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Enhancing Trust in Science and Democracy in an Age of Misinformation

Thomas Jefferson once observed, "I know of no safe depository of the ultimate powers of the society, but the people themselves." He cautioned that correcting "abuses of constitutional power" may not be possible if the people are "not enlightened enough to exercise their control with a wholesome discretion." However, he concluded, "the remedy is not to take it from them, but to inform their discretion by education."

During the roughly 200 years since Jefferson made those pragmatic observations, science has provided incalculable knowledge and innovative tools that have improved people's lives, permitted the pursuit of the general welfare as articulated in the Constitution, and allowed many citizens to enjoy a bountiful existence. Now the world negotiates the intersection of unprecedented opportunities made possible by technological advances while also confronting the interconnected crises of pandemic, war, and climate change. Meanwhile, the volume, velocity, and reach of unintentional misinformation and deliberate disinformation, enabled by advanced information technologies, are distorting public deliberation and undermining trust in science as well as democracy itself.

The misinformation and disinformation that hamper the public's discretion are not new, but the consequences are becoming increasingly stark. For instance, public understanding of climate policy has been stymied by disinformation that has called into question the scientific consensus about the nature of the threat as well as responses to it, such as transitioning to renewable energy sources. More recently, the explosion of misinformation during the COVID-19 pandemic limited the positive impacts of life-saving vaccines. And the war in Ukraine has confirmed that misinformation and disinformation are now weapons routinely unleashed by autocratic regimes to destabilize democracies.

Although scientists and elected leaders inhabit distinct communities, they are often allied by their professions' commitment to the public interest. At this critical juncture, taking Jefferson's admonition seriously requires that scientists and leaders join forces to inform the public's discretion through improved communication and education. In these efforts, science and democracy have much in common. At the individual level, scientists and elected leaders share the need to earn citizens' trust, work in the best interests of the public, and remain transparent about motives, conflicts of interest, and decisionmaking. When misinformation or disinformation undermine the credibility of scientists and political leaders, public trust is weakened, the progress of science is inhibited, and democracy itself is destabilized.

For science, which focuses on generating knowledge and improving decisionmaking, misinformation scrambles the meaning of knowledge as well as its ability to further the public good. The speed of change in science is increasing, as is the complexity of informing the understanding of citizens; as a result, the norms of previous generations are being eroded. More importantly, poorly informed discretion inhibits the policy processes and investment logics that drive efforts to produce and apply knowledge. Thus, Jefferson's words are as relevant today as when they were written: our democracy needs to address the growing gap between scientific knowledge and public understanding by better informing citizens' discretion for the purpose of building a healthier, more prosperous, and better defended society.

Therefore, we believe the scientific community must more fully embrace its vital role in producing and disseminating knowledge in democratic societies. In *Science in a Democratic Society*, philosopher Philip Kitcher reminds us that "science

should be shaped to promote democratic ideals." To produce outcomes that advance the public good, scientists must also assess the moral bases of their pursuits. Although the United States has implemented the democratically driven, publicly engaged, scientific culture that Vannevar Bush outlined in *Science, the Endless Frontier* in 1945, Kitcher's moral message remains relevant to both conducting science and communicating the results to the public, which pays for much of the enterprise of scientific discovery and technological innovation. It's on scientists to articulate the moral and public values of the knowledge that they produce in ways that can be understood by citizens and decisionmakers.

However, by organizing themselves largely into groups that rarely reach beyond their own disciplines and by becoming somewhat disconnected from their fellow citizens and from the values of society, many scientists have become less effective than will be necessary in the future. Scientific culture has often left informing or educating the public to other parties such as science teachers, journalists, storytellers, and filmmakers. Instead, scientists principally share the results of their research within the narrow confines of academic and disciplinary journals.

This general detachment from society exacerbates the disconnect, and ultimately the scientific enterprise fails to recognize that it serves democracy and the public interest. Working in isolation, scientists are less likely to produce the sorts of results that are useful for society. Researchers need to better appreciate their potential to influence and impact the broader society.

Today, science has neglected to help the public understand what motivates researchers. This has led to the myth that scientists succeed by agreeing with the consensus—a false narrative that erodes public trust in science. To the contrary, scientists honor those who overturn reigning paradigms and advance understanding by producing knowledge that extends beyond the consensus. A recent paper on the mathematics of color perception, to name one example, overturned a 100-year-old theory of how the eye distinguishes color. Without an informed perspective about the way science is conducted, citizens are less likely to understand that science is an ongoing continuous process to pioneer better ideas and models of how nature is organized.

This process of constant knowledge generation does not align well with the notion that scientists merely supply "right answers." Since the processes of research are not well understood and remain at best abstract to the public, both scientists and elected representatives are forced to address well-intentioned but misguided questions about whether society has enough or too much science or whether the end of science has been reached. Scientific and educational institutions must always find ways to address these kinds of concerns and help people understand the inner workings of scientific culture and scientific processes.

Although anachronistic attitudes within the scientific community are changing, public communication and education are still considered something of a side hustle, an "unscientific" attempt to gain attention. Carl Sagan was infamously denied scientific recognition because his efforts to communicate complex scientific concepts with the public were unappreciated. Even now, scientists are rarely trained to communicate with and inform nonexperts, and the potential for making mistakes, or even just stating an uncomfortable truth, further discourages them from interacting with the public. Of course, it may be unrealistic to expect that scientists—even those who have been trained to engage with the public—can probe the mysteries of, say, how nano particles behave, *as well as* communicate what their research means for human health within the current polarized media ecosystem. The problems associated with producing effective communication are complex and will require innovative research, tools, and techniques.

