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Science Without Trust

Edouard Machery[1,2]

[1]Department of History and Philosophy of Science, University of Pittsburgh, Pittsburgh, PA, USA and [2]African Centre for Epistemology and Philosophy of Science, University of Johannesburg, Johannesburg, South Africa
Email: machery@pitt.edu

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Abstract

It is often said that successful scientific research must be built on trust. Focusing on the alleged necessity of trust for successful scientific communication and thus for scientific cooperation (which underlies much of contemporary science), I argue that science mustn't be built on trust. Appearances to the contrary come from a failure to distinguish different attitudes toward scientists' testimony, in particular, trusting and relying on other scientists. This article proposes an account of scientific reliance and explains how it differs from scientific trust; it also shows why this distinction matters for science.

1. Introduction

There is now a broad consensus among philosophers of science that trust is necessary for the success of the scientific enterprise: Whether between scientists or between scientists and their various publics, trust is the glue that holds the scientific enterprise together (e.g., Hardwig 1985, 1991; Wilholt 2009; De Ridder 2022). This article focuses on the alleged necessary role of trust among scientists, setting aside the discussion of what kind of attitudes the lay public must (and ought to) hold in relation to science. Trust among scientists is assumed to be necessary in many contexts (Frost-Arnold 2013), but I will only be concerned here with the alleged necessary role of trust for ensuring successful scientific communication:[1] Scientists must take the word of other scientists on trust.

A common argument for the necessary role of trust in scientific communication appeals to the division of scientific labor (e.g., Hardwig 1991, 695; Wilholt 2013, 234; De Ridder 2014, 48; Rolin, 2020, 354). Wilholt puts the point sharply (2013, 234): "The division of cognitive labor within the sciences requires scientists to regularly invest trust in each other's work." Scientific research is often far too complex for scientists

[1] Scientists also communicate in many different ways, even when we limit our attention to what they say as scientists, but I am setting aside this complication here.

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to know everything that is relevant to a research project (from its theoretical significance to the mathematical and computational work involved, the details of the experiments or data collection to be conducted, the data analysis, etc.), and research is thus often collaborative; in such collaborations, even the expert depends on what other experts tell them (they depend on "other experts' testimony"), and, so the argument goes, trust is required when a scientist bases their work on what another scientist tells them.

The goal of this article is to argue that trust is in fact not necessary for successful science: Scientific testimony and thus scientific collaboration can proceed without scientists trusting one another. Appearances to the contrary come from the fact that in contrast to moral theorists working on trust (e.g., Baier 1986, 1992), philosophers of science working on scientific trust have failed to distinguish several attitudes toward other scientists' testimony, only one of which is properly understood as trusting other scientists. This article describes in some detail another attitude, which I will call *relying on others*, and shows how it can replace trust among scientists.[2]

Establishing that trust is not required for scientific research is important for the following reason: If trust among scientists happens to be often unjustified (something I will not argue for in this article, but see Machery and Doris [forthcoming]) but is at the same time necessary for scientific research, much of scientific research would either halt to the ground or rest on an unjustified attitude. That consequence is avoided if trust is not the only attitude scientists can adopt with respect to other scientists' testimony.

Here is how I will proceed. In section 1, I briefly lay out what I take trust among scientists to be. In section 2, the most important section, I contrast trusting and relying on someone. Section 3 replies to some objections.

