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Building Public Trust in Science: A Team Task

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Abstract

Discussions on the relationship between science and society frequently advocate for direct engagement between scientists and lay people. While such engagement is often framed as a remedy for declining trust in science, it introduces a distinct set of ethical challenges. One such challenge concerns the risk of *epistemic trespassing*, the overstepping of disciplinary boundaries. Another arises when individual scientists, by virtue of their public role, are seen as representatives of "science" as a whole. These issues are further complicated by a less-discussed form of trespassing: the ethical tensions that emerge when scientists draw on non-epistemic sources of authority, such as charismatic or traditional authority (in the Weberian sense), to bolster their public claims. This paper argues that addressing these challenges requires a nuanced, context-sensitive approach. In some cases, the most ethically defensible strategy and pragmatically viable strategy may be not to communicate individually, but rather to contribute to *collective* efforts that facilitate responsible public communication. By reframing public engagement as a *team task*, scientists can mitigate the risks of trespassing while still fulfilling their role in fostering trust in science.

Keywords: trust in science; epistemic trespassing; science communication; Max Weber; authority

1. Introduction

The relation between science[1] and society, whether in science communication or the science-policy-nexus, is often framed in terms of trust: non-scientists need to trust scientists by accepting their testimony, and to rightfully gain this trust, scientists need to behave in ways that are trustworthy (e.g., De Melo-Martín and Intemann 2018 ; Frost-Arnold 2013; Gerken 2022; Goldenberg 2023; Hardwig 1994; Herzog 2023: chap. 8; Intemann 2023; Irzik and Kurtulmus 2019; Oreskes et al. 2019; Rolin 2020;

[1]I use the term broadly to also cover social sciences, humanities, and applied fields of research, because the general challenges I discuss can occur in all of them. There might be some nuances in how exactly individual academics depend on the work of others in different disciplines; for example, in the humanities, single-authoring is more common. But insofar as scholarship in all fields happens in social contexts, building on the work of others and in exchange with them, the challenges are comparable.

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Scheman 2011; Wilholt 2013).[2] Often, the imperative to "build trust in science" is translated, implicitly or explicitly, into an imperative for scientists to engage in science communication, preferably by entering into direct dialogs with stakeholders or members of the public. Such calls have increased in recent years, as traditional science journalism came under financial pressure (e.g., Weingart and Guenther 2016: 2). Universities increasingly see science communication and engagement with society as part of their responsibilities (sometimes framed as their "third mission," e.g., Compagnucci and Spigarelli 2020).

In this paper, I discuss some problems with this view and arrive at a counterintuitive conclusion: it is *not* always the best thing for individual scientists to engage directly with the public. This result follows from reflections on a number of ethical challenges in science communication, and the best ways of responding to them. When entering into dialog with non-scientists, scientists often cannot avoid certain forms of "epistemic trespassing," i.e., claiming epistemic authority outside of their own field of expertise (Ballantyne 2019; Gerken 2018; DiPaolo 2022). I take up more recent contributions to the trespassing debate (e.g., Pavličić et al. 2024; Watson 2022) and argue that in the context of science communication – especially in more dialogical forms – trespassing is difficult to avoid, and not always problematic, but still comes with challenges. The reason is that, whether they like it or not, scientists can end up in the role of representatives of "spokespeople" of their discipline, or even of science as a whole. In such situations, they need to do justice to the collaborative nature of science, instead of relying on a problematically individualized understanding of "trust in science."

In this context, I diagnose another, less noticed risk of trespassing: that into forms of authority other than that of the scientific expert. To illustrate this point, I draw on an analogy from political theory: Max Weber's (1978) distinction between traditional, bureaucratic, and charismatic authority. The additional risks of "trespassing" occur between these forms of authority, with scientists being tempted to draw on traditional or charismatic forms. While not always problematic, this creates the risk of providing non-scientists with the *wrong reasons* to trust science. To deal with these challenges, the best strategy is often a team approach: not a scenario in which as many scientists as possible engage with various publics *individually*, but one in which there are clearly defined roles, possibly with a return to the figure of the "science journalist" in an updated form.

