Regaining Trust in Public Health and Biomedical Science following Covid: *The Role of Scientists*

BY ARTHUR L. CAPLAN

Public confidence in biomedical science has declined precipitously since the Covid-19 pandemic began in the United States. In 2022, only 29 percent of U.S. adults in a Pew Research Center poll told researchers that they have a great deal of confidence that medical scientists will act in the best interests of the public, down from 40 percent in November of 2020.[1] Other polls and studies show similarly dour findings.[2] The pandemic not only killed millions; it also undercut a long history of nearly universal trust in the value of biomedical science.

At a time when the world is confronted with calamitous health threats, ranging from pandemics to heat waves, pollution, loss of rain forests, flooding, obesity, species extinctions, and food shortages, this loss of trust is dangerous. While information generated by biomedical science is not the only source of guidance for grappling with these ongoing worldwide catastrophes, it is a key source. Diagnosing threats, pinpointing causes, knowing the options open for responding, and gauging responses' likelihood of success are simply essential for successful public policies. And while biomedical scientists bring their politics along with their advice, and while biomedical science is far from value free, still, having information that has been subjected to critical inquiry, peer review, replication, and outcomes assessment means that there is a stream of informed opinion that is likely to be useful, even if it is somewhat error prone, to political and administrative decision-makers.

Biomedical science is facing a loss of trust fueled by the ongoing debate about Covid. Some argue that marginal or nonmainstream views that disagree with consensus opinions about Covid show that mainstream voices are not credible since universal agreement is lacking and that, without complete agreement on the facts, an essential attribute of trustworthy biomedical science expertise is missing. Others reject expert views because they challenge deeply held ideological beliefs—that autonomy must not be compromised, for example—or religious beliefs—that God created the world and in creating the world provided natural cures for the problems that ail us. And there is a perception among many that the data of biomedical science is unreliable because its messages shift and evolve, as happened during Covid.

These challenges to trust seem to fall into two classes. One is a crisis fueled by confusion over the epistemology of science. It is based on a mistaken view of what the warrant is for crediting scientific information. The ideas that science is characterized by universal agreement and that the evolution of beliefs about facts and theories undermines trustworthiness are simply false.

Arthur L. Caplan, "Regaining Trust in Public Health and Biomedical Science following Covid: The Role of Scientists," in "Time to Rebuild: Essays on Trust in Health Care and Science," ed. Lauren A. Taylor, Gregory E. Kaebnick, and Mildred Z. Solomon, special report, *Hastings Center Report* 53, no. 5 (2023): S105-S109. DOI: 10.1002/hast.1531

The other class is a variety of sociological reasons for a loss of faith in experts. Many experts have noted the unwillingness and inability of major social media companies to edit or censor obvious misinformation and their tendency to heavily feature easily falsified fringe ideas. Others bemoan the increasing perception that science and medicine are dominated by powerful pharmaceutical business interests, creating conflicts of interest that undermine objectivity and thus undermine trust in what biomedical scientists say. Still others point toward the collapse of education about science in high schools and colleges, allowing the acceptance of fringe views or distorted ideas about who is deserving of trust. During Covid, one factor in the loss of faith in science experts was and is the failure on the part of these experts to engage in public discourse, reflecting a failure to recognize the obligation that science has, as a field, to bolster trust in its work and findings by concerted public engagement.

Why Is Science Trustworthy?

Epistemology first: What is it that makes biomedical science claims warranted and thus deserving of trust? Science, and biomedical science in particular, possesses three misunderstood epistemological features that provide justification for belief.

First, biomedical science, like many areas of science, is pragmatic. The test of soundness of any belief is not simply coherence with other beliefs but whether the belief leads to predictable practical consequences that can be repeated.[3] One can claim that bleach or warm weather or ivermectin can kill the Covid virus, but until there is evidence that acting on these views can actually bring about the desired result, the claims are merely that—claims. Anecdotes and testimonials of cures for almost every known disease abound on social media. For Covid alone, a parade of personal attestations alleges the value of taking vitamin C, gargling with salt water, using herbal eyedrops, drinking garlic water, nebulizing hydrogen peroxide, snorting volcanic ash, and chewing betel leaves. But, no matter how fervently such claims are asserted, the true test of any of these "remedies" is not simply personal experience but whether they have repeatable efficacy. If testimonials are not borne out by repeated applications, as assessed by users, health care providers, and independent observers, then they are not warranted claims.

