsense, 2020, by Michael Cheshire. Silver ash (*Flindersia schottiana*), Queensland walnut (*Endiandra palmerstonii*), blush alder (*Sloanea australis*), hoop pine (*Araucaria cunninghamii*), Jarrah (*Eucalyptus marginata*), rosewood (*Pterocarpus indicus*), 1,400 mm x 1,200 mm.



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