The paper contributes to the normative analysis of science-society relations. So far, this discussion has focused mostly on the ethics of communing scientific uncertainty (Hardwig 1994; Keohane et al. 2014; Lane 2014) and the role of values in science and science communication (Boulicault and Schroeder 2021; De Melo-Martín and Intemann 2018; Douglas 2009; Elliott 2017; Intemann 2024; John 2018; Schroeder 2021; Wilholt 2013). In contrast, the problems I here discuss have not yet received detailed attention. I follow Contessa's (2022) call to consider the issue of trust in science as a matter of a truly *social* epistemology. But while his focus is on the *citizens* who might trust scientists, and the broader social contexts that surround them, my focus is on the side of the scientists who communicate with non-scientists, and a socialized view of *their* role. My approach is in line with Slater and Scholfield's (2022) proposal to see trust in science as a public collective good, with uncoordinated individual science communication potentially leading to a collective action problem. My proposal to see building trust in science

[2]For an alternative view that is based on evidence, see Leefman and Lesle 2020. It builds on the performance of experts, but the latter may be difficult to judge for non-experts. This account is, therefore, only applicable to a subset of science-society relations (as the authors acknowledge, p. 3624).

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as a team task responds to this diagnosis, functioning at a similar "non-ideal" level that takes the challenges of today's media environment and the presence of malicious actors seriously.

I hasten to add that I do not claim that this approach, in itself, would be sufficient to heal all distrust in science, which is often politically or economically driven and needs to be seen against a broader background of political polarization, growing socio-economic inequality, and decreased trust in institutions (e.g., Herzog 2023). My focus is narrower and more specific: given this background, how can academics best react? Insofar as science communication is part of the role of academics, one can understand the questions I discuss as part of their role ethics: they fall under the ethics of science communication.

My approach is "non-ideal" in the sense that it tries to take seriously the media and political context in which science communication happens today, and also the practical constraints (time pressure, high workloads, etc.) under which many academics today need to work. It joins John (2018) in arguing that what may seeming to be clear normative proposals (in his case, honesty, sincerity, openness, and transparency; in my case, the imperative that each scientist should enter into a dialog with non-scientists) are not always ideal when one thinks through the consequences they can have in different contexts.[3] It also takes seriously the warning that it is not *always* appropriate for non-scientists to trust scientists, given all that we know about the scientific process and its many flaws. Given the latter, there is a non-negligible risk of conveying falsehoods in science communication, because "it is far from obvious that science as it is currently practiced is fully trustworthy" (Contessa 2022: 2951). Rather, we might sometimes be confronted with cases of "institutional distrustworthiness" (Fricker 2023).[4]

Nonetheless, my focus will be on cases in which trust is, in principle, justified, because the scientific process has gone sufficiently well to produce insights that are reliable and go beyond what non-scientists can know about a topic. In other words, my focus is not on cases where the commercialization of science (e.g., de Melo-Martín and Intemann 2018: 96–113) or other systemic problems put the trustworthiness of science fundamentally at risk. In general, my arguments relate to *epistemic* trust in the sense of accepting testimony. Irzik and Kurtulmus (2019: 1148) define it as follows: "Epistemic trust is about taking someone's testimony that P as a reason to believe that P on the assumption that she is in a position to know whether P and will express her belief truthfully" (see, for a detailed discussion of testimony and trust, also Faulkner 2011). Sometimes, "trust in science" may also include changes in one's behavior (e.g., "I trust science therefore I get vaccinated"). While I cannot discuss all the ways in beliefs are connected to behavior (or disconnected, because of factors such as weakness of will, fear, procrastination, etc.), I take it that there is a considerable subset of science communication that comes with the expectation that belief changes also lead to behavioral changes, at least in tendency – and that this is precisely why trust in science matters.

In the next section (section 2), I discuss some challenges that scientists face in science communication, given that scientific inquiry is a process with highly divided labor. This makes epistemic trespassing difficult to avoid, especially in dialogical forms of engagement with the public. I then (section 3) move to a related, but neglected topic: the

[3]A related topic, at least in the sense of covering non-ideal territory, is Intemann's (2020) discussion of how to deal with hypes in science communication.