The first Covid vaccines engendered wariness in the early stages of the pandemic due to their rapid development, but their success rate and safety profile were so outstanding that few challenged their value. Only later, when the pandemic did not abate as new variants appeared and when a backlash arose against mandates and lockdowns, did the value of Covid vaccines and their defenders come seriously into question. Trust, not in the evidence, but in the authority of scientists, was harmed—a loss that scientists did not know how to address with the public.

In all the metastudies that philosophers, historians, and sociologists have contributed on the credibility of science, attention to the importance of practical outcomes deriving from theories, models, and experiments has, for the most part, been an exception.[4] Pure theory has reigned supreme, disconnected from applied and practical science. Yet why have scientists been so persuaded by evolutionary theory? For Darwin, it was because of his knowledge of domestic breeding. In our time, evolutionary theory is the key to the discovery of the location of fossil fuels. What gives germ theory its standing among scientists? The fact that antibiotics kill microbes and thus cure the infected. It is the practical, the operational, that fuels the veracity of scientific claims, but this has been underappreciated both in these metastudies and in battles over trust in biomedical science.

The neglect of the practical is partly due to the fact that practical science—medicine, veterinary medicine, engineering, agricultural science, and architecture—have often been assigned a lower or derivative status relative to "pure" science. The reductionist views of science that prevailed among philosophers and the public[5] throughout much of the twentieth century had physics at the base of the prestige pyramid—the foundation for everything else—and social science teetering up in the clouds. Applied science was nowhere to be found. Biology was seen as molecular with a bit of ecological frosting. This situation left fields like medicine and public health vulnerable to attacks as unscientific or ideological.

But the warrant of scientific belief and the corresponding trust that should be accorded scientific belief, especially in medicine and public health, derives in significant part from the demonstrated practical efficacy of those beliefs. Your theory of pathology and disease and of prophylaxis and therapy is only as good as the coroner reports.

Second, as many commentators, beginning with Karl Popper, have noted, science is distinguished by its pursuit of falsifiability. If there is no way to prove that a diagnostic test for Covid or any disease does not work, then the claim belongs in the realms of faith or ideology—or willful ignorance. When disinformers point to scientific errors about Covid, such as the failure to recognize early on the role of airborne spread, what they demonstrate is the reason that science merits trust: it acknowledges falsification and new information, and it tries to adjust and move forward. Ideology is the art of insisting through powerful rhetoric that a belief is true no matter what. Trust that leads to desirable results, however, is best placed in admitted fallibility.

Lastly, biomedical science merits trust because it has a well-populated graveyard of bad ideas. It has tossed aside demonic possession, alchemy, miasma, leeching, purging,

There has been no serious effort, ever, to engage mainstream scientists in dialogue about how to relate to the political currents of the day as scientists. This failure greatly exacerbates the lack of trust in experts and expertise.

Lamarckianism, race hygiene, the belief that vaccines cause autism, and many other flawed ideas. It practices what it preaches in terms of abandoning, albeit slowly, mistaken ideas. Trust is merited when you can point to your past failures, not scramble to deny them, hide them, or concoct just-so stories to explain them away.

Oddly, it is the frailty, fallibility, and acknowledged mistakes of science, along with its triumphant practical successes, that form the epistemological grounds for trust in science and scientists. Experts know their limits. Experts know that advancing the truth is hard. Ideologues and hucksters admit to neither.

How Should Scientists Talk about Science?

Now for the sociological. Scientists' role in participating in public discourse about how science contributes to policy was a flash point during Covid. Scientists' failure to engage with the public is one reason for the loss of trust in scientific experts that scientists themselves could, in principle, help to improve. From the start of Covid through to today, scientists' influence over public health policy has often been disparaged as a "tyranny of experts," as Per Bylund and Mark Packard put it in a recent comparison of how the Swedish approach to science policy-making differed from those of the rest of the world. Describing Sweden but extending their view to other countries, they observe: "This 'tyranny of experts,' and the knowledge problem from which it arises, has been in full exhibit amid this pandemic. A problem to be solved, with the avoidance of death as the top and, in fact, only political priority in most cases, politicians turned to expert immunologists and epidemiologists, the World Health Organization (WHO), and other public health experts for guidance. [*sic*] . . . [H]uman rights were ignored altogether as the virus became a technocratic problem to solve. Outcry from those whose rights were violated [was] actively hushed by the political class and its sympathizers who claimed that this was a problem that required extreme measures and the cooperation of all. The swiftness in enacting such measures may also have played an important role, as populations have been found to be initially more willing to trade off civil liberties for improved public health conditions, a willingness that then gradually declines."[6]

