

TRUSTED SCIENCE IN A POLARIZED, UNCERTAIN WORLD?

Dietram Scheufele
Investigator – Morgridge

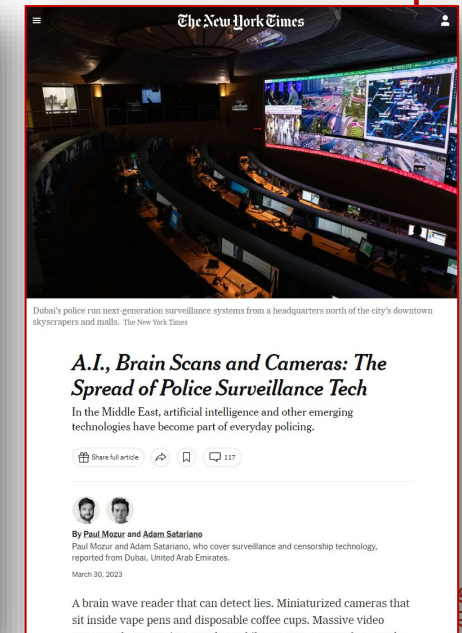
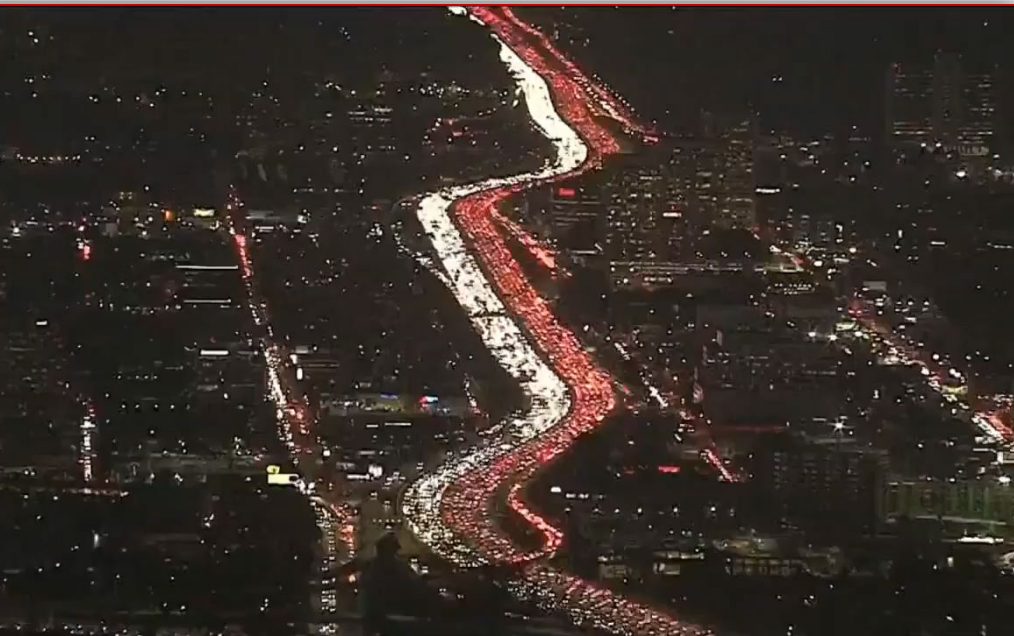


- A new era for science ... and society?
- Three challenges
 - When facts meet values
 - Communicating uncertainties
 - Expertise vs. advocacy
- A handful of thoughts on moving forward



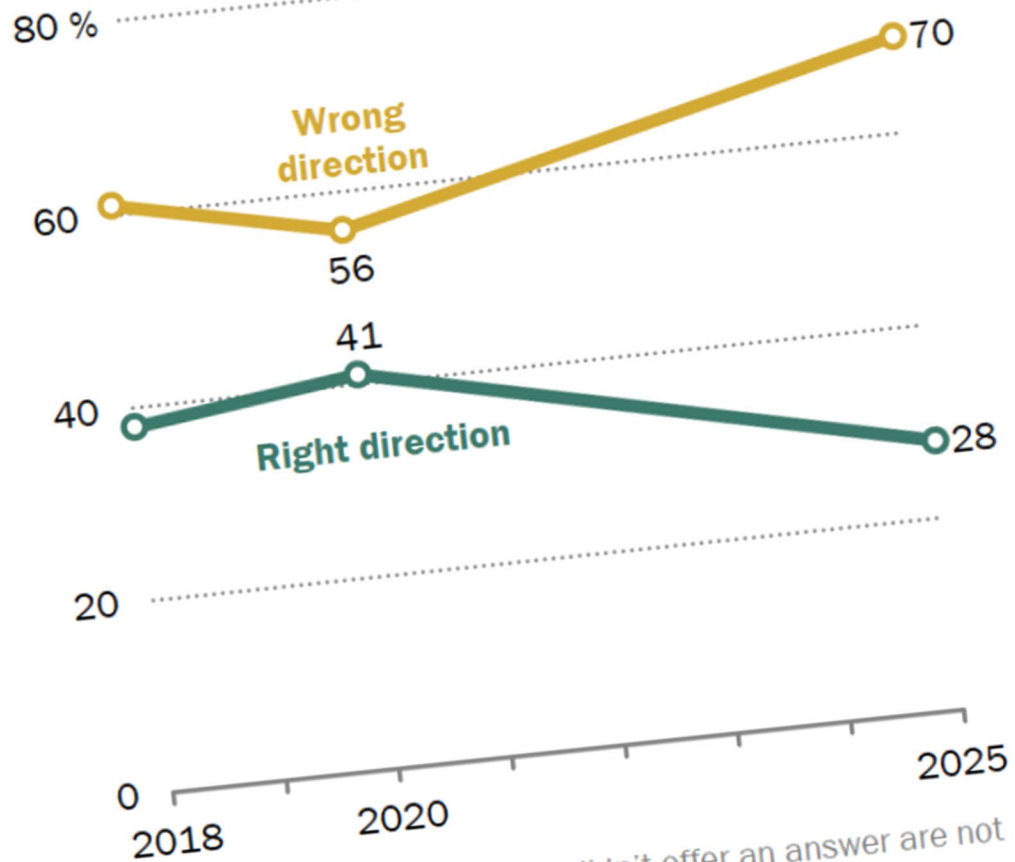
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OUR NEW NORMAL: “WICKED PROBLEMS,” I.E., POLICY DILEMMAS THAT SCIENCE CAN INFORM BUT NOT SOLVE



7 in 10 Americans now say U.S. higher education is going in wrong direction

% saying the higher education system in the U.S. is generally going in the ...



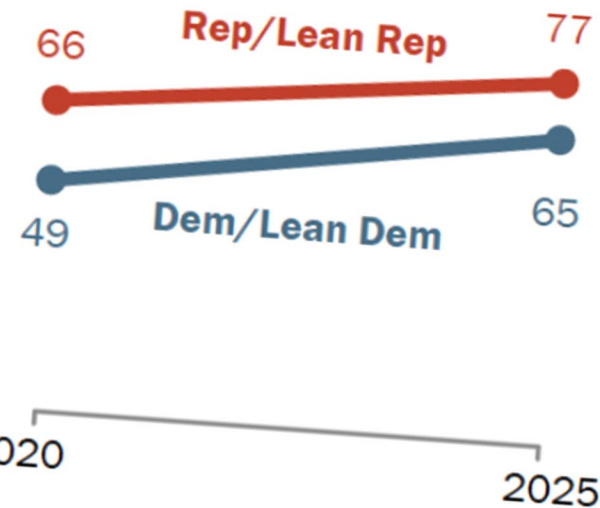
Note: Shares of respondents who didn't offer an answer are not shown.

Source: Survey of U.S. adults conducted Sept. 22-28, 2025.

U.S. HIGHER EDUCATION'S FAILING CONTRACT WITH SOCIETY

Views of higher education have turned more negative in both parties

% saying the higher education system in the U.S. is generally going in the **wrong direction**



Source: Survey of U.S. adults conducted Sept. 22-28, 2025.