[4]For reasons of scope, I cannot discuss here what steps of reform (e.g., more replication studies, more research syntheses, etc.) would be needed within science to improve epistemic practices in these fields.

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risk of trespassing not between scientific fields but between forms of authority, drawing on Max Weber's classic distinction. I argue (section 4) that while the best reaction to these challenges is context-dependent, one promising way forward is to understand science communication and the building of trust in science, in a less individualistic way: to take a team approach with clearly defined roles, to which scientists can also contribute indirectly. The conclusion (section 5) summarizes my arguments.

2. Some neglected challenges in building trust in science

When members of the public encounter a scientist, they often encounter an individual person and hear their testimony, which can induce them to take up certain beliefs if they trust this person. But the reason why they should trust this person *as a scientist* is not that they trust *this particular person*, but rather that this scientist is a member of the *system* of scientific knowledge production. This system, however, consists of highly divided labor (e.g., Gerken 2022, 2023; Hardwig 1985, 1991; Longino 1990). As Gerken puts it metaphorically: "Scientists no longer stand on the shoulders of giants as much as they stand within an edifice built by a myriad of their predecessors and contemporary peers" (2022: 28). One indication of this phenomenon is the high number of co-authors in many fields (ibid.). These collaborators rely on what Gerken (2022) calls "intra-scientific testimony" (between scientists who directly collaborate) and "inter-scientific testimony" (without direct collaboration, but still crucial for sharing data, analyses, etc. through publications). Through such testimony, different insights and results can be brought together; where appropriate, it can also be used for integrating other forms of knowledge, e.g., indigenous knowledge.[5] At least as important as direct collaboration is the role of scientists in double-checking each other's work: as peer-reviewers, discussants, respondents, initiators of replication studies, etc. While these mechanisms are not perfect, they provide a form of quality control that serves to weed out error and fraud.[6]

This "social view of science" sees it as a community-based endeavor with ethical and epistemic norms that its members need to follow (e.g., Longino 1990: chap. 4). Feminist philosophers of science have added an important dimension to this view: to fulfill its function as well as possible, the scientific community needs to fight against biases, e.g., along lines of gender or race, because, as Rolin puts it, "inclusive and responsive dialogue based on shared standards of argumentation is a background condition that makes it more reasonable to trust the community's ability to detect and eliminate error and bias than otherwise" (Rolin 2002: 101, see also Rolin 2017). The public can trust science – as an institution – insofar as the members of this community, together, come up with results that have been checked and vetted, following the right social norms (e.g., responsive dialog) while attempting to minimize bias (e.g., Oreskes et al. 2019).

[5]For a recent account of "transformative transdisciplinarity," see Ludwig and El-Hani (2025). Here, the research process includes a broader range of people from the start, making science and science communication a "team task" in an even deeper sense. While, arguably, more such approaches are needed, the cases this paper discusses are more traditional in the sense of not already including the audience for science communication in the process of knowledge generation.

[6]An even stronger view is to view scientific knowledge as collective knowledge (e.g., De Ridder 2014, who points to the fact that the justification condition of scientific knowledge may only be available to a collective of scientists). If one endorses this view, the problem I discuss in this paper becomes even more urgent, but one need not hold it to accept the practical challenges I discuss.

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I take this rough sketch to be uncontroversial on the descriptive level. Insofar as non-scientists are expected to "trust science," they therefore need to place trust in this system as a whole.

It might be objected that one cannot trust a system, because trust is a moral relationship, the violation of which induces blameworthiness (Baier 1986). It is not immediately clear how such a moral relation could hold towards a system of divided labor. But one can make sense of this claim if one takes into account that the role of a scientist comes with epistemic responsibilities that have a moral dimension. As Rolin puts it:

> in epistemically well-designed scientific communities, epistemic responsibilities are understood not merely as epistemic but also as moral duties. . . . The moral account is needed to bridge the gap between individual scientists' personal ends and the impersonal epistemic ends of science when neither the self-interest nor the epistemic account (or a combination of them) succeeds in explaining why it is rational for an individual scientist to behave in an epistemically responsible way. (Rolin 2017: 469).

