Fact Checking 102

by Douglas Allchin

Abstract. The Fact-or-Faux series addresses misinformation and science media literacy. Here, we delve deeper intohe principles behind basic fact-checking methods.

Keywords: conflict of interest; credibility; epistemic trust; multiple sources; expertise; consensus

Fact checking is all well and good. But *how* does it work? Just as students learn about the nature of science, they also need to know, as consumers of science, about the nature of *science communication*. Here, we build on the basic skills of fact checking (Fact-or-Faux, Sept., 2024; Jan., 2025; Allchin, 2023), and explore the concepts behind the tools for sorting fact from faux. Scientific reasoning helps us understand why scientific facts are facts. Media literacy reasoning helps us solve the very same problem — how we establish trustworthy claims — but in the context of transfering knowledge reliably from experts to non-experts. (For a prepared student inquiry presentation, see http://shipseducation.net/misinfo/fact-checking102.htm.)

The Background

First, let's review the basics. Fact-checking at the "101" level guides you to:

1. **S**top, take your bearings and find out who is making a claim, and why.
2. **I**nvestigate the credibility of the source online through lateral reading.
3. **F**ind multiple sources, or
   Trace the origin of information to confirm simple facts.
4. **E**stbalish a source's expertise.
5. **D**epend on the consensus of the relevant scientific experts.

That can be summarized in the convenient acronym SIFT-ED (Caulfield & Wineburg, 2024). Here, we want to delve into each of these steps in more detail. Each may be a separate short lesson?

Conflict of Interest

The first step is to stop and find out who is making the claim, and why. Their motivation (or intent) matters. They might want to deceive you. Power, profit, privilege are all powerful motivations to mislead you. Alas, there are plenty of science con artists (see Fact-or-Faux, Jan., 2024 on the "The Science L.I.A.R.S. Game"; Osborne, 2025 on "The Disinformation Playbook").

This is a first step, because if the source of information is not oriented to being faithful to the science and its consensus, why bother further?

This may be the most important criterion in contemporary media communication. The media is flooded with people trying to sell you things, persuade you to their cause (or to abandon a "good" cause), and even sow confusion or political discord—all while trying to disguise their own purpose or benefit. They do not always have *your interests* in mind, despite what they may say otherwise.

Here, then, is where you can introduce students to the concept of a ***conflict of interest***. The purpose of the message may not be to inform you (your interest). It may be to promote *their* interests.

For example, if someone claims that vitamins can prevent or cure AIDS (as Mathias Rath did in the 1990s), you might well be suspicious if you learn that they sell vitamins (see opening image)(Goldacre, 2010). Similarly, a doctor promoting the many workplace virtues of vitamin D — and warning that many people have deficient levels without knowing it — might be viewed differently if you know that he is a major investor in a new vitamin-D testing company (Allchin, 2017). Their claims are suspect because they have an "interest" in persuading you. To be a savvy consumer of information, first check for conflicts of interest.

Credibility and Trust

Next, you want to know if the source can be trusted. You want to know if it is truly ***credible*** — not just whether it has a good reputation or lots of "likes," or you approve of its values or messaging. What fundamentally justifies your trust?

Here, it is important for students to explore the many meanings of the concept of ***trust***. Some trust is about promise-keeping. Some is about loyalty. Some is about moral respect, some about leadership skills. Some is narrowly contractual, some is about exhibiting fairness. For scientific claims, the relevant type of trust is intellectual trust (or *epistemic* trust). This differs from the other forms of trust in that it requires the source to be knowledgeable, as well as demonstrate a track record of truth-telling. One form of trust does not necessarily imply the others. For example, moral trustworthiness does not ensure intellectual trustworthiness. That's an easy (and common!) mistake. So, we need to be careful when we use the term trust.

For some, trust is a moral virtue, and depends on a personal judgment. Intellectual trust, however, is largely an objective feature. It is an *expectation*. It is based chiefly on evidence of past behavior — which can be observed and measured, just like scientific evidence. Does the source have *demonstrated history* of reliability? Promises or comfortable assurances have no place in science. Nor in media literacy. We need to instill the importance of the notion of a track record, and to research that record as an outside observer.

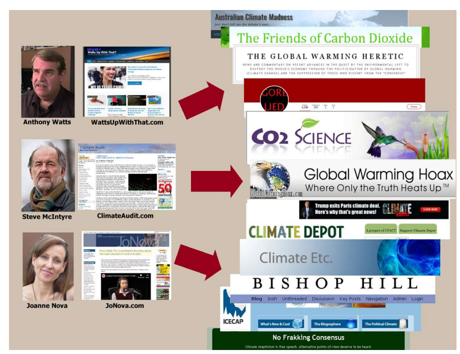
Trust should thus be based on data, not individual impressions. The evidence should be public and transparent. And because trust is a form of expectation, there should be accountability and ways to revise our asessments. That is one reason for trusting established scientific institutions (see Fact-or-Faux, May, 2024).

Multiple Sources

Even if one source appears trustworthy, fact-checkers typically consult another, too. But why bother? Why use ***multiple sources***? How does that contribute to establishing reliability?

We may readily acknowledge that any one person is limited in what they know. The scope of their specialized expertise is bounded. Or there may be gaps in their particular background or awareness. They may not be familiar with the very latest research. They may exhibit a modest theoretical bias, or there may be slight differences of interpretation. Often, we don't know exactly how much the source knows or doesn't know. So, it is prudent — and usually easy enough — to see if another credible source echoes the same claim.