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Survey Center
on American Life



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THE GOOD NEWS: THERE ARE FEW TRULY “ANTI-SCIENCE” ... OR EVEN ANTI-SCIENCE PARTISAN ACTORS

Séralini et al. *Environmental Sciences Europe* 2014, **26**:14
<http://www.enveurope.com/content/26/1/14>

RESEARCH

Republished study: Roundup herbicide and genetically modified

Gilles-Eric Séralini^{1*}, Emilie Clair¹, Robin Mesnage²,
Didier Hennequin³ and Joël Spiroux de Vendeville¹

Abstract

Background: The health effects of a Roundup (glyphosate and adjuvants) in diet, cultivated with or without Roundup ap containing glyphosate and adjuvants) in diet, follow-up investigation of a 90 day feeding, this GMO, employing the same rat strain an per group as our investigation. Our research observations including tumors are reported. We report the major findings with 34 organ

Results: Biochemical analyses confirmed ve 76% of the altered parameters were kidney times higher. Marked and severe nephropat groups showed a two- to threefold increa three male groups fed with GM maize. All were comparable. Females developed larg the second most disabled organ; the sex treatments. Males presented up to four ti group, in which only one tumor was not disrupting effects of Roundup but also b GM maize and their metabolic consequ

Conclusion: Our findings imply that lon safety of GM foods and pesticides in the

Keywords: Genetically modified; GMO;

Early report

Ileal-lymphoid-nodular pervasive developmen

A J Wakefield, S H Murch, A Anthony, P Harvey, A Valentine, S E Davies, J A

Summary

Background We investigated a co children with chronic enterocolit developmental disorder.

Methods 12 children (mean age 6 y boys) were referred to a paediatric with a history of normal developme acquired skills, including language, and abdominal pain. gastroenterological, neurological assessment and review of ileocolonoscopy and biopsy sampl imaging (MRI), electroencephalog puncture were done under sedati radiography was done where haematological, and immun examined.

Findings Onset of behavioural by the parents, with meas vaccination in eight of the infection in one child, and oti children had intestinal at lymphoid nodular hyperplas Histology showed patchy chr in 11 children and reactive seven, but no granulomas. autism (nine), disintegrative postviral or vaccinal encef focal neurological abnorma were normal. Abnormal lab raised urinary methylmal matched controls. Up=6 children, and low S

Interpretation We ident disease and developme previously similar child in time and possible env

Lancet 1998; **351**: 637-44
See Commentary page

Inflammatory Bowel Dise of Medicine and Histopat J J Ince, A D Phillips



Research article

Quasi-universal accepta science in the United S

Jan Pfänder¹, Lou Kerzrek² and Hugo Mercier¹

Institut Jean Nicod, Département d'études cognitives, ENS

Abstract

Substantial minorities of the population report a low theories that violate basic scientific knowledge. This r four studies, we asked 782 US participants questions a science (e.g. the relative size of electrons and atoms). consensual answer to the basic science questions, and scientific consensus was very high in the sample as a wh trust in science: 87.3%; complete endorsement of flat Ear of basic science suggests that people are motivated to rej whole. This could be leveraged in science communication.

Keywords

conspiracy theories, conspiracy thinking, science knowledge

1. Introduction

Trust in science is related to many desirable outcomes, from acceptance of anthropogenic climate change (Cologna and Siegrist, 2020) or vaccination (Lindholt et al., 2021; Sturgis et al., 2021) to following recommendations during COVID (Algan et al., 2021, who suggest that trust in science was the most important predictor of these behaviors).

Although recent global evidence shows that trust in science is moderately high (e.g. 87.3% in the United States), it is far from being at ceiling. Large-scale polls who degree of trust in science are rare. We conducted a survey of 782 US participants who

“Acceptance of the scientific consensus was very high in the sample as a whole (95.1%), but also in every sub-sample (e.g. no trust in science: 87.3%; complete endorsement of flat Earth theory: 87.2%) ... [P]eople are motivated to reject specific scientific beliefs, and not science as a whole.”

in the United States. *Public Understanding of Science*, 35(2), 144-158.

WHY WE ALL LOOK AT THE WORLD DIFFERENTLY

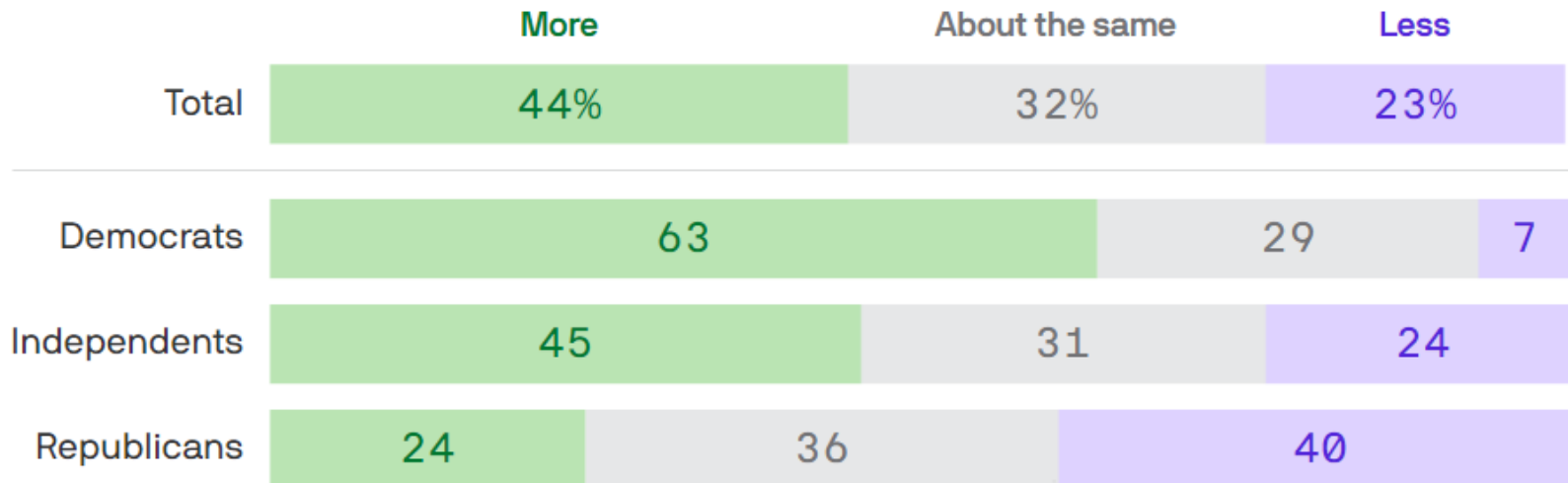
Scheufele, D. A. (2014). Science communication as political communication. *Proceedings of the National Academy of Sciences*, 111(Supplement 4), 13585-13592. doi:10.1073/pnas.1317516111



- Motivated reasoning
 - (Dis)confirmation biases
 - Biased assimilation
- Why: Identity protection
- The same piece of (scientific) information means different things to all of us ...

Do you believe the number of Americans dying from COVID-19 is more, less, or about the same as the reported number?

Survey of 1,012 U.S. adults conducted May 1–4, 2020. Reported number in question was 61k deaths as of April 30, 2020.



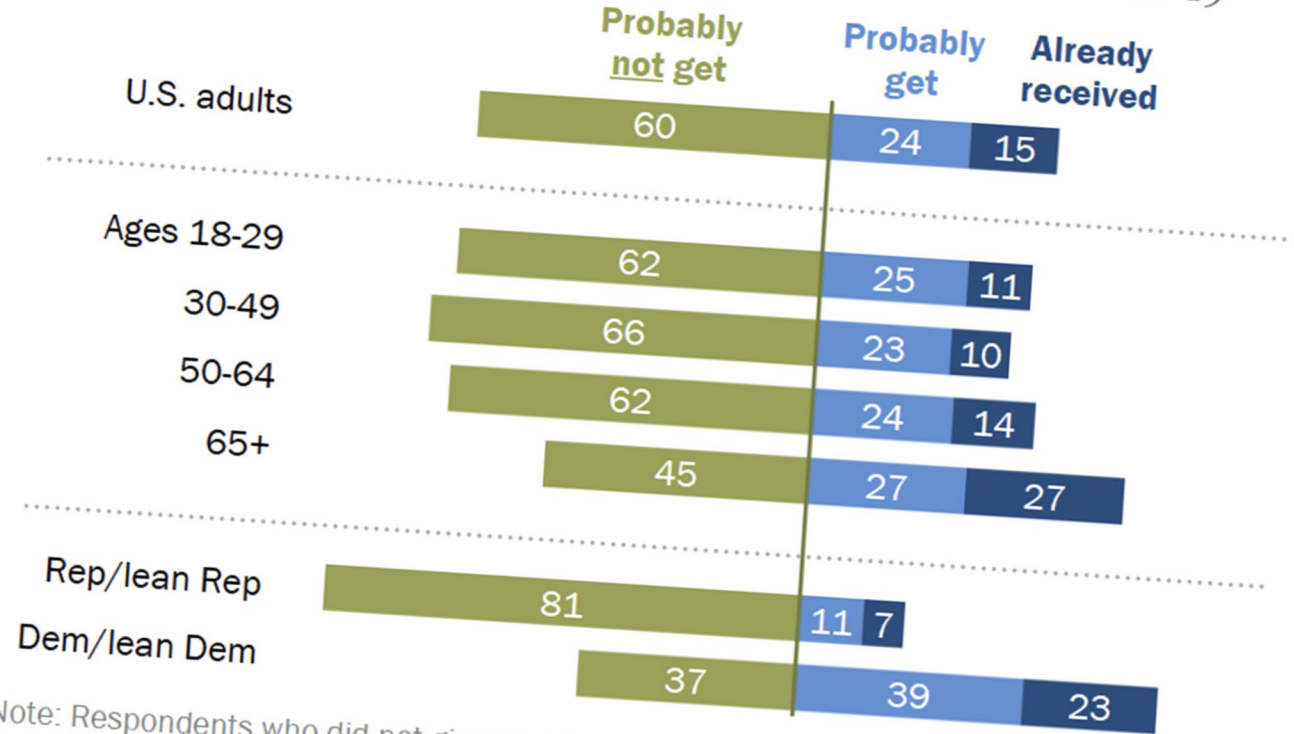
PARTISAN VACCINE ATTITUDES PRE AND POST COVID ...