The self-interest or the personal epistemic goals of scientists may deviate from what they need to do for scientific cooperation to go well, epistemically speaking; therefore, an additional moral motive is needed (ibid., p. 475, see also Frost-Arnold 2013). One can spell out this additional motive in terms of commitment to the institution of science and its norms (Fricker 2002) or commitment to specific epistemic values such as competence, conscientiousness, and honesty (e.g., Margitay 2021).

In this way, trust in science can be understood as trust in a social system of divided labor. Of course, this does not mean that one should neglect formal mechanisms of checks and balances. This has been emphasized in particular by those who see the scientific system more in terms of reliability than in terms of trust. Scientists can base their beliefs on the testimony of other scientists because the latter are embedded in institutions in which false or misleading testimony is discovered and sanctioned (e.g., Fricker 2002: 383). Such an account relies on strictly enforced standards, not only when it comes to the responsibilities of scientists, but also concerning structural questions, such as preventing problematic forms of commercialization (on the latter see, e.g., de Melo-Martín and Intemann 2018: chap. 8; Fernández Pinto 2020). From this perspective, it is particularly important that there are no distorting incentives[7] that would tempt scientists to deviate from their role responsibilities.

Sociological research on collaborating scientists confirms that trust is not only a matter of interpersonal relations but also of structures of reliability. It shows that scientists' mutual trust is not "blind" (as Hardwig (1991) had once put it), but that they use an "ongoing probing process" and other strategies, e.g., indirect monitoring, for building mutual trust (Wagenknecht 2015). The ability to collaborate is itself a capacity that scientists need to learn. As Gerken (2022: 127) puts it: "part of scientific competence consists in a meta-competence that includes at least two aspects. The first aspect consists in some ability to recognize a competent scientific collaborator. The second aspect consists in some sensitivity to defeaters of intra-scientific testimony." Nonetheless, in

[7]Here, I refer to well-known problems such as an exaggerated focus on quantitative measurement in the evaluation of researchers or hyper-competitiveness that can induce unethical behavior. For reasons of space, I cannot discuss these problems here.

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many cases, Hardwig's (1991) basic point still stands: the sheer complexity of the division of academic labor makes it unfeasible to double-check everything and therefore makes trust within the scientific system unavoidable.

What does this fact of divided labor, and the need for trust *within* the scientific system, mean for the scientists who want to "build trust" with nonscientific audiences through science communication? The scenario I have in mind, in what follows, is a scientist who communicates with non-scientists, whether in classic science communication scenarios, e.g., giving public talks, or in science-policy contexts, e.g., in policy advisory boards. In such situations, a speaker invites trust through speech-acts such as accepting a public role or giving advice (Barimah 2024, drawing on Faulkner's 2007 view of affective trust, see also Kelsall 2021).

This individual scientist speaks to non-scientists as a *member of the institution of science* – and the message he or she brings to the non-scientists will almost never be based *only* on his or her own work or that of close collaborators. To put it metaphorically, this person often becomes a spokesperson for a whole social system – if not "the academic world" as a whole, then at least the relevant disciplines and lines of research they draw on in their work.[8] Even if invited to speak only about their own research, they will typically need to draw on other scientists' research.

In the scenario I have described – and which will be the focus of my discussion from now on –, it seems almost unavoidable for communicating scientists to say things like "This has been confirmed in a neighboring field of research" or "I here draw on peer-reviewed research from field x," without having the expertise to judge the quality of that research (e.g., they would never themselves be invited as peer-reviewers for these studies). Often, the best response would in fact be: "I can give you the rough outlines, but in our present context of discussions, some of the details really matter, and unfortunately I am not sufficiently steeped into the material to give them to you, we need to find someone else," or "Please give me two hours, I first need to talk to a colleague who *really* knows about this area." In some circumstances, this may be possible, and it would indeed be the right thing to do. However, in many communicative settings, such strategies are not practically feasible – think about public podiums, life interviews, or committee meetings with policy-makers under time pressure. It may then be almost unavoidable for scientists to "epistemically trespass."