2. What is trust among scientists?

Presumably, trust among scientists is a form of trust, and we can make progress by examining trust in general. Trust is a three-place relation, involving the agent who trusts ("the trustor"), the agent who is trusted ("the trustee"), and some action: One trusts someone to do something. Emi, for instance, could trust John to pick her up at the airport. The trustor and the trustee can be either individuals (e.g., a spouse or a friend) or collectives (e.g., a group of coauthors or an institution such as a university or the US Senate). Trust is also relative to some particular action (e.g., picking up a friend at the airport on Sunday) or to some action type, such as telling the truth. Let's call this action the *object of trust*. This action type can be broad: It could be as general

[2] Baier (1986, 234–35) also distinguishes two attitudes, which she also calls *trust* and *reliance*, but her analysis of what she calls *trust* and *reliance* differs from the one proposed here: "What is the difference between trusting others and merely relying on them? It seems to be reliance on their good will toward one, as distinct from their dependable habits, or only on their dependably exhibited fear, anger, or other motives compatible with ill will toward one, or on motives not directed on one at all" (Baier 1986, 234). Thus, in her view, trusting but not relying involves (explicitly or implicitly) assuming that the person trusted has a moral concern. While useful in some contexts, Baier's distinction is not relevant here because my concern is limited to epistemic matters (what are scientists to do if they can't assume that their scientific collaborators' testimony is backed by good reasons?). (To be clear, I am not denying that scientists *do* assume, at least sometimes, that their collaborators have moral concerns, although I doubt they must and I suspect they often shouldn't; see Machery and Doris [forthcoming].)

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as doing the right thing. But even if you trust your friend to do the right thing, you might not trust them to cook a risotto.

So, trust involves a trustor, a trustee, and some action, the object of trust. But what does trust itself amount to? The literature on trust in science is large,[3] to say nothing of the literature on trust in general,[4] and the discussion that follows is by necessity shorter than the topic deserves, but the goal of this section is to say enough about trust so as to introduce the contrast between trusting and relying on someone.

To trust someone to do something is to be disposed to believe and to act under the assumption that the trustee will successfully perform the relevant action. If Emy trusts John to pick her up at the airport, she assumes that John will pick her up at the airport; she modifies her beliefs accordingly, expecting, for example, to see John when she arrives at her destination, and she acts accordingly—she does not book a cab, for instance.

The objects of trust are multifarious, and trust is often about nonlinguistic actions (to reuse my stock example: to pick up someone at the airport). But trust among scientists, as I understand it here, is supposed to be about a particular type of action: saying something or making an assertion (what philosophers sometimes call *testimony*). In a communicative context, the listener trusts the speaker to assert successfully. If Bob tells his wife, Deb, that he has paid the mortgage this month, and if Deb trusts him, she is disposed to act and believe under the assumption that Bob's assertion was successful (exactly as Emy assumes that John will actually be at the airport). Philosophers do not agree about what makes an assertion successful: Perhaps the speaker must know what they assert (e.g., Williamson 2000), or perhaps the assertion must be true (e.g., Weiner 2005), or perhaps the speaker must have some justification for asserting what they assert (e.g., Lackey 2007). Assertions' success conditions could also vary across communicative contexts: Perhaps success does not mean the same in the context of science communication and on social media. In any case, whether trust is warranted depends on what exactly is required for an assertion to be successful.

Knowledge (in the philosophical sense) and truth (even approximate truth) are rare in science, save perhaps for its more mature branches, and most assertions would thus be unsuccessful if knowledge or truth were required for successful communication, something I take to be unacceptable. On the other hand, mere belief in the proposition asserted would be too trivial a success condition: Scientific literatures are not meant to be mere reports of what scientists believe. So, here is the proposal: *To trust other scientists is to be disposed to believe and act under the assumption that scientists have good reasons to make their reports*. When an epidemiologist trusts the statistical analysis completed by their statistician collaborator, the former is disposed to believe and act under the assumption that the latter has good reasons for the conclusion they report.

This characterization of trust among scientists differs from other possible characterizations. Sometimes, when people say they trust science, they express a positive attitude toward the scientific enterprise and the scientific community. This

[3] For example, Hardwig (1985, 1991); Barber (1987); Wilholt (2009, 2013); Anderson (2011); De Ridder (2014, 2022); Rolin (2002, 2020).

[4] For example, Baier (1986, 1992); Pettit (1995); Simon (2020).