In order for the measles vaccine to do its job, **92 percent** of a population must be immunized. But at 6 of 12 daycare centers affiliated with Bay Area tech and biotech companies, vaccination rates are below



Democrats more likely than Republicans to say they will get or have gotten an updated COVID-19 vaccine

% of U.S. adults who say they will ___ an updated vaccine for COVID-19



Note: Respondents who did not give an answer are not shown.
Source: Survey of U.S. adults conducted Oct. 21-27, 2024.

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The typical American TikTok user doesn't follow a single journalist or traditional media outlet

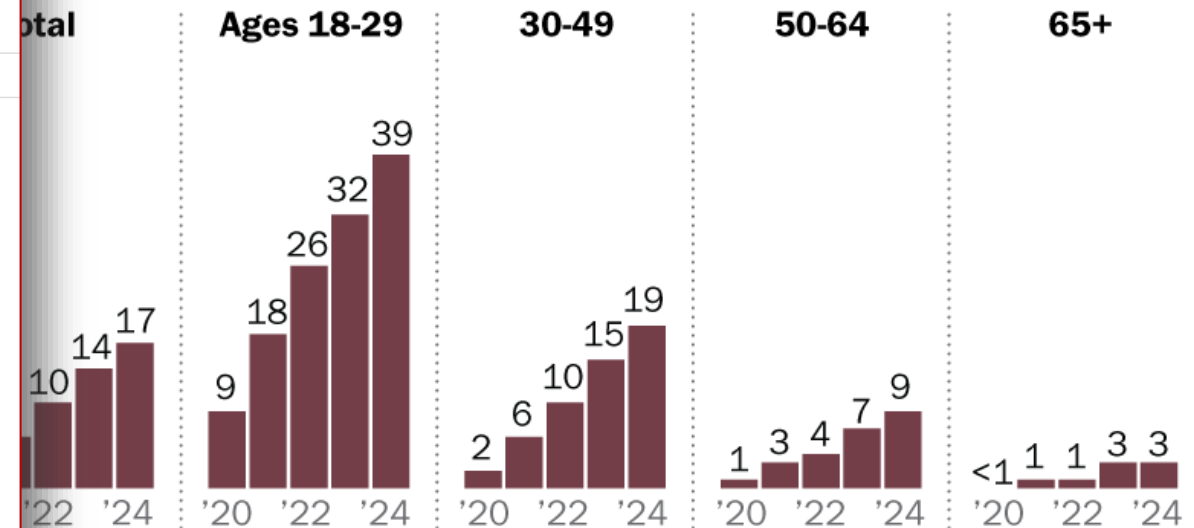
LINK: WWW.PEWRESEARCH.ORG | POSTED BY: SARAH SCIRE | OCTOBER 9, 2024

Pop culture, viral dances, and comedy are big on TikTok. News and politics? Not so much.

A new report from the Pew Research Center finds that Americans on TikTok follow very few politicians, journalists, or traditional media outlets. In fact, the typical U.S. adult on TikTok follows *zero* accounts in those categories.

About 4 in 10 young adults in the U.S. now regularly get news on TikTok

U.S. adults who **regularly** get news from TikTok, by age group



Source: Survey of U.S. adults conducted July 15-Aug. 4, 2024.

PEW RESEARCH CENTER

"BESPOKE" AI WILL MAKE FILTER-BUBBLED SORTING EVEN MORE EFFECTIVE

NEWS + TECH

Google is at the news you pick the new Search's top

by **Emma Roth**

Aug 12, 2025, 11:00 AM

[Link](#) [Facebook](#) [Twitter](#)

TE

AI

Google's Daily Discover feed

Aisha Malik — 8:03 AM PST ·

IMAGE CREDITS: SEAN GALLUP

Google is testing a new automatically generated Discover feed. The company says that Daily Listen is a new experience that is designed to show you the topics you care about.

Google The Keyword

In this story

Expanded Personal Intelligence

Finally, for AI to be most helpful, it shouldn't just know how to understand your context, too. So today, we're expanding it to help more people in nearly 200 countries and territories. You can securely connect apps like Google Calendar. Personal Intelligence was designed with you in mind. You're always in control — you choose if and when you want to use Google Photos.

This is the next chapter of Google Search: it's now working for you. So ask whatever's on your mind before. 

COLLECTION



PERSPECTIVES

SCIENCE COMMUNICATION

The chronic growing pains of science online

Scientists have not yet adapted to new information environments

By **Dominique Brossard^{1,2}** and **Dietram A. Scheufele^{1,2}**

Almost a decade ago, we wrote, "Without applied research on how to best communicate science online, we risk creating a future where the dynamics of online communication systems have a stronger impact on public views about science than the specific research that we as scientists are trying to communicate" (1). Since then, the footprint of subscription-based news content has slowly shrunk. Meanwhile, microtargeted information increasingly dominates social media, curated and prioritized algorithmically on the basis of audience demographics, an abundance of digital trace data, and other consumer information. Partly as a result, hyperpolarized public attitudes on issues such as COVID-19 vaccines or climate change emerge and grow in separate echo chambers (2). Scientists have been slow to adapt to a shift in power in the science information ecosystem—changes that are not likely to reverse.

The business-as-usual response to this challenge from many parts of the scientific community—especially, since the early days of the internet, from the

ence. To be fair, this has been driven most recently by a demand from policy-makers and from audiences interested in policy and decision-relevant science during the COVID-19 pandemic.

Unfortunately, social science research suggests that rapidly evolving online information ecologies are likely to be minimally responsive to scientists who upload to TikTok or YouTube. In highly contested national and global information environments, the scientific community is just one of many voices competing for attention and public buy-in about a range of issues, from COVID-19 to artificial intelligence to genetic engineering, among other topics. This competition for public attention has produced at least three urgent lessons that the scientific community must face as online information environments rapidly displace traditional, mainstream media.

One challenge is for scientists to break free from informational homophily. Since the early days of the internet, scientists have

of the scientific community's more ambitious and resource-intensive efforts to communicate science online, such as science series that have been both streamed online and broadcast on television, were heavily favored by audiences that are likely to be receptive to the messages of scientists already showing that they can do better, scientists often argue that "[i]ntangible measures... may matter most" (8) and give in to the inherently unscientific temptation to turn to personal anecdotes as a defense against inconvenient empirical data that tell them how to do better.

Scientists' homophilic self-sorting online has another, more subtle siloing effect. Social media platforms have provided a temptation for science journalists, scientists, and other science-affiliated actors to follow and retweet each other in an online environment that looks very much like the rest of the





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WHEN UNCERTAIN SCIENCE MEETS URGENT PUBLIC POLICY

WIRED

BUSINESS CULTURE GEAR MORE ▾

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ADAM MARCUS

IVAN DRANSKY

IDEAS 03.28.2020 07:00 AM

The Science of This Pandemic Is Moving at Dangerous Speeds

Much of the research that emerges in the coming weeks will turn out to be unreliable, even wrong. We'll be OK if we remember that.



