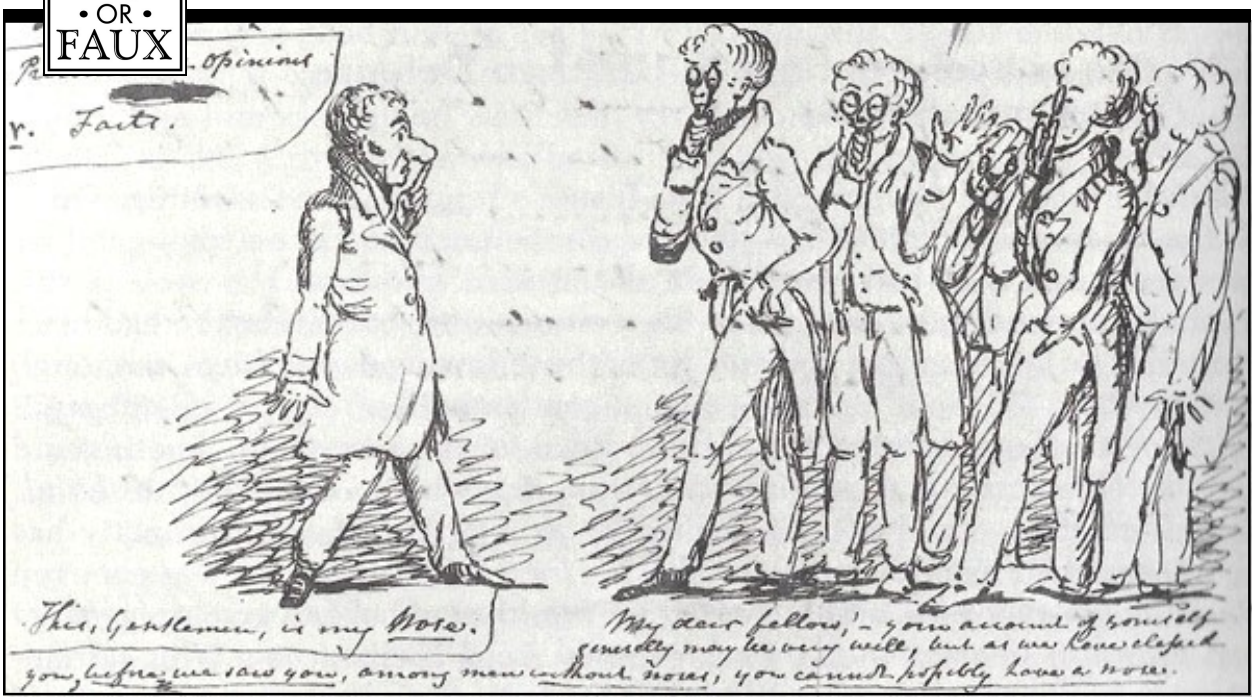

When Experts Disagree

Douglas Allchin

ABSTRACT. The Fact-or-Faux series addresses misinformation and science media literacy. Here, we consider how consumers should manage scientific disagreement and uncertainty.

Keywords: consensus; disagreement; scientific uncertainty; precautionary principle

Respect the consensus of the relevant scientific experts. That's the benchmark for "settled" science in informing public policy or personal decision-making (Oreskes, 2019). But what if the experts disagree? What if there is no genuine consensus? What then? If we cannot confidently sort fact from faux, what are we to do?

First, Check: Is the Controversy Counterfeit?

In some cases, the appearance of disagreement is just that: *mere appearance*. Social media can amplify the views of dissenting experts, making them appear far more important than they really are. One study showed that contrarian claims about covid vaccines were 11 times more frequent than those of the corresponding consensus (Efstratiou, et al., 2024). Similarly, there are dozens of blogs and websites denying global warming and climate change. But they mostly repost information from just three sites (Sharman, 2014). Alas, lies seem to spread on social media more rapidly, more broadly, and farther than facts (Vosoughi, et al. 2018). So, before concluding that science is in disarray, you need to ask: are the sources of dissent credible?

Or might the debate be imaginary, occurring just in the public media and not among genuine experts?

Impressions of a controversy are easy to fake. For a long while, two-thirds of the misinformation on covid on social media originated from just a dozen sources (Center for Countering Digital Hate [CCDH], 2020). Similarly, reports denying climate change shared on Twitter were traced to just ten publishers (CCDH, 2021). Another analysis of over 22,000 tweets critical of climate change revealed 60 sources funded by a "Big Oil" company (Collarossi, 2023). Accordingly, consumers of science need to learn how to not mistake a flood of sponsored messaging by a vocal few as "the wisdom of the crowd."