In Sweden, the United States, Canada, Brazil, Australia, and other nations, trust in expertise eroded as initial uncertainty befuddled biomedical experts and as their later recommendations to mask, quarantine, vaccinate and isolate struck many as too intrusive. Science was seen by many as shaky and uncertain and as the enemy of individual freedom and civil liberties. Sweden, rejecting its science experts, adopted the most lenient Covid policy of almost any nation, with dire results.[7]

It is useful to make a distinction between scientists' role in engaging the public about scientific facts and their role in the formation of public policy. Bylund and Packard's claim about a "tyranny of experts" is directed at the latter. In their view, scientific experts have frequently been given outsized power over policy: "Those of higher knowledge, status, or authority—experts—take it upon themselves, justified by their epistemic monopoly, to both define and solve the problem for nonexperts. The expert-nonexpert distinction, then, is further stratified into 'helpers' and the 'helped,' where the latter typically have little or no say in the matter, but are expected to only accept what the former have chosen on their behalf." One component of this outsized influence of scientific experts is that the technical information overwhelms or suppresses discussion of values. "Human rights were ignored altogether," claim Bylund and Packard, "as the virus became a technocratic problem."[8] In the United States, many claimed that their values were ignored by public health authorities.

Of course, biomedical science and medicine are not the enemies of freedom. The public health message about Covid was that temporary limits on freedom were the fastest routes to protecting lives and restoring full individual freedoms. Following those recommendations was a political choice. Bylund and Packard may be right about some politicians' tendency to choose to give scientific information too much influence. But correcting that problem hardly means rejecting the input of scientific experts. Rather, politicians must ensure that values questions are engaged on their own terms, not treated as if they are settled by science. Science tells us what can be done; the political task is to decide what ought be done within the constraints and boundaries that science provides. Distrust in science was triggered by misplaced anger over policy choices to follow liberty-limiting scientific advice. But the error was in the

failure to engage openly in the values surrounding public health choices, rather than merely claiming scientific authority for what were hard value choices responding to scientific advice.

There has been no serious effort, ever, to engage mainstream scientists in dialogue about how to relate to the political currents of the day as scientists. This failure greatly exacerbates the lack of trust in experts and expertise. To give but one example, for decades, almost no scientific expert in America has uttered a word in the mainstream media about claims concerning embryos, fetuses, and personhood, denying that science could resolve issues like when life begins[9] or the moral standing of embryos and fetuses.[10] This is so even though huge areas of biomedical research have much to say bearing on these topics, if not in deriving oughts from facts (the much-discussed ought-is problem), then at least in limiting oughts by biological reality (a widely accepted ought-can connection). When someone claims that a fetal heartbeat exists at six weeks or that emergency contraception is an abortifacient, it is disappointing not to see loud rebuttals of such an assertion by the medical communities who know the facts.

Scientists' role in engaging the public about scientific facts is also important. A failure to adequately communicate the uncertainty and provisional nature of science to the public has been flagged by a few prominent scientists as a cause of loss of trust. In a speech to the media, former National Institutes of Health director and current White House science advisor Francis Collins revealed his pain at seeing people spurn safe Covid vaccines and lamented that he and other health officials had failed to communicate the ever-changing science behind Covid recommendations. "The big thing that I know I didn't do, and I don't think a lot of the communicators did, was to say this is an evolving crisis, this is going to change every time we made a recommendation, whether it was about social distancing or mask wearing or vaccines," Collins told journalists in September 2022.[11] "And we lost their confidence as a result of that."

In fact, matters are worse than Collins acknowledged. There are huge barriers to competent communication by scientists and researchers with the public. There is next to no required training for students or faculty members in the biomedical sciences about how best to communicate. It is hard to trust those you don't hear from or can't understand.