The New York Times

Outbreak > **LIVE** Latest Updates Maps and Cases What is Dexamethasone? Reopenings by State Emissions Surge Back

Scientists Take Aim at Another Coronavirus Study in a Major Journal

A report on masks relied on unfounded assumptions, researchers charged, and the authors were permitted to choose their own reviewers.



conclusion that masks prevent viral transmission was supported by other methodology was deeply flawed. Demetrius Freeman for The New York Times

AND NO, COVID DID NOT SHOWCASE THE SELF-CORRECTING NATURE OF SCIENCE ...

THE CONVERSATION
academic rigor, journalistic flair
Arts + Culture Economy Education Environment

HYDROLYSIS
200 M
SUBSTITUTED

Retractions and the process as it should
Published: July 6, 2020 8:12am EDT Up

A high-profile paper on the risks of hydros...

Leer en español
Several high-profile papers have been under fire for weeks. Two have been taken by COVID-19 calling for the behaviors that...

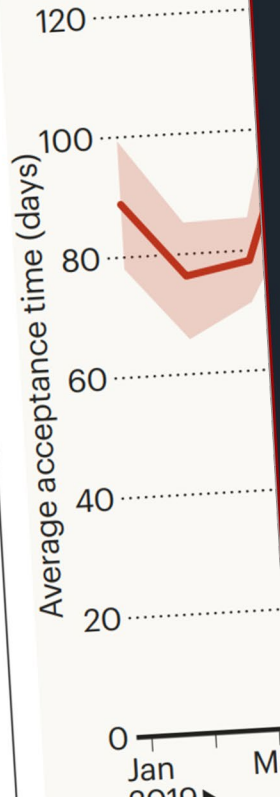
PREPRINT AT <https://arxiv.org/abs/2010.02594> (2020). UNEQUAL BURDEN: F. SQUAZZONI ET AL.

SPEEDY REVIEW

Journals rushed to get COVID-19 articles reviewed. A study of the year found that papers much faster publishing other

Publications:

— Total — COVID



Science

Laura Ingraham @IngrahamAngle · Jun 3
Next time they say "trust the science," remember this: Governments and WHO changed Covid-19 policy based on suspect data from tiny US company | World news | The Guardian

THE LANCET

The NEW ENGLAND JOURNAL of MEDICINE

The Guardian

Governments and WHO changed Covid-19 policy based on suspect data... Surgisphere, whose employees appear to include a sci-fi writer and adult content model, provided database behind Lancet and New England ...
theguardian.com

219 1.9K 4K Tip



... REGARDLESS OF POLITICS, "JUST FOLLOW THE SCIENCE" IS AN UTTERLY UNPRODUCTIVE MANTRA



The New York Times

GIVE THE TIMES Account ▾

Times

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AstraZeneca COVID-19
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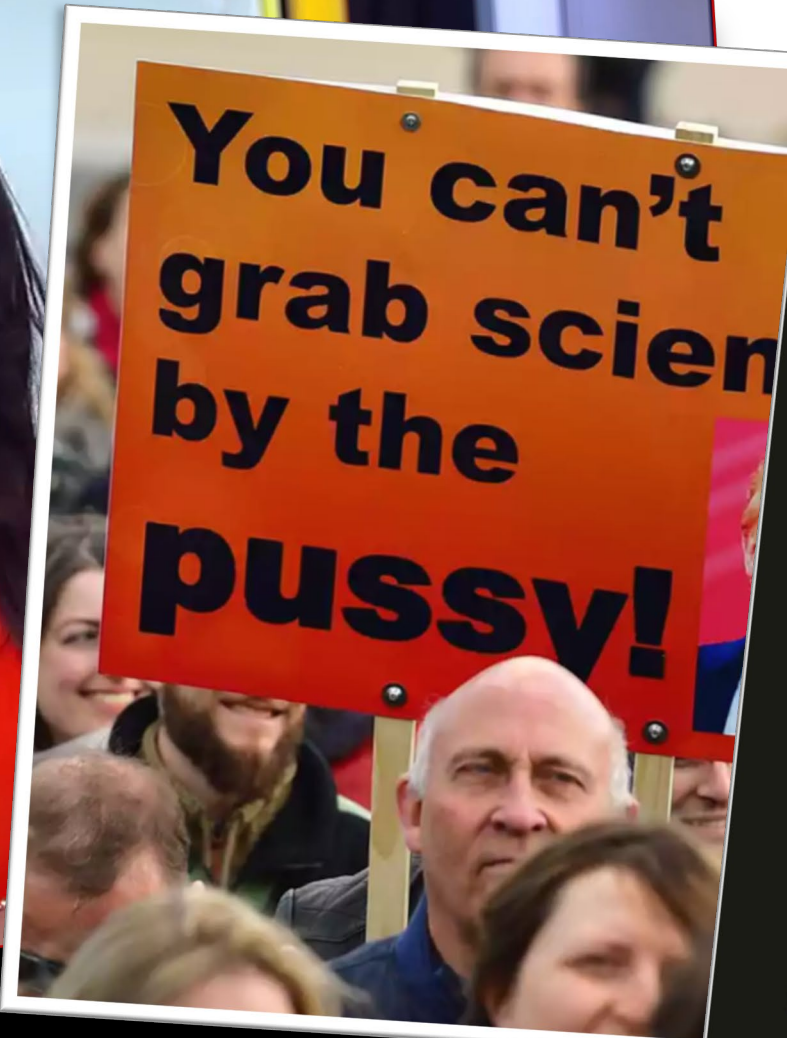


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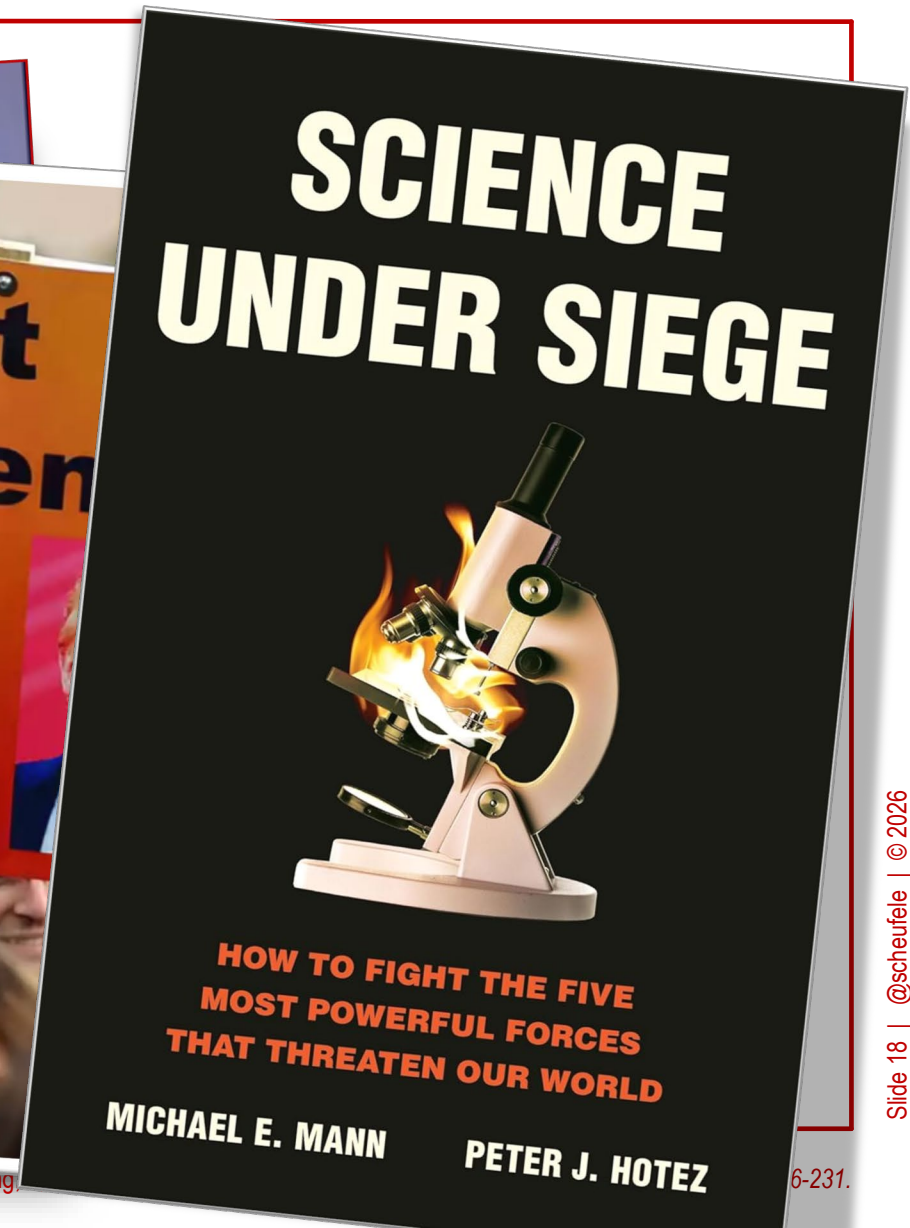
THAT'S WHY IDENTITY POLITICS IS KRYPTONITE FOR SCIENCE