The concept of "epistemic trespassing" (Ballantyne 2019; Gerken 2018; DiPaolo 2022; Hardwig 1994) describes the phenomenon of experts testifying about a domain in which they are not experts. As DiPaolo argues, this is deeply problematic: non-experts depend on experts, and this makes them vulnerable, "by requiring partial abandonment of their intellectual autonomy" (2022: 236). Often, "[p]ractical dependence accompanies epistemic dependence" (2022: 236), when non-experts need to *act* on the beliefs they form on the basis of trust in science. Trespassing experts therefore "irresponsibly abuse their authority and neglect the responsibilities they have toward epistemic dependents" (Di Paolo 2022: 238).

[8]For reasons of space and focus, I here abstain from discussing questions about more 'activist' forms of science communication in which scientists combine scientific insights with value judgments about what *should* happen in response. The problems I discuss become ever more urgent in such cases, because it cannot be assumed that these value judgments are shared by all scientists. In cases in which the epistemic situation is not yet clear-cut, but action is required, the entanglements are even more complex. See e.g., Beaty (2006) for a case study on why scientists sometimes mask disagreement; see Moore and McKenzie (2020) for an argument about why such disagreement should be made public.

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Nonetheless, as has been conceded from the beginning, a complete avoidance of trespassing would be problematic as well. Gerken (2022: 166–7; 2023), for example, discusses this as a problem for intra-scientific testimony, and briefly mentions the challenge for testimony to non-scientists as well:

> If scientists could provide intra-scientific testimony that *p* only if they mastered the relevant scientific justification for *p*, the fine-grained division of cognitive labor that is central to the epistemic force of science would be severely hampered. Similarly, much public scientific testimony would be infeasible, if properly based trespassing testimony was never permissible. (Gerken 2022: 166)

More recent accounts of trespassing have, indeed, painted the phenomenon in a somewhat more positive light. Pavličić et al. (2024) point out that many scientific breakthroughs happened because scientists trespassed into another area and brought new perspectives (although they admit that trespassing can also lead to real harm). They also emphasize that many interdisciplinary forms of research, e.g., in nutrition science, would be impossible without trespassing, and therefore suggest calling it "hospesism" instead (ibid., 259ff.). Watson (2022) suggests replacing the metaphor of "trespassing" by that of "epistemic neighbourliness": it describes "the claim that domains can be nested inside one another or they can overlap, and that epistemic authority is better analyzed as a function of the degree of overlap and nature of the shared epistemic project than by whether experts stay within their respective boundaries" (2022: 15).

Nonetheless, this does not mean that scientists engaging in science communication would not face normative challenges here. For the sake of argument, we can exclude notorious cases such as Nobel-prize-winning chemist Linus Pauling, who ended up publicly promoting vitamin C as a cure for cancer (Ballantyne 2019: 195–96). Such cases are, arguably, normatively overdetermined in their wrongness. But even well-intending, epistemically humble scientists who are invited to speak about their own research to a nonscientific audience can be faced with questions about neighboring areas, or may need to use results from other areas as input into their own research, without having produced them themselves. Of course, every academic in such a situation should do the obvious "homework" before: reading up on relevant research, double-checking claims they vaguely remember from earlier projects that might be of interest to the audience, etc. But there are practical limitations, stemming from at least two directions: one is that it is not always possible to predict what one will be asked about and which turn the discussions will take; another is the sheer amount of time that is needed for such preparation, and which the hectic life of academia often hardly admits.

This problem is particularly urgent for scholarship that cuts across disciplines. While it is often feasible to acquire some "interactional expertise" (Collins and Evans 2007: 14), in the sense of being able to understand the methodology and results of studies in neighboring fields that one relies on, interdisciplinary researchers cannot fully grasp all details from other fields on which their research draws. The challenges multiply if one needs to draw on work from fields that are known to have problems, e.g., the replication crisis in social psychology. Scientists in, say, organization science, arguably need to be extremely careful when their research is connected to such fields and they communicate about it to the public.