Certainly, when we are unsure about the conclusions from a particular expert — say, the diagnosis of a doctor or an auto mechanic — we generally know to "get a second opinion." The same is true in science: researchers frequently use multiple investigative methods to gain more confidence in their observations.



Of course, if a second or third source is merely a "carbon copy" of the first, you do not learn anything new. So, it is noteworthy that for many years a large number of climate change websites and blogs all traced their information to just three original sources — all denying global warming (Sharman, 2014). Effective media analysis is thus achieved only if the multiple sources are *independent*.

Additional sources may also share the same blind spots or have similar biases. If the purpose is to try to establish a more neutral or objective view, you need to ensure that your multiple sources have contrasting or *complementary perspectives*.

Expertise

Another dimension of fact checking is ***expertise***. Is the person qualified to speak for science?

But what exactly is expertise? How do you, as a non-expert, know who is an expert? This inquiry is certainly ripe for a whole lesson on its own (see Fact-or-Faux, Nov., 2024, for an "Inquiry into Expertise").

Most obviosuly, experts have a degree of specialized knowledge that the rest of us do not. That includes knowledge of potential ways to make mistakes. So, even if you can search the web and collect vast hoards of information, it does not mean that you are positioned to interpret it all and to not make errors along the way. But how do you ascertain someone's expertise as an outsider? It may seem as challenging as checking the claims themselves.

Various criteria for *identifying* experts are familiar, especially in non-scientific contexts (doctors, lawyers, appliance repairers, and so on): (a) track record; (b) advanced degree or training; (c) demonstrated experience; (d) certification or other credentials; and (e) peer recognition (awards and leadership positions), among others. But the consumer also needs to be wary of those imitating expertise. Imposters may appeal to fake credentials, invent bogus institutions, pay for favorable online reviews, and so on. So, the consumer needs to develop a hoabit of vigilance.

Here again, it may be worth reviewing the nature of trust, in order to not confuse trust with expertise. Many politicians may be expert *leaders*, but this does not guarantee *scientific* expertise. A famous science-fiction *writer* may be a superb author, but that does not translate into scientific expertise itself. Even Nobel Prize-winners can have expertise, but not the *relevant* expertise. For example, one Nobel Prize-winning chemist predicted an early end to the covid pandemic (trying to calm the public). But he was wrong. Not surprising, really: he was a chemist, not an epidemiologist (Allchin, 2021). On the other hand, veteran science journalists, even though not scientists themselves, may be well informed enough to speak accurately on behalf of the experts.

Consensus

Expertise alone, however, is not enough for scientific claims. "Settled" science depends on the **consensus** of the relevant expert community. Within science, researchers do not depend on one experiment or one study alone. They use multiple lines of evidence. So, echoing that method for ensuring reliability, the consumer of science needs to rely on the *collective* judgment of the experts.

Consulting only one expert — even if they have the credentials, experience and so on, and even if they can be considered trustworthy — still leaves us vulnerable to misleading (mis)information. In science, at least, any claim should be fully vetted by other experts. A dissenting scientist is not a voice of science (see Fact-or-Faux, May, 2024).

For example, in 2024 *The New York Times* published an Opinions essay about the origin of the covid virus (Chan, 2024). The author, a molecular biologist at MIT, provided five forms of evidence that the notorious virus came from a virology lab in China, not from a wild animal in a market in Wuhan, as generally reported. Her evidence all aligned with her claims. Should we have accepted her argument? No! Our very first question should have been: why is she trying to convince us, the non-experts, rather than her peers in a scientific journal? Indeed, it was easy to discover on the internet that her view was not widely accepted. It was plausible, but too many details were left unexplained. She ignored a lot of data. So, she did not speak for all the experts. An appropriate response would thus be: if she is unable to persuade her peers — those who have enough expertise to assess the evidence and argument, as well as its possible flaws or incompletenesss — why should we take her claims seriously?

Of course, it is equally possible for important discoveries to languish when a cluster of leading experts are convinced that they already have all the answers— what we might call *communal confirmation bias*. For decades, poor J Harlen Bretz collected evidence of a huge catastrophic flood in the Scablands of eastern Washington state, only to be dismissed prejudicially by the elite geologists, who did not believe that any such dramatic event was theoretically possible and refused to do any field work themselves (Soennichsen, 2008). But Bretz was right. Simlarly, a conclusion about women's health (or intelligence or psychology) might be subject to question if all the researchers were male (Saini, 2017). A diversity of perspectives matters to a full and effective analysis. So, a reliable consensus depends in part on adequate levels of investigation and of critical discourse.

Of course, experts may disagree. There may not *yet* be a consensus. Such uncertainty is best met with alternative strategies for decision making — a special case to be addressed in a forthcoming Fact-or-Faux ("When Experts Disagree").

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Simple fact checking is easy enough, given access to the internet. True, social media and websites are awash wth misinformation. Yet at the same time they can also be a source of *reliable* scientific information. Skeptics abound, ready to debunk the pretenses of anti-science misinformation. The informed citizen-consumer just needs to learn how to find those sources and recognize them.

The basic skills of fact checking at the "101" level — stopping, investigating (through lateral reading), finding multiple sources, establishing expertise and scientific consensus — are relatively easy. However, delving deeper into the nature of science communication, as we have here, allows us to do so more effectively. We can appreciate more fully why trust is warranted, make more informed and nuanced judgments, and deal with apparent exceptions to the customary rules.

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No potential conflict of interest was reported by the author.

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