9:47 AM · Nov 5, 2022



Krause, N. M., Scheufele, D. A., Freiling,

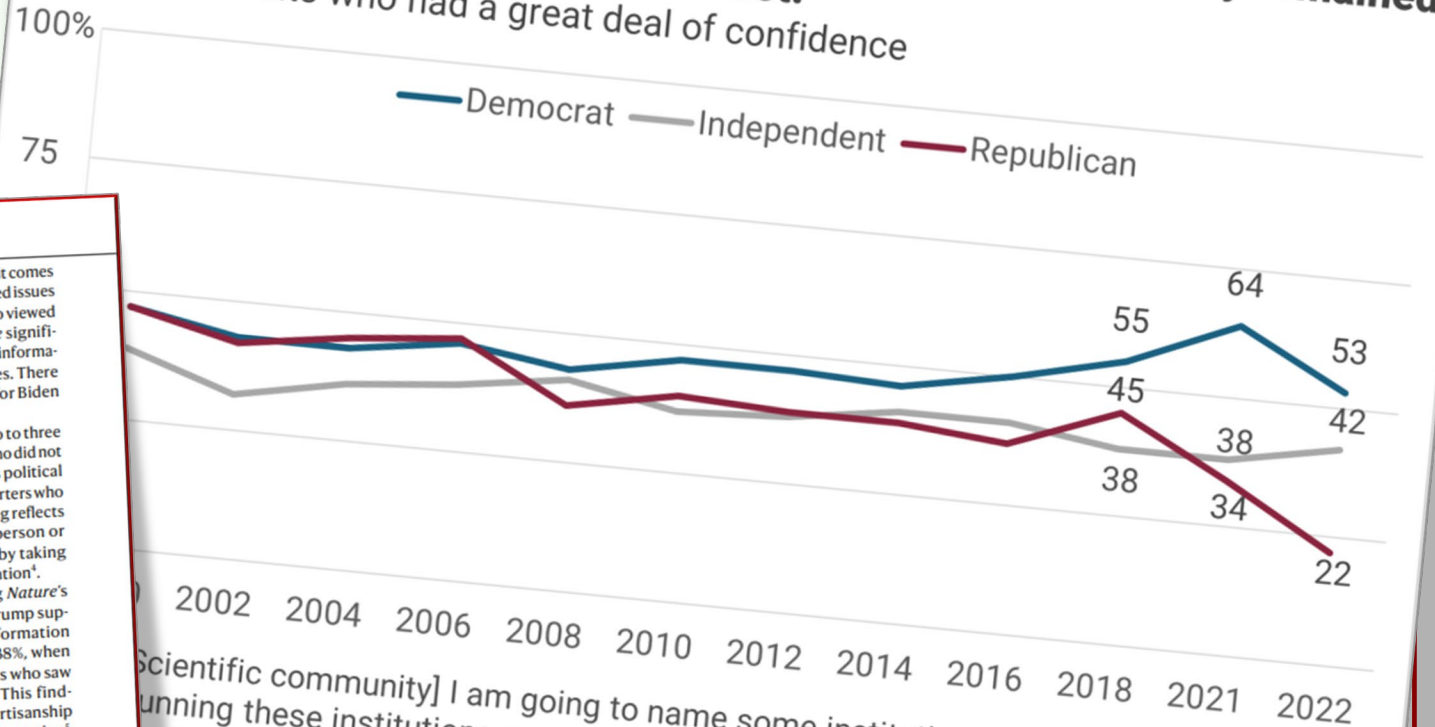


SCIENTIFIC INSTITUTIONS AT RISK OF BECOMING JUST ANOTHER INSTITUTION WE DON'T TRUST?

Average Confidence in Major U.S. Institutions 1979-2025

Figures are the average percentages of each

Large partisan gap on confidence in the scientific community remained as Republicans continued to lose trust.
Percent of adults who had a great deal of confidence



News & views

Social science

Political endorsements can affect credibility

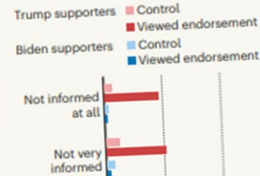
Arthur Lupia

In 2020, *Nature* endorsed Joe Biden in the US presidential election. A survey finds that viewing the endorsement did not change people's views of the candidates, but caused some to lose confidence in *Nature* and in US scientists generally.

We live in an era in which there are many attempts to politicize science. Some scientists are concerned that such attempts will reduce both public confidence in science¹ (see also go.nature.com/3tpscrs) and people's willingness to rely on scientific information to manage challenges such as a pandemic. *Nature* was one of several prominent scientific publications to endorse Joe Biden in the 2020 US presidential election, adding a political element to a publication that derives its credibility from science. How did *Nature*'s endorsement affect people who viewed it? Writing in *Nature Human Behaviour*, Zhang² describes an experiment that asks this question, revealing that some who saw the endorsement lost confidence in the journal as a result. This topic is important because, if people believe that political forces might introduce bias or inaccuracy into research claims, they might also think it is riskier for them to trust

information about COVID-19 from *Nature* or from other sources.

Overall, the study provides little evidence that the endorsement changed participants' views of the candidates. However, showing the endorsement to people who supported Trump did significantly change their opinion of *Nature*. When compared with Trump supporters who viewed *Nature*'s formatting announcement, Trump supporters who viewed the endorsement rated *Nature* as



significantly less well informed when it comes to "providing advice on science-related issues facing the society" (Fig. 1). Those who viewed the endorsement also rated *Nature* significantly lower as an unbiased source of information on contentious or divisive issues. There was no comparable positive effect for Biden supporters.

These effects, moreover, were two to three times larger for Trump supporters who did not initially expect *Nature* to make this political endorsement than for Trump supporters who fully expected it. This type of finding reflects other research indicating that a person or organization can lose credibility by taking actions that contradict their reputation³.

Zhang also found that viewing *Nature*'s political endorsement reduced Trump supporters' willingness to obtain information about COVID-19 from *Nature* by 38%, when compared with Trump supporters who saw the formatting announcement. This finding echoes other work on how partisanship influences interest in scientific information⁴. Furthermore, Trump supporters who viewed the endorsement also rated US scientists, in general, as much less well informed and unbiased than did Trump supporters who viewed the formatting article. There was no comparable positive effect for Biden supporters.

Like any study of this kind, design elements limit the results' generalizability⁵. First, the study focuses on a single political endorsement from a single scientific publication in a single election. The study offers no evidence for what would happen if a different publication made the same endorsement or if *Nature* made a different type of endorsement in a different election. Zhang did not collect data on how the endorsement might have altered the views of readers outside the United States,

Scientific community] I am going to name some institutions in this country. As far as running these institutions are concerned, would you say you have a great deal of only some confidence, or hardly any confidence at all in them? General Social Survey, the latest conducted May 5 - December 20, 2022.

APNORC.org

Scheufele, D. A., Freiling, I., & Brossard, D. (2021). The trust fallacy. *American Scientist* (July-August), 228-231.

“Science gets lost ... when politically convenient claims are defended longer than they should be because correcting them would help the “wrong” people ... [T]he greatest threat to science in politics is not always an external attack. Sometimes it is internal over-identification.”

- Questions? Pushback? Observations?
- Two or three questions, specifically:
 - Where is the distinction – if there is one – between advocacy and effective science communication ...
 - ... and is there a bright red line that scientists shouldn’t cross?
 - What about the idea of epistemic trespassing?

- 
- A new era for science ... and society?
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 - A handful of thoughts on moving forward
 - It's not all about knowledge ...

WHAT OUR INSTINCTS TELL US (AND WHAT MANY SCIENTISTS STILL GO BY)



- “Knowledge deficit models”
- Assumption
 - If people were only more informed, they would be more supportive of science
 - Effective communication is about informing the consumer
- Unfortunately, that’s *not* how most of us make decisions about most issues ...