Ironically, these problems are particularly pronounced in the more dialogical forms of science communication that are seen as most suitable for building trust in science. In "sending" models of science communication – e.g., TED talks with a lone scientist in the

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spotlight – careful preparation can minimize the risk of harmful trespassing, e.g., by carefully double-checking every study from a neighboring field one draws on, running one's claims by colleagues from different fields, etc. But such forms of science communication have rightly been criticized for relying on an outdated "deficit model" (the public has a knowledge deficit that the communicating scientist needs to fill). Instead, more "dialogical practices" of public engagement are seen as the gold standard of developing trust in science among laypeople (see e.g., Ivani and Dutilh Novaes 2022 for a critical discussion and defense). But in such settings, it is much more likely that scientists are confronted with unexpected questions, or that the discussion turns to topics in which one has some "interactional expertise" – which may still be greater than the expertise of one's interlocutors – but not the deep expertise of one's own research. Hence, the risks of "epistemic trespassing" and the need to carefully avoid harmful forms of it are particularly great.

This systemic dimension of "building trust in science" has not been discussed much in the literature on trust in science, where the focus is mostly on the trustworthiness of *individual scientists* communicating with the public. For example, Intemann (2024: 3, building on Goldenberg 2023: 370) argues that "epistemic trustworthiness" involves "four key features":

> (i) epistemic competence, i.e., the expert is in a position to know; (ii) epistemic reliability, i.e., the expert conforms to reliable standards for producing knowledge; (iii) honesty, i.e., the expert is disposed to tell the truth and be sincere; and (iv) a good will, i.e., the expert shares a commitment to the public interest or cares about those whom their work impacts or about their wellbeing (Intemann 2024: 3).

A scientist who shows these features gives "laypersons good reasons to think the conditions of epistemic trustworthiness are met" (Intemann 2024: 4; see also Irzik and Kurtulmus 2019: 1146[9]). Of course, there may be questions about the ease with which non-scientists can evaluate whether communicating scientists show these features (e.g., Anderson, 2011; Goldman, 2001). It also depends on one's conception of science communication how the division of labor between experts and laypersons is imagined in detail. Gerken, for example, argues for a model of "justification expert testimony," according to which communicating scientists should, "whenever feasible, include appropriate aspects of the nature and strength of scientific justification, or lack thereof, for the scientific hypothesis in question" (2022: 158, see also pp. 185–7 for a parallel norm for science reporters such as journalists).

My point is not to criticize these conditions of trustworthiness (or to defend this specific view of science communication). Rather, it is that whatever conditions and task descriptions one defines, one misses part of the picture if one focuses only on one individual, namely, the communicating scientist. Trust needs to extend to the whole group of scientists involved in the relevant research (see also Wilholt 2016).[10] Therefore,

[9]Irzik and Kurtulmus (2019) use the term "enhanced epistemic trust" for situations in which the public can also expect that the communicating scientists' inductive risk judgments align with those of the audience, which can be made explicit in 'hybrid forums' (e.g., citizen assemblies, ibid., 1153).

[10]Wilholt (2016) also makes the case that methodological standards are 'irreducibly social' (p. 219), and that therefore 'the trustworthiness of the group cannot be reduced to the trustworthiness of its members' (p. 200). I find this argument convincing, but my point about the relation to outsiders does not hinge on it. Generally speaking, my argument concerns not *only* the value judgments that go into methodological

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the conditions of trustworthiness carry over to the scientists *on whose work the communicating scientist draws*: if *they* have not been epistemically competent, for example, this may undermine the trustworthiness of the communicating scientist as well. Or if the justifications *they* provide for a certain result – and which the communicating scientist passes on, either explicitly or implicitly as part of a more complex justificatory narrative – do not stand up to scrutiny, the justification that non-scientists receive is incomplete.

This makes the communicating scientist vulnerable to any form of negligence, incompetence, let alone fraud, by colleagues on whose work they draw. They might end up not being trustworthy, or failing to provide proper justification, not because of a fault of their own, but because something went wrong within the wider social system of science. Intemann acknowledges this point in a footnote. She writes:

> it is also true that much of the expert knowledge that is disseminated to non-experts is the result of groups of scientists, or scientific organizations, or institutions. While it is open for debate what is the appropriate subject of trust (individual, group of individuals, or institutions), I will assume for the sake of the argument here that these criteria can also be applied to groups or institutions (Intemann 2024: 4).

However, what is here assumed, namely, that "these criteria can also be applied to groups or institutions," is not something we can take for granted. It may be relatively unproblematic in the case of clearly delineated and organized groups – Intemann refers to the IPCC or CDC as examples – that make a collaborative effort to share their results among each other and to relate different forms of evidence to each other, agreeing on the specific ways in which they make inductive risk judgments and communicating these publicly. But even these groups draw on many studies done by nonmembers.