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"bumper sticker," expressive understanding of "trust in science" is not relevant here: The concern is not whether to admire science and scientists but what attitude scientists must take with respect to scientific testimony. Alternatively, when people assert that they trust science, they sometimes express the belief that science will ultimately be successful (however scientific success is understood). This metaphysical understanding, too, is not relevant here: Its truth is unknowable, and in any case, it does not help address my present concern about scientific testimony here and now.

3. Trusting a scientist versus relying on a scientist

The goal of this section is to show that there are several ways for a scientist to take into account what another scientist says, and trusting it is only one way to do so.[5] While the discussion of trust among scientists in this article is focused on a particular form of action—namely, asserting—the point can be illustrated by considering other actions. The best hitters in baseball rarely hit a ball more than 350 times out of 1000. Outfielder Ty Cobb, who played from the 1900s to the 1920s, still holds the best batting average for his 24-year-long career (.366); since 1941, right fielder Tony Gwynn holds the best single-season batting average (.394). So, hitters are unreliable; they are more likely to miss than to hit. Baseball managers thus should not, and plausibly do not, trust even their best hitters to hit the ball: They know that they will fail more often than not, and thus they do not act under the assumption that hitters will successfully do the action under consideration—namely, hitting (which is what trusting is all about). Indeed, they would not bet at fair odds that their best hitters will hit the ball. But for all that, managers do compose a line-up with some of their players: While managers do not trust their hitters to hit the ball, they *rely on* them to do so.

Generally, as I understand it, *to rely on someone to perform some action* is to be disposed to act and believe under the assumption that this person can and tries to complete this action. *Can* relates to the competence of the person relied on, and *try* relates to their intentions: The person relied on must have some capacity to complete the relevant action, and they must intend to do so. While the person relied on must be able to complete the action, they need not be able to do it reliably. I do not assume that the person relied on must complete the relevant action out of the goodness of their heart: They could just act out of self-interest.

Furthermore, the notion of reliance applies to the action under examination in this article: assertion. For a listener to rely on a source of information is for them to be disposed to act and believe under the assumption that the source of information can and tries to assert successfully (which, again, was glossed in section 1 as asserting on the basis of good reasons). The person relied on need not be likely to assert on the basis of good reasons, and they may try to assert on the basis of good reasons out of self-interest or by habit rather than out of goodwill.

Trusting a source of information differs from relying on that source. Trusting a source of information involves the assumption that the speaker successfully asserts (which was glossed earlier as having good reasons for asserting), exactly as trusting a

[5] While this section draws a contrast between trusting and relying on, I do not take these two attitudes to exhaust the ways of being influenced by what someone says. The slogan "in Rome, do what Romans do" does not recommend trusting Romans, but it is at the very least unclear that it recommends relying on them, in the sense defined in section 3 of this article.

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hitter to hit involves the assumption that the hitter does hit. No such assumption is made for relying on someone; rather, relying on a source of information involves the assumption that the speaker can and tries to assert successfully, exactly as relying on a hitter to hit involves the assumption that the hitter can and tries to hit. Because of this difference between trusting and relying on, listeners can rely on a source of information that they don't trust, exactly as baseball managers can (and must) rely on players whom they don't (and shouldn't) trust. If a lost hiker asks someone for directions, the hiker would rely on the informant but not trust them if the informant told the hiker that they are not sure but think the directions are correct. (What's the evidence that the hiker doesn't trust the informant, you may ask? Well, if the hiker meets someone else soon after, the hiker will ask again.) The hiker relies on the informant because the hiker is disposed to act (namely, to walk in a particular direction) and believes under the assumption that the informant can and is trying to give them information on the basis of good reasons.