WE DO OR DON'T DO A LOT OF THINGS IN SPITE OF KNOWING THAT SCIENCE TELLS US OTHERWISE



- 
- A new era for science ... and society?
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 - ... especially if our knowledge is not (yet) reliable

WHAT IF OUR FACTS TURN OUT TO BE WRONG, OVERHYPED ... OR BOTH



- Dec. 2, 2010: NASA-supported researchers Felisa Wolfe-Simon and her colleagues report a new type of bacterium – GFAJ-1
- NASA press release (on forthcoming *Science* article): “This finding ... will alter biology textbooks and expand the scope of the search for life beyond Earth.”

RESEARCH ARTICLE

A Bacterium That Can Grow by Using Arsenic Instead of Phosphorus

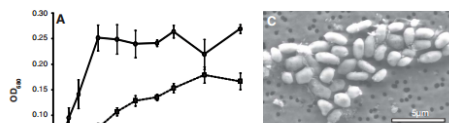
Felisa Wolfe-Simon,^{1,2,*} Jodi Switzer Blum,² Thomas R. Kulp,² Gwyneth W. Gordon,³ Shelley E. Hoefft,⁴ Jennifer Pett-Ridge,⁵ John F. Stolz,⁶ Samuel M. Webb,⁶ Peter K. Weber,⁴ Paul C. W. Davies,^{1,2} Ariel D. Anbar,^{1,3,4} Ronald S. Oremland²

Life is mostly composed of the elements carbon, hydrogen, nitrogen, oxygen, sulfur, and phosphorus. Although these six elements make up nucleic acids, proteins, and lipids and thus the bulk of living matter, it is theoretically possible that some other elements in the periodic table could serve the same functions. Here, we describe a bacterium, strain GFAJ-1 of the Halomonadaceae, isolated from Mono Lake, California, that is able to substitute arsenic for phosphorus to sustain its growth. Our data show evidence for arsenate in macromolecules that normally contain phosphate, most notably nucleic acids and proteins. Exchange of one of the major bio-elements may have profound evolutionary and geochemical importance.

Biological dependence on the six major nutrient elements carbon, hydrogen, nitrogen, oxygen, sulfur, and phosphorus (P) is complemented by a selected array of other elements, usually metals or metalloids present in trace quantities that serve critical cellular functions, such as enzyme co-factors (1). There are many cases of these trace elements substituting for one another. A few examples include the substitution of tungsten for molybdenum and cadmium for zinc in some enzyme families (2, 3) and copper for iron as an oxygen-carrier in some arthropods and mollusks (4). In these examples and others, the trace elements that interchange share chemical similarities that facilitate the swap. However, there are no prior reports of substitutions for any of the six major elements essential for

stream biochemical pathways may require the more chemically stable P-based metabolites; the lifetimes of more easily hydrolyzed As-bearing analogs are thought to be too short. However, given the similarities of As and P—and by analogy with trace element substitutions—we hypothesized that AsO_4^{3-} could specifically substitute for PO_4^{3-} in an organism possessing mechanisms to cope with the inherent instability of AsO_4^{3-} compounds (6). Here, we experimentally tested this hypothesis by using AsO_4^{3-} , combined with no added PO_4^{3-} , to select for and isolate a microbe capable of accomplishing this substitution.

Geomicrobiology of GFAJ-1. Mono Lake, located in eastern California, is a hypersaline and alkaline water body with high dissolved arsenic concentrations [200 μM on average (9)]. We used lake sediments as inocula into an aerobic defined artificial medium at pH 9.8 (10, 11) containing 10 mM glucose, vitamins, and trace metals but no added PO_4^{3-} or any additional complex organic supplements (such as yeast extract or peptone), with a regimen of increasing AsO_4^{3-} additions initially spanning the range from 100 μM to 5 mM. These enrichments were taken through many decimal-dilution transfers, greatly reducing any potential carryover of autochthonous phosphorus



FROM ACADEMIC SUPERSTAR TO REAL WORLD CELEBRITY; LEARNINGS FROM OTHER SCIENTISTS

men, love + life / 5-minute mentor

REPORTS

17. G. R. Willsky, M. H. Malamy, J. Bodenroth **144**, 356 (1980).
18. D. Cánovas, C. Durán, N. Rodríguez, R. Amis, V. de Lorenzo, *Environ. Microbiol.* **5**, 133 (2003).

Acknowledgments: We thank R. Oremland and J. S. Blum for providing strain GFAJ-1, P. Christen and F. Ryffel for technical and experimental assistance, as well as an anonymous

reviewer for valuable suggestions and comments on our manuscript. T.J.E. was supported through an ETH Fellowship.

Supplementary Materials
www.sciencemag.org/cgi/content/full/science.1218455/DC1
Materials and Methods

Figs. S1 to S3
Tables S1 to S8
References

27 December 2011; accepted 1 June 2012
Published online 8 July 2012;
10.1126/science.1218455

Absence of Detectable Arsenate in DNA from Arsenate-Grown GFAJ-1 Cells

Marshall Louis Reaves,^{1,2} Sunita Sinha,³ Joshua D. Rabinowitz,^{1,4} Leonid Kruglyak,^{1,5,6} Rosemary J. Redfield^{3*}

A strain of *Halomonas* bacteria, GFAJ-1, has been claimed to be able to use arsenate as a nutrient when phosphate is limiting and to specifically incorporate arsenic into its DNA in place of phosphorus. However, we have found that arsenate does not contribute to growth of GFAJ-1 when phosphate is limiting and that DNA purified from cells grown with limiting phosphate and abundant arsenate does not exhibit the spontaneous hydrolysis expected of arsenate ester bonds. Furthermore, mass spectrometry showed that this DNA contains only trace amounts of free arsenate and no detectable covalently bound arsenate.

Wolfe-Simon *et al.* isolated strain GFAJ-1 from the arsenic-rich sediments of California's Mono Lake by its ability to grow through multiple subcultures in artificial Mono Lake medium AML60 that lacked added phosphate but had high concentrations of arsenate (+As/-P condition) (*1*). Because GFAJ-1 grew in -P medium only when arsenate was provided, and because substantial amounts of arsenate were detected in subcellular fractions, growth was attributed to the use of arsenate in place of phosphate. However, the basal level of phosphate terminating the -P medium was reported to

to arsenite in physiological conditions (3, 4) and because arsenate esters in aqueous solution are known to be rapidly hydrolyzed (5). We have now tested this report by culturing GFAJ-1 cells supplied by the authors (*1*) and by analyzing highly purified DNA from phosphate-limited cells grown with and without arsenate.

Wolfe-Simon *et al.* reported that GFAJ-1 cells grew very slowly in AML60 medium (doubling time ~12 hours) and that, when phosphate was not added to the medium, cells failed to grow unless arsenate (40 mM) was provided (*1*). How-

ever, although we obtained these authors, in our hands to grow at all in AML60 specified trace elements a 1500 μ M sodium phosphate in (*1*). We confirmed the reverse transcription-polymerase chain reaction and sequencing of 10 primers specified by Wolfe-Simon *et al.* gave a sequence identical to GFAJ-1. We then found amounts of yeast extract amino acids to be growth, with double Medium with 1 mM before used for subculture.