Moreover, many forms of science communication do *not* rely on such group processes of mutual scrutiny and integration of insights. Often, it is a single scientist who communicates and who draws on results they have taken over from others, as part of the overall narrative that they convey to non-scientists. In such situations, in which one scientist acts – voluntarily or not – as the "spokesperson" for science, great ethical care is needed not only for how one communicates about one's own research, but also in how one relates to the system of science of which one is part. One obvious challenge is not to take credit for work done by others. Another is to convey, as precisely as possible, the degrees of expertise one has for different claims: has one done a study oneself, or together with others, or does one draw on other people's work? How well can one judge the soundness of the methodology? Has one seen just one study about a certain effect, or is there a broader array of evidence, maybe based on different methodological approaches?

This dependence may be less visible because everything has "gone" well in the research on which a communicating scientist depends. But consider the many ways in which biases or methodological problems can make the confidence in past research results brittle. For example, many scientific fields, especially in medicine, have only

choices (concerning the risks of false positives, false negatives, no results, or a weighted combination thereof), and which, according to Wilholt, are conventionally chosen within research communities. My argument is broader and meant to cover also other potential issues of (lack of) trustworthiness, e.g., risks of negligence or fraud in certain lines of research because of known misalignments of incentives.

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recently started to reckon with the fact that much past research has been done on male patients only, which makes many recommendations that were previously taken for granted problematic for female patients. Or take the many methodological criticisms that have been brought forward by psychologists and other social scientists against the applicability of rational choice methodology as often used by economists. Being aware that such criticisms exist, but no consensus has yet emerged on how to deal with them, can further complicate the position of scientists who want to draw on such research in their communication to the public.

In an ideal scenario, a scientist would have enough time to carefully lay out these challenges – and the audience enough patience to listen to them. There would indeed be an opportunity to say: "Let me check this with a colleague and get back to you later about it." If the discussion turns to a topic that really requires a different expert, the communicating scientist would suggest inviting a colleague from another field to take over from them. In longer-term collaborations, e.g., in team-based medical care (e.g., Watson 2022: 8), such reflexive ways of dealing with the divided labor of scientific research are possible. However, in many situations in which scientists communicate, this is practically unfeasible. In such settings, there can be a temptation to trespass in a different way: to trade different forms of authority for each other. I turn to this issue next, drawing on Weber's (1978) classic distinction of three forms of authority.

3. Trespassing between types of authority

To discuss this related, but different form of trespassing, which has not been considered in the philosophical literature on science communication so far, I draw on a classic tripart distinction from political theory. Max Weber's distinction between traditional, bureaucratic, and charismatic authority may be well-worn, and yet it throws interesting light on the problem I analyze in this paper, especially that of science communication with a broader public.[11] Here is a brief summary of Weber's ideas (1978). The first type, traditional authority, claims legitimacy "by virtue of the sanctity of age-old rules and power" (ibid., p. 226). It can often be found in close-knit communities with "personal loyalty which results from common upbringing" (ibid., p. 227). The second type, "rational legal authority" (ibid., pp. 218–225), in contrast, is based on rule-based decision-making by bureaucrats with their specific offices, which they are supposed to execute in a "spirit of formalistic impersonality: '*Sine ira et studio*'" (ibid., p. 225). As such, it means "domination through knowledge," which makes it "specifically rational" (ibid.). Thirdly, charismatic authority is exercised by someone who rules by help of "a certain quality of an individual personality by virtue of which he is considered extraordinary and treated as endowed with supernatural, superhuman, or at least specifically exceptional powers or qualities" (ibid., p. 241). Historically, those were often religious leaders, e.g., prophets, but in any case, it is a matter of "extra-ordinary" personalities (ibid., p. 244). Charisma is often experienced as "a 'call,' a 'mission' or a 'spiritual duty'" (ibid.).