Just as scientists and communications professionals must be trained to inform the public, the scientific community needs to apply its innovation skills to create new ways of teaching and learning. Scientific institutions and organizations should take inspiration from the ways that businesses have adjusted to the changing needs and wants of their customers in recent years. In an age of continuously morphing social media, the ways society produces and acquires information are rapidly changing, and the scientific community needs to advance its outdated modes of informing and engaging the public in order to keep up.

Science communication is often siloed when it should instead embrace the professional skills that have been pioneered in publishing, moviemaking, and storytelling. These specialized skills have allowed writers, producers, and editors to remake entire sectors of the entertainment business. For instance, consider how the science fiction writer and physicist Arthur C. Clarke worked with editors, publishers, publicists, screenwriters, and director Stanley Kubrick to develop *2001: A Space Odyssey*. Despite such pioneering exemplars, most scientists and the organizations in which they are embedded do not invest sufficiently in educating the public in comprehensible language and concepts.

Undeniably, some agencies are more effective at communicating with their audiences. Take NASA, for instance, which receives support and investment from a public that finds its space exploration and research compelling. Some of the interest may be attributed to the influence of the *Star Wars* and *Star Trek* franchises, but it is also the result of the agency's deliberate strategy to relate their cutting-edge science to everyday life. NASA has invested heavily in communicating the wonder of space exploration in innovative ways—through traveling exhibits, space-themed LEGO sets, programs that bring

schoolchildren's experiments to the International Space Station, and grants that involve local entrepreneurs in solving problems.

The National Academies of Sciences, Engineering, and Medicine (NASEM) has long informed the discretion of citizens and policymakers through reports and consensus studies. But more recently, NASEM has begun exploring new ways to communicate the value of science to all citizens. By choosing to directly collaborate with Hollywood, the Science and Entertainment Exchange has successfully matched filmmakers with scientists to encourage more accurate portrayals of scientists—and science—in film and television.

Since the public had many questions during the COVID-19 pandemic that deserved evidence-based answers, NASEM was able to leverage its Based on Science project to help provide clear, concise answers. Initially launched in partnership with Google, the online project was already using NASEM's community of experts to provide up-to-date information about science and health questions that affect the decisions people make each day. During the pandemic, such questions included whether heating one's skin would kill the coronavirus or whether lemon juice could cure COVID. Few scientists would consider researching or publishing papers to address these questions, but it was clear that unintentional misinformation of this type was harming people. To answer these questions, NASEM paired experts on the relevant subjects with skilled science writers who prepared answers that could be easily understood. As the Omicron variant took hold in late 2021, traffic surged, and Based on Science remains some of NASEM's most engaged content, demonstrating the ongoing demand for reliable information.

Although it is difficult to rise above the noise of the internet and social media, NASEM has found, to its delight, that millions of Americans have downloaded its reports and studies on subjects including K–12 science education, the future of nursing, and the effects of Agent Orange. A 2022 study described readers of NASEM publications as "adults motivated to seek out the most credible sources, engage with challenging material, use it to improve the services they provide, and learn more about the world they live in." Finding new ways to deliver high-quality, evidence-based information to people who want it at the times and places that they need it is a long-term challenge that scientific and educational organizations must take on.

Similarly, Arizona State University (ASU) has found that it needed to rethink the conventional system of education. Accordingly, over the past two decades, ASU has worked to promote broad accessibility to research-grade knowledge production at scales that have significant social impact. As a foundational prototype for the New American University model, ASU demonstrates that research excellence and broad accessibility need not be mutually exclusive. The charter of the university reflects these values by measuring the performance of the organization not by the exclusionary standards of conventional elite colleges and universities but instead by the inclusion of students from the broadest possible demographic and by the success of graduates.

We are aiming to bring not only the best students but also the "C" students into the process of making, using, and owning knowledge. Through innovative pedagogy, technologically enhanced delivery, expanded research initiatives, and service to its local communities, ASU further envisions that research universities will become platforms for universal learning, enabling qualified learners from any socioeconomic demographic or life situation to acquire knowledge and skills that they need to advance their careers or interests. For example, ASU partnered with Dreamscape Immersive in a collaborative venture to produce Dreamscape Learn, which merges advanced pedagogy with the powerful emotional storytelling of the entertainment industry. Dreamscape Learn redesigns how students are taught while eliminating gaps in student learning. Furthermore, ASU is now working with other universities in alliances that will differentially improve the discretion of the public by communicating ethical scientific and democratic values of their research.

Science is the primary activity that has allowed humanity to rise above brute subsistence by, for instance, helping to feed more people without condemning others to starvation. Technological innovation has permitted humans to live longer lives that are less burdened by illness and physical toil. Accordingly, we are deeply distressed to see unintentional misinformation and deliberate disinformation erode public trust in science and democracy, interfering with both institutions' ability to construct a better world.

Although scientists have largely stayed on the sidelines as the complexity of the world advances and the role of science in the transformation of the future becomes ever more important, it is no longer acceptable to remain complacent about communicating the critical role of science. As Jefferson observed, scientists and elected leaders must educate the public so that they can make better-informed decisions. We call on science and the institutions associated with it—colleges and universities, governmental agencies and laboratories, business and industry, and nongovernmental organizations—to take responsibility for valuing and investing in communication and education to inform the "wholesome discretion" of all citizens.

In that spirit, we encourage you to attend or participate in the 2023 Nobel Prize Summit hosted by the National Academy of Sciences on May 24–26, 2023, which will focus attention on how misinformation and disinformation are eroding public trust in science and democracy and on how experts and the public can work together to identify solutions.

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