With 1500 μ M phosphate (Wolfe-Simon medium produced -As/+P yield. As expected, level of phosphate even unsupported to ~2 $\times$ 10⁶ cells, relatively constant (MS) showed 0.5 μ M concentration. The growth rate of the former

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CONSENSUS STUDY REPORT

- 
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 - **Learning from the science of science communication**

GOOD #SCICOMM IS LESS ABOUT FACTS THAN IT IS ABOUT CONNECTING THOSE FACTS TO WHAT MATTERS TO AUDIENCES



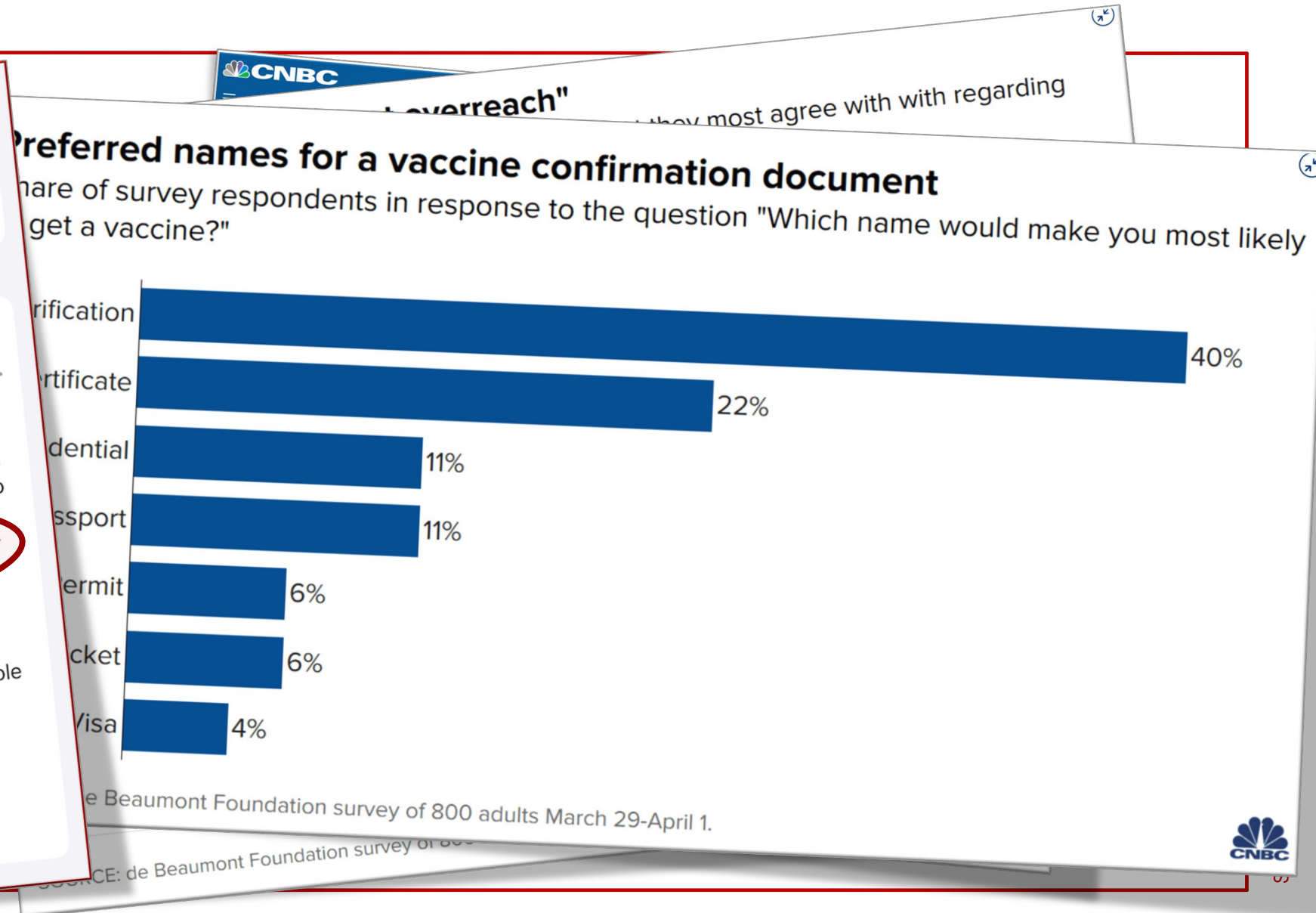
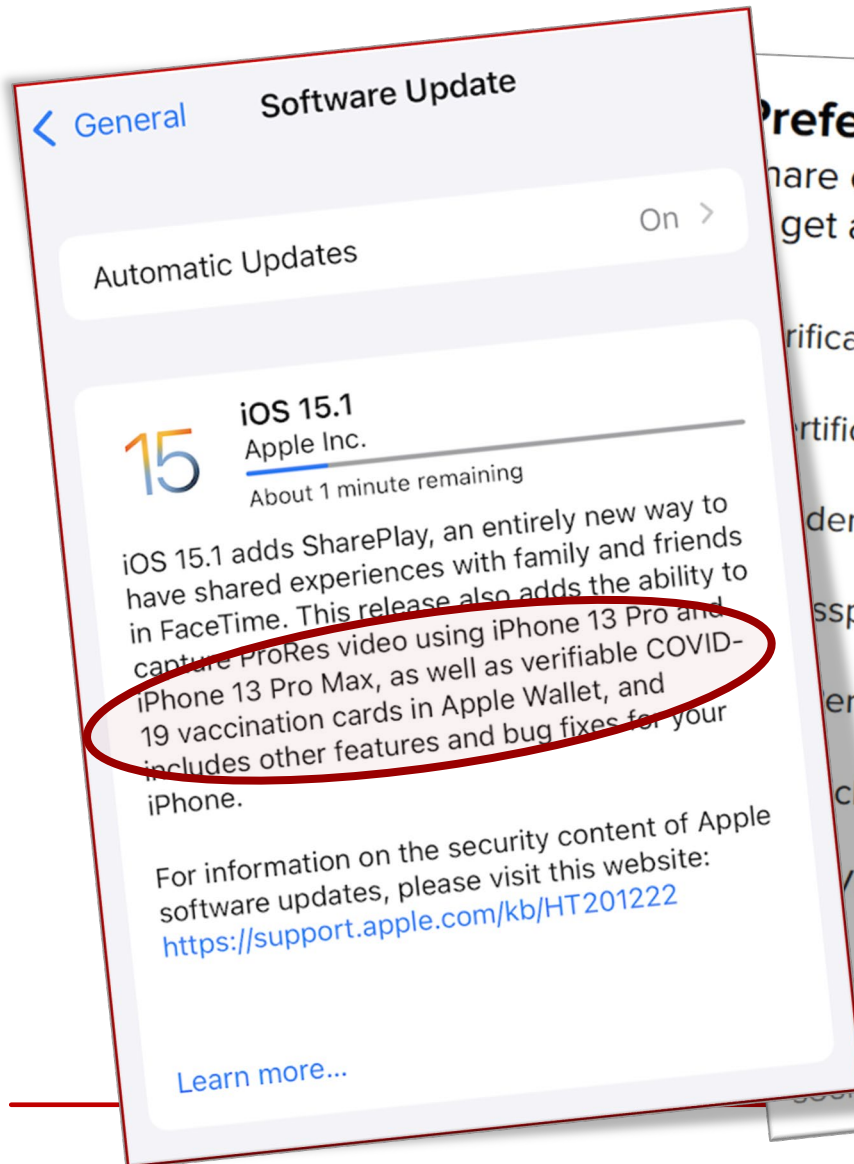
- Daniel Kahneman and Amos Tversky: "Perception [of ambiguous stimuli] is reference-dependent."
- Science as complex, ambiguous stimulus; framing as a way to reduce this ambiguity by contextualizing information

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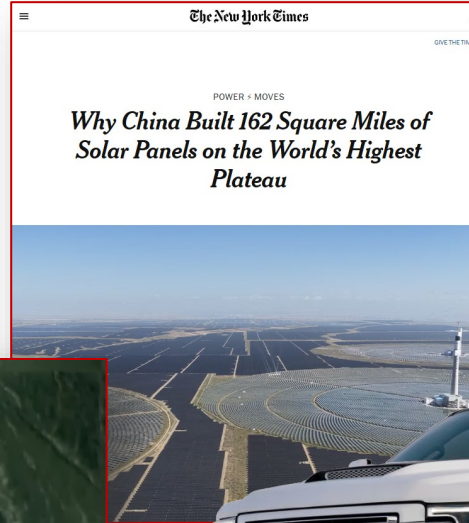
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FRAMING INFORMATION TOWARD SHARED VALUES



FRAMING INFO TOWARD *SHARED* VALUES: GLOBAL COMPETITIVENESS AND ENERGY INDEPENDENCE



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- A new era for science ... and society?
 - Three challenges
 - When facts meet values
 - Expertise vs. advocacy
 - Communicating uncertainties
 - A handful of thoughts on moving forward
 - **What about wicked problems that cannot be answered by just doing more science?**

Avoid potential controversy

Educate
the public

Build democratic capacity through deliberation

Widen
representation
of voices

Solicit input
on value
debates

Enable
responsible
innovation

Shape policy

Scientists worry about some risks more than the public

DIETRAM A. SCHEUFELE^{1*}, ELIZABETH
ELLIOTT HILLBACK³ AND DAVID H.

A comparison between two recent studies in the US shows that, in general, the potential benefits of nanotechnology outweigh long-term health impacts of nanotechnology on the public.