Trusting a source of information is a disposition to believe, and so is relying on it. But when you trust a speaker, ceteris paribus, you believe what they say: Because you are disposed to believe under the assumption that they assert successfully (i.e., have good reasons to assert what they say), you believe what they say if you have no countervailing reasons. By contrast, when you merely rely on them, you don't; rather, because you are disposed to believe under the assumption that they can and try to assert successfully, which is not the same as actually asserting successfully, if you have no countervailing reasons, you merely believe that what they say *might* be true because they are to some degree competent and have the proper intentions (for moral or nonmoral reasons). The hiker needn't believe the uncertain informant in the hiking situation just described, although if they have no countervailing reasons, they believe that the informant might be right and would thus act on the basis of what the informant said. (As noted earlier, the hiker would ask again if they met someone else.)

Typically, when we rely on someone to complete some action, it is because we have some reason to think that this person can and tries to complete this action. Furthermore, when we rely on someone rather than someone else to complete some action, it is because we have some reason to think that the former person is more able or tries with greater determination to complete this action. ("Typically" because one can rely on someone chosen randomly when the people one could have relied on seem equally likely to complete the action; one could also rely on someone [e.g., a child or someone who is learning] for practical reasons—for example, to encourage them—despite the fact that someone else might have been more likely to get it right.) Thus, baseball managers have some reasons to rely on particular players and to include them in their line-up: Sometimes, they consult the horoscope (as Domenech, the disastrous manager of the French soccer team from 2004 to 2010, admitted doing[6]); for a long time, they used their expert judgment; now, they often use quantitative indices (e.g., current season batting rate or last month batting rate). Similarly, scientists have particular reasons to rely on the testimonies of their collaborators.

[6] See https://www.independent.co.uk/sport/football/international/the-game-plan-from-out-of-this-world-zodiac-signs-help-domenech-spot-his-shooting-stars-800471.html.

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What makes those reasons good reasons? That is, when is relying on someone justified? The reasons a baseball manager has for relying on a player can be better or worse; plausibly, it is better to use quantitative indices than gut feelings (see *Moneyball*), to say nothing of the horoscope (as evidenced by the dismal performance of the French national team at the World Cup in South Africa in 2010). (We are assuming here that the different ways of selecting a line-up and the different possible line-ups have the same utilities for baseball managers; that is, we are assuming that the only thing they care about is their players hitting as often as possible. This might sometimes be an idealization [some managers might dislike relying on quantitative indices, or they might dislike including some players in their rotation], but this is probably close enough to the truth.) Plausibly, when they select their line-up by following their gut feelings, baseball managers are not justified to rely on the chosen hitters because gut feelings are poor indicators of hitters' competence and intentions; baseball managers who select their line-up on the basis of quantitative indices are justified to rely on the chosen hitters if these indices are good indicators of hitters' competence and intentions.

Similarly, as a first pass, I propose that to the extent that the relier (e.g., a scientist) only cares about receiving testimony backed by good reasons, they are justified to rely on someone's (e.g., another scientist's) testimony if their decision is based on reasons that genuinely indicate that the person relied on has the *competence* and *intention* to communicate on the basis of good reasons. The relier is justified to rely on someone's testimony rather than on someone else's if their decision is based on reasons that genuinely indicate that the former has a greater *competence* or a more committed *intention* to communicate on the basis of good reasons.

We can now see where the discussion of trust in science has gone wrong. From the true premise that science is cooperative, philosophers of science have often inferred that trust is necessary for successful science because they have not given due attention to other ways of taking into account what scientific collaborators say in addition to trust. The collaborative nature of science does not require trust because scientists can rely on others without trusting them: They can act on the basis of what their collaborators say under the assumption that these can and try to communicate on the basis of good reasons, even if they suspend judgment about whether their collaborators and competitors manage to have good reasons for what they say. More important, they can justifiably rely on others, provided that they decide on the basis of cues that genuinely indicate their collaborators' competence and intentions.

4. Objections and responses

A critic might not see the point of the whole discussion because, they could insist, as a matter of fact, scientists typically trust their collaborators. To prevent misunderstanding, I do not doubt that this is indeed the case; that is, I do not doubt that scientists are indeed disposed to act and believe under the assumption that their collaborators are providing information on the basis of good reasons. The question is whether they must, and I hope to have shown that the answer to this question is negative: Scientists can rely on their collaborators even if they don't trust them; what's more, they can do so justifiably.