Efforts to engage the public are not only not encouraged; they are also rarely rewarded by the institutions that employ scientists and public health experts. Institutions are more likely to warn their employees, students, and faculties against spending their time on social media, wikis, blogs, or online chats. There are no metrics to evaluate the amount or quality of outreach effort that can be used to assess whether a scientist (or academics in general) should be awarded a grant or promotion. In fact, communication with the public is actually abhorred by many scientists. There's even a term for the related stigma: "Saganization." The hugely competent scientist Carl Sagan was a victim of the deep-seated opprobrium among scientists against communicating with lay audiences. His persecution began in the 1960s, when Harvard University denied him tenure. Nobel laureate Harold Urey, a chemist who had previously served as one of his mentors, helped quash his chances with a nasty letter objecting to Sagan's budding media and outreach efforts. Sagan continued his efforts at public communication but was stigmatized by much of the mainstream science community for doing so.[12]

Science and medical research in the United States depend on public funding, generous patent protection, and tax advantages. All too often, priorities in funding are set by those voices that can command congressional attention or celebrity endorsement, which draws media that in turn draws legislators—instead of being based on the actual state of the science or the scientific strength of the community doing the proposed work. Not only do those in science and biomedicine have a fiduciary duty to communicate to the public as to how its money is being spent, but the research community must also develop skills and outlets for getting their views out about what those priorities should be. In addition, credit must be given for work to enhance the public understanding of biomedical and scientific research across the board in the research community, from hiring to promotion to career awards. At present, despite the reliance on public trust for both the funding and application of biomedical science, almost no systematic efforts exist to encourage and prepare scientists to engage in public venues.

Covid made it frighteningly clear what the price of Saganization and ivory-towerism is to the standing of science in public debate and for protecting public health. Despite the yeoman efforts of a few scientists to engage with the public and its representatives during Covid, the biomedical science research community found itself politicized, censored, outgunned, and outspent by a host of forces, including widely cited unqualified disinformers and antiscience outlets.

Trust, when it comes to science, requires belief in both the message and the messenger. Covid illustrated vulnerabilities in both. Without efforts to advance a better understanding of science and to empower scientists to better communicate, there is little reason to think that the loss of trust will be reversed.

1. B. Kennedy, A. Tyson, and C. Funk, "Americans' Trust in Scientists, Other Groups Declines," Pew Research Center, February 15, 2022, at https://www.pewresearch.org/science/2022/02/15/americans-trust-in-scientists-other-groups-declines/.

2. C. Fonseca et al., "People with More Extreme Attitudes towards Science Have Self-Confidence in Their Understanding of Science, Even If This Is Not Justified," *PLOS Biology* (2023): doi:10.1371/

journal.pbio.3001915; D. A. Cox et al., "America's Crisis of Confidence: Rising Mistrust, Conspiracies, and Vaccine Hesitancy after COVID-19," American Enterprise Institute, Survey Center on American Life, September 28, 2023, https://www.americansurveycenter.org/research/americas-crisis-of-confidence-rising-mistrust-conspiracies-and-vaccine-hesitancy-after-covid-19/; M. A. Mills, "Why So Many Americans Are Losing Trust in Science," *New York Times*, October 3, 2023.

3. C. Misak, ed., *New Pragmatists* (New York: Oxford University Press, 2009).

4. For a recent exception, see H. Chang, *Realism for Realistic People: A New Pragmatic Philosophy of Science* (Cambridge: Cambridge University Press, 2022).

5. H. Andersen, "The History of Reductionism versus Holistic Approaches to Scientific Research," *Endeavour* 25, no. 4 (2001): 153-56.

6. P. L. Bylund and M. D. Packard, "Separation of Power and Expertise: Evidence of the Tyranny of Experts in Sweden's COVID-19 Responses," *Southern Economic Journal* 87, no. 4 (2021): doi:10.1002/soej.12493.

7. A. H. Pashakhanlou, "Sweden's Coronavirus Strategy: The Public Health Agency and the Sites of Controversy," *World Medical and Health Policy* 14, no. 3 (2022): 507-27.

8. Bylund and Packard, "Separation of Power and Expertise."

9. W. Sullivan, "Onset of Human Life: Answer on Crucial Moment Elusive," *New York Times*, May 4, 1981.

10. A. Caplan, "When Does Human Life Begin?," *Free Inquiry* 34, no. 5 (2014): https://secularhumanism.org/2014/07/cont-when-does-human-life-begin/.

11. E. Cooney, "'I'm Deeply Concerned': Francis Collins on Trust in Science, How Covid Communications Failed, and His Current Obsession," *STAT News*, September 19, 2022.

12. E. C. Shugart and V. R. Racaniello, "Scientists: Engage the Public!," *mBio* 6, no. 6 (2015): e01989-15.