In previous controversies surrounding emerging technologies, such as nuclear energy and food biotechnology, scientists, in most cases, perceived lower risks associated with these new technologies than the general public or the journalists covering these stories. These findings seem to hold in both the US and Europe^{1,2}, and most recently, an exploratory comparison of a quota sample of 375 lay people and a convenience sample of 46 experts in Switzerland suggested that the same pattern is beginning to emerge for nanotechnology as well³.

However, two large-scale systematic data collections in the US now show that the dynamics surrounding risk perceptions of nanotechnology among members of the general public and nanoscientists shape up to be much more complex than for previous issues. In particular, historical patterns of the difference between the perceptions of scientists and the general public of risks

We collected survey data from both lay individuals and nanotechnology scientists. Both surveys used questions with identical wording, providing a unique opportunity for systematic comparisons across two large-scale, national data sets. The first data source

Scientists' incentives and attitudes toward public communication

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In an era of large-scale science-related challenges and rapid advancements in groundbreaking science research, the effective applications, communicating about science is critical. The profile of science communication has changed over the last few decades, with multiple sectors calling for science communication. In response to calls for public-facing communication, we need to ensure unique science faculty at all university levels. We conducted a survey of science faculty at 10 large universities across the United States intended to spur the next generation of science communication. We found that science faculty have a positive view of science communication, and their strong approval of the lack of institutional support and confidence in communication efforts.

science communication | engagement with science | public universities

[illegible]

based on 6,242 valid responses, we find tenure-track scientists across these institutions strongly approve participation in science communication, and are more likely to expect people to increase public trust in the scientific enterprise. More importantly, we identify a strong endorsement of institutional science communication as learning what people think about specific issues. However, we find little support for science communication and engagement, and we find little potential for change related to the institutional climate identified by these scientists. These results are consistent with a adequately conduct such efforts.

the scientific community, calls for communication efforts by scientists and researchers, including efforts from the National Academies of Sciences (Medicine 2, 3) and efforts by the Center for Public Engagement with Science and Technology at the American Association for the Advancement of Science (AAAS).⁴ The AAAS has been at the image of science, some argue that the public communication efforts should focus on the public's perception of science and not on the science itself. This is not necessarily false, nonexperts in productive discussions are often more concerned with the image of science than with the science itself. However, the AAAS has been at the forefront of providing opportunities for mutual learning between scientists and members of the public (AAAS). Additionally, the AAAS has been at the forefront of providing

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Public engagement: Faculty lived experiences and perspectives underscore barriers and a changing culture in academia

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Authors	Metrics	Comments	Media Coverage
Abstract	Abstract		

Introduction

Abstract

Understanding the

The idea of fract

engaging students in meaningful dialogue with different publics instead of simply communicating research to interested audiences has gradually morphed from a novel concept to a mainstay within most parts of the academy. Given the variety of public engagement modalities, it may be useful to categorize them into three broad categories that influence faculty engagement to public engagement. These modalities are: (1) *public engagement as a goal*, (2) *public engagement as a means*, and (3) *public engagement as a barrier*. These modalities are not mutually exclusive, and they often overlap. For example, a faculty member may engage in public engagement as a goal, but also as a means to achieve other goals, such as to increase their research impact. Public engagement as a goal is the most common modality, and it is the one that we will focus on in this paper. Public engagement as a goal is the most common modality, and it is the one that we will focus on in this paper. Public engagement as a goal is the most common modality, and it is the one that we will focus on in this paper.

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ENGAGEMENT ON WICKED SCIENCE: CHANGE HAS BEEN SLOW

Planck's Principle: Science progresses one funeral at a time.



ONE BOLD IDEA: RESTORING SCIENCE TO ITS CIVIC ROOTS

46 Stanford Social Innovation Review / Spring 2018

→ At a time of rapid scientific advances, philanthropy has a vital role to play in building a culture of “civic science”: one in which scientists take active roles as citizens, and citizens from all walks of life engage with scientific research and its social and ethical implications.

The Civic Science Imperative

BY ELIZABETH GOOD CHRISTOPHERSON,
DIETRAM A. SCHEUFELE
& BROOKE SMITH

Illustration by Michael Waraksa



Science, backed in part by philanthropic funding, has made great gains in the global fight against malaria. The [World Health Organization](#) estimates that since 2001, these efforts have prevented 6.8 million malaria deaths. What if they all could be avoided? Some 429,000 people still died from malaria in 2015, most of them children. What if we could engineer the extinction of a few species of mosquitos to prevent more deaths? What if doing so required a technology that could, in the wrong hands, be reversed to make mosquitos into new kinds of biological weapons, carrying new kinds of diseases? What if in the future no one needed to wait for an organ transplant? As of last summer, more than 116,000 people in the United States were waiting for an organ. Twenty die every day while waiting. What if the organs needed to end this continual shortage could be grown in pigs? Would animals that were edited to be “human” enough to serve as sources of organs also have enough human cells in their brains—as some ethicists have argued—to have partially human consciousness? What if a person with the mutated gene that causes Huntington’s disease, devastatingly, fatally—could have the gene edited out? What if the edit in

do it? Only wealthy people? People in some countries and not others? Who would decide?

Those who have been following the rapid development of the new gene editing technique called [CRISPR/Cas9](#) (or simply “CRISPR”) know that steps have been taken toward all of the possible futures described above, although some seem within reach, while others are, at this point, purely speculative.

A nonprofit research consortium called [Target Malaria](#) is using CRISPR—a kind of molecular find-and-replace function—to develop *Anopheles* mosquitos that can only produce non-biting male offspring and that can spread this trait throughout a mosquito population, eventually causing the population to collapse. Earlier this year, researchers at the [Salk Institute](#) in San Diego used CRISPR to grow a functioning rat pancreas, heart, and eyes in a mouse embryo. They also generated human cells and tissues in an embryonic pig, which is the right size to host human organs. We are still far from knowing how to modify genes to produce complex traits such as intelligence. But researchers, using mice, were able to edit the mutant *Htt* gene that causes Huntington’s disease, nearly eliminating the toxic protein that causes the breakdown of cells during the course of the disease. And in August, scientists at [Oregon Health and Science University](#) reported successfully editing a gene responsible for heart failure in a human embryo. These advances are remarkable examples of the miraculous new coveries of contemporary science. The immensity of the radical new kind of power that CRISPR represents has led it to be compared—even by the scientists who invented it—to atomic energy. Like any powerful technology, it can be used for purposes that most of us would applaud or for purposes that most of us would condemn. And there is a lot of gray territory in between. Only a few years old, CRISPR has



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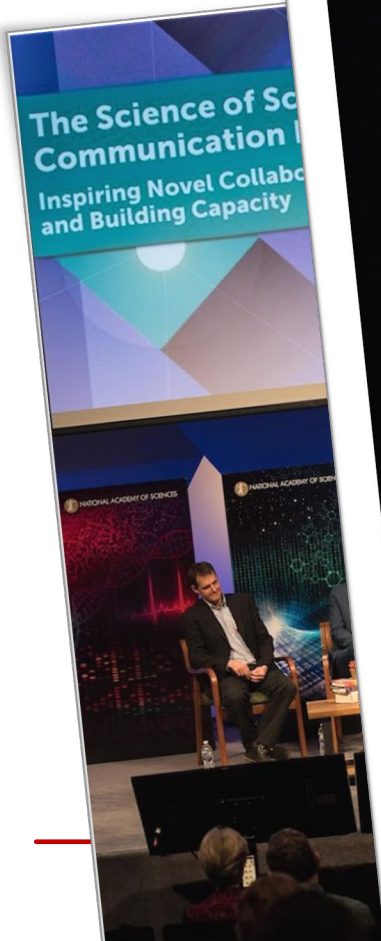


Science in Society Funder Collaborative

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Feld Family Initiative for Civic Science Communication at the Boston University College of Communication





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SOME TAKE-AWAYS: WHY SCIENTISTS ADVISE, BUT POLICYMAKERS AND CITIZENS MAKE DECISIONS

A CRACK IN CREATION

GENE EDITING AND
THE UNTHINKABLE
POWER TO CONTROL
EVOLUTION

JENNIFER A. DOUDNA
SAMUEL H. STERNBERG

In spite of scientists' wishful thinking, that's the way it's supposed to be.

So how can we optimize policy choices with best available evidence and without being partisan?

- Language that speaks to shared values rather than (what might unfairly be considered) tribal identities
- Making value propositions that address salient public concerns, scientific or not
- Presenting evidence as "best available evidence right now" ... acknowledging that it will (and should) change
- Human nature as powerful tool for (non-partisan) community buy-in

THANK YOU



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