Another way agents try to shape public opinion is to generate bogus "consensus statements," such as the 1995 Leipzig Declaration and the 1998 Oregon Protocol. Each tried to challenge the consensus on global warming, Yet most signers had no actual expertise in the field. Creating an *image* of a controversy (when there is none) is a standard ploy now (see Fact-or-Faux, Osborne on "The Disinformation Playbook"; Figure 1). Indeed, this tactic has been increasingly used to confound timely action on important socioscientific issues (Oreskes & Conway, 2010; Michaels, 2020).

Another tactic for counterfeiting controversy is for someone without genuine expert credentials to pretend that they are a legitimate voice of dissent. For example, Judy Mikovits, an outspoken vaccine critic (*Plandemic*, *Plague of Corruption*), has been called by supporters "among the most skilled scientists of her generation." They herald her as "a modern-day Rosalind Franklin." But no qualified immunologist regards her views as sound. Research she published in *Science* magazine linking chronic fatigue syndrome to a virus was later retracted, and attributed to a contaminated reagent. Lacking credibility, her dissent is empty and without merit.

All this imitation of expert consensus or faux contoversy can usually be identified with lateral reading and the basic tools of quick fact-checking (see Fact-or-Faux, July, 2024 on "The Art of Critical Ignoring"). The consumer of science should, as always, consider the contexts of power, profit and privilege, and be on the lookout for conflicts of interest.

We can also turn to scientific institutions. Consolidating expertise and reporting it is one of the primary reasons we have established such organizations as the IPCC, WHO, CDC, EPA or National Academy of Sciences (Fact-or-Faux, May, 2024). They can also help us spot and discount counterfeit controversies in the media.

Why Experts Disagree

Real experts can surely disagree. Indeed, in the ongoing scientific research relevant to many contemporary issues, it is common. However, the mere presence of debate among scientists does not discount the science, as some contend. It is not a signal that some investigators are incompetent or wrong. Or that every scientist is opinionated and ignoring the role of empirical results. Instead, professional disagreement is an indicator of active *science-in-the-making*. Science is doing exactly what it should be doing: trying to get things right. Resolve ambiguities. Clarify the interpretation of the evidence. Find more relevant data. Scientific investigations take time and resources. And sometimes, for the rest of us, it takes patience, too.

For example, relevant data may be meager and insufficient. Or researchers may encounter different sets of evidence that do not align. Or they may not concur about which observations are most significant. Multiple theories may explain the same results. These are all reasons why

experts may justifiably disagree.

This is one reason why studying history can be valuable: to understand and appreciate how disagreement can actually contribute to scientific progress (e.g., Hallam, 1989; Hellman, 2007). How did scientists stumble on conflicting results? How did they resolve debates? You may tell the story of the particle vs. wave approaches to light. Or the Neptunists vs. the Plutonists in interpreting the formation of geological strata. Or the Mendelians vs. the Biometricians in conceptualizing the patterns of inheritance. All provide insights into the *critical discourse* and *social practices* that are integral to the nature of science.

Sometimes, science is incomplete. Namely, we just don't know. Or we don't know *yet*.

The challenge for consumers of science is learning to accept that scientific knowledge may sometimes be uncertain. Accepting such a status as "natural" is an important foundational epistemological belief (or element of "epistemic cognition").

A Matter for Experts

When the experts do not agree, we may easily be tempted to substitute our own judgment for the experts'. Yet non-experts must resist this compelling urge. If the experts cannot reach consensus, who are we to trump their conclusions? We can easily miss something that the experts themselves know very well. Let us remind ourselves of the importance of intellectual humility (see Fact-or-Faux, Jam., 2025).

One may desperately want to follow a personal hunch or an intuition. Yet this is not knowledge. It is just a dangerous excuse for succumbing to preconceptions. It is easy to cherry-pick data to support your favored conclusion. But a patchwork of "positive" evidence is not necessarily complete. It fosters illusions, susceptible to blind spots. That's why we turn to experts to begin with. They know all the ways unwitting mistakes can happen. So, we must guard against accepting merely plausible arguments, and respect the view of experts (see Fact-or-Faux, March, 2024).

It is equally dangerous to cherry-pick just the experts who agree with our preferred view. Non-experts are not equipped to second-guess the experts, even if they disagree. Our job is *not* to judge *which* scientific expert to trust—that is part of the inherent dilemma of expertise. Instead, we must see any major disagreement as the expert conclusion itself. That is, the justification is incomplete. The knowledge is still *uncertain*.

Yes, in practice, consumers often make their own substitute judgments. But are they scientifically justifiable? Psychologists have identified what cues we tend to rely on. We use indirect clues, such as the apparent majority view, repeated claims, judgments of information quality, and personal experience (Johnson, et al., 2023). We rely, too, on what we know ourselves (Barzalai, et al., 2020). But ideally we shuld adopt a bird's-eye view of the relevant scientific community and its institutions. Thus, if the experts *as a group* are uncertain, we should think likewise. Adopt a posture of *agnosticism*. Proceed as if that information was simply not available. This is not abandoning science or reason. We are just prudently accepting the way it is.