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Why does it matter if scientists can justifiably rely on their collaborators in the absence of trust, one might also ask? Here is the reason: If it were the case that scientists are sometimes not justified to trust their collaborators (an antecedent not argued here but examined in detail in Machery and Doris [forthcoming]), they should stop trusting their collaborators. The good news is that science would not grind to a halt if they stopped because they could still rely on their collaborators. Consider, for instance, what a senior principal investigator (PI) recently acknowledged, remembering the discovery that one of her postdoctoral fellows (fictionally named "John") had been making up the apparently groundbreaking data she, the PI, had been touting around (Coleman 2023):

> As a senior scientist, I felt humiliated, but I also felt I deserved the humiliation. Why had I not been more vigilant? [. . .] After seeing John's exciting initial results, I stopped reviewing his original data. I wanted to believe the findings underpinning the novel concepts were real. [. . .] The worst of it was that my deepest beliefs had been shaken. I had depended on the idea that scientific research is a sacred trust, not only to the other individuals in one's group, but also to the research enterprise as a whole. John's betrayal was a warning lesson—one I am sorry I had to learn.

What is this senior PI to do? Stop her scientific research because she has discovered that trust is not justified? Continue to trust despite the fact that she thinks, perhaps correctly, that her trust is not justified? The answer is that she should rely on her collaborators, and she would be justified to do so if she relies on them based on genuine indicators of their intentions and competence.

One might also ask whether reliance is not just trust, properly understood. In this view, trust would not require assuming that the trustee acts successfully (in a communicative context: that the trustee asserts on the basis of good reasons), merely that the trustee can and tries to act successfully (in a communicative context: can and tries to communicate on the basis of good reasons). So, scientists would trust their collaborators because they would act and believe under the assumption that their collaborators can and try to communicate on the basis of good reasons.

I do not want to get into a terminological dispute, and people can use the word *trust* as they see fit, but it is then important to acknowledge the enormous gap between the claim that one should trust science in that sense ("okay scientists are often doing poorly, but they really they do their best"—viz. can and try to communicate on the basis of good reasons) from what many hear when they are told to trust science ("scientists are doing well"—viz. are actually communicating on the basis of good reasons). For what it's worth, using the term *trust* to refer to an attitude toward testimony that assumes that others are merely able and trying to communicate with good reasons is also at odds with common ways of using *trust* in everyday English. In the earlier hiker and the baseball examples, the people relied on others to do their best, but they were not really trusted. Or so it seems to me.

Conclusion

In this article, I have argued against the claim that successful scientific communication, and thus scientific research (because so much of it is built on the

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division of scientific labor), must rest on trust. Trust is only one of the possible attitudes toward other scientists' testimony, and even if it is the case that scientists actually trust other scientists, they mustn't do so: They could merely rely on them, that is, be disposed to act and believe under the assumption that other scientists can and try to provide information on the basis of good reasons. To the extent that they rely on their collaborators on the basis of good reasons (i.e., reasons that genuinely indicate that their collaborators have the competence and intention to provide information on the basis of good reasons), they are justified to rely on them, whether or not they are justified to trust them.

Thinking of scientific testimony as being underwritten not by trust but by reliance has the following advantage: Relying on what other scientists say is compatible with a form of scientific agnosticism, which recommends that scientists suspend judgment about what other scientists assert (Machery and Doris, forthcoming). It is also compatible with a call to reinvigorate the critical attitude in science. Individual scientists should develop the habit of questioning what their collaborators are telling them: the data they provide, the analysis they come up with, and so on.[7] The slogan should not be "Trust, but verify" but rather "Rely on, and verify."

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[7] Investigations of scientific frauds have shown that collaborators of the fraudsters rarely checked the data sets they were given.

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