Uncertain, But Not Clueless

It is easy to imagine the non-expert's frustrattion. They may conclude, "if scientists are uncertain, then they know nothing at all!" When the experts disagree, the citizen-consumer may

throw up their hands in despair and dismiss the science altogether. But that would not be prudent either. Experts may disagree, but they are not necessarily clueless. Accordingly, our task is to collect what information *is* available and to contextualize it. Uncertain science may still *inform* our decision-making.

For comparison, we may reflect on how we respond to conflicting advice from acquaintances — about which cell phone service to use, or which college to attaned. We do not discount their information entirely. We "measure" it.

For example, the *range* of scientific perspectives is typically relevant. The extremes set informative boundaries. Also, there may be common ground on some basics. That may well be enough to guide us.

Or there may be differing levels of uncertainty. Even if there is not a solid "consensus," there may be a definitive majority view. Sometimes, that is all we need. We would certainly not want to give "equal weight" or "balance" to a minority view, as though it would surely triumph eventually (see Fact-or-Faux, May, 2024 on "The Galileo Gambit").

When scientific issues become critically important socially, scientific institutions and professional organizations often articulate the status of knowledge. Again, the science may not be certain, but they can clearly delineate what uncertainties remain.

In other cases, it is helpful to know what the leading experts think —the ones that fellow experts regard as most knowledgeable and experienced. In a sense, that peer recognition may be reason to consider their judgment "more expert." That work of appraisal is often done by professional science journalists in reporting the status of the ongoing science in the news. Indeed, such media "gatekeepers" are important interfaces between the community of expert scientists and non-expert consumers. We may need to keep in mind *their* particular expertise. They are skilled in probing and "translating" the experts' knowledge for us — including when the experts disagree. Their mediating role is an integral part of the social architecture of trust (see Fact-or-Faux, Nov., 2024; Höttecke & Allchin, 2020).

Decision Making Under Uncertainty

Thus, when experts disagree, we consumers of science need to adapt our method of making decisions. How can we *accommodate* the uncertainty?

For example, we may want to consider the entire spectrum of possible outcomes consistent with the science. Perhaps we should hedge our bets against any undesirable outcome. Perhaps we should try to avoid the "worst case scenario." Or should we first protect the most vulnerable stakeholders? There are many versions of the Precautionary Principle for guiding decision making in a social context when desired information is unavailable (Fisher, et al., 2006; Steel, 2015).

So, the alternative strategy is to assess what we do know scientifically about the risks, costs and possible consequences of making certain assumptions (or of disregarding them!). If there is a lack of overwhelming evidence, we may choose to forego a collective decision and let individuals make their own private choices. In other cases, the "most probable" outcome *may* be an appropriate benchmark (even if we know that other outcomes are possible). That is, we need to adopt a distinctive posture towards *decision-making under uncertainty*.

Who knows? Maybe we may elect to wait for better information, and to invest in more research? Other times, not: the risk is too urgent.

Ultimately, personal or social decision-making under (scientific) uncertainty follows different principles and criteria than with definite information.

That realization opens an opportunity for students to discuss how different criteria may fit different contexts. Socioscientific decisions-making is *informed by* science, but not determined wholly by it.

Recap

Yes, scientists sometimes disagree. Nothing extraordinary about that. However, when they do, we may apply a series of queries (a sort of decision-tree) to help guide us.

> First, check whether the disagreement is genuine, or manufactured artificially in the media by interests hoping to obscure the science in their favor.

> If experts do disagree, exercise epistemic humility. Do not try to trump the expert uncertainty. Simply accept it for what it is.

> Probe the nature of the disagreement. Why do the exoerts disagree? What is the degree of uncertainty, the range of debated alternatives, and the views of the leading experts — a task greatly facilitated by veteran science journalists and scientific institutions.

> Accommodate the uncertainty. Adapt your style of decision-making and rely on different guidiing concepts, such as the Precautionary Principle.

And maybe we invest in trying to resolve the disagreement by sponsoring more science?

DISCLOSURE STATEMENT

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Figure 1. Some bogus controversies, where public media has been flooded with impressions of scientific disagreement when, in fact, there was a consensus among the relevant experts.

second-hand cigarette smoke
climate change
safety of vaccines
acid rain
environmental harms of pesticides
toxicity of hexavalent chromium
toxicity of formaldehyde
toxicity of vinyl chloride
toxicity of lead
ephedra
effectiveness of statins in controlling cardiovascular disease
health effects of burning diesel fuel
severity of the covid pandemic
significance of masking in reducing viral transmission
origins of the COVID-19 virus