To be sure, this is a very rough distinction, which can be no more than a heuristic for thinking about certain problems. Like all heuristics, it has limitations, but it is useful insofar as it lets us see certain things more clearly. And while scientists who communicate with a broader audience or with policymakers do not have direct authority – only

[11]For another use of the notion of charisma in (the history of) academia, see Clark 2006.

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"epistemic authority"[12] – it is interesting to think through the question of how they can build trust with the help of Weber's three categories.

Traditional authority would mean that scientists are trusted because they have always been trusted. *Descriptively*, this may sometimes be the right way of understanding trust in science – think about the way in which doctors were, and sometimes still are, seen as authorities whose judgment lay persons simply have to accept, because it is part of their community's mores that one "listens to the doctor." As empirical work on science communication shows, the typical "highly visible scientist" is male, elderly, and good-looking, playing into clichés about traditional authority, maybe mixed with some charisma – a pattern that a recent study about highly visible "pandem-icons" during the COVID-19 pandemic confirmed (Joubert et al. 2023; see also Fahy 2015). But from a *normative* perspective, this is a problematic model: it provides no reasons for *justifying* the trust that laypeople put into scientists. The fact that scientists have always (or rather, for a long time, in certain societies) been listened to does not, as such, explain why they *should* be listened to.

Bureaucratic authority seems to come closer to the view of science as a social system that I have described above. While the parallel is, of course, not exact, some features are comparable: the existence of clear rules and interlocking roles, the possessors of which are supposed to contribute to the overall functioning of the institution "sine ira et studio." What is obviously different is that in the scientific system, it is not hierarchy that creates authority; as is well-known, social hierarchies introduce many problems in what should be a knowledge-oriented social system. Also, science as a system is not "value free," as authors in the philosophy of science have shown *against* Weber's use of that term (e.g., Douglas 2009; Elliot 2017). But it is the impersonality that is comparable: just as it should not make a difference which official a citizen speaks to when putting down a request at a public office, the messages that reach the audience from the scientific community, on a particular topic, should not depend on which scientist conveys them.

What about charismatic authority? Like traditional authority, it obviously cannot deliver a normative basis for public trust in science. But at a descriptive, and in particular at a *psychological* level, it is an interesting category. In a media environment dominated by celebrities, it is quite common to see particular scientists rise to prominence as the "public face" of their field.[13] Often, this has to do with features such as relatability, rhetorical skills, or even simply good looks (Joubert et al. 2023). Some of these "science stars" are willing to open up their whole life to the public, e.g., doing home stories with gossip magazines. Their names become brands, which can open doors for lucrative book deals and consultancy gigs. This phenomenon can be seen against the context of not only a historiography of science that often misleadingly celebrates lone geniuses (see, e.g., Gerken 2022: 148), but also political developments that see more and more populist leaders who present themselves as the direct voice of the people (e.g., Mueller 2017). Social media facilitates the (seeming) closeness of "leaders" and "followers."

[12]It might be asked whether my account here hinges on a particular account of epistemic authority, e.g., Zagzebski's (2012) preemption account or Croce's (2018) virtue-based account that integrates cases of superior understanding as discussed by Jäger (2016). I take it, however, that when it comes specifically to *scientific* knowledge, the dependence on the *system* of science holds for all these different accounts, and therefore the challenges I discuss arise for all of them.

[13]On some of the problems of "celebrity epistemic power" in democratic societies, see also Archer et al. (2022).

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It is here that individual scientists who communicate with an audience of non-people may run into a dilemma: effectiveness may call for traditional or charismatic communication, even though this wrongly places the reasons for trust on the character of a single individual, not on the system of science as a whole. Even though one may deplore this fact, on a purely descriptive level, the efforts of such "science stars" for building public trust in science may in fact be more important than many other strategies. One can grant that some forms of stardom may be put aside as unethical for independent reasons (e.g., because they reflect an idea of superiority that is in tension with a democratic understanding of moral equality). But apart from egregious cases, it is worth emphasizing that charisma may well have positive effects in terms of reaching audiences and building trust. Research by Fiske and Dupree (2014), on public communication by different professional groups, shows that scientists are perceived as having high competence but showing low levels of "warmth." According to these authors (Fiske and Dupree 2014: 13595), scientists "earn respect but not trust." Being charismatic may offer a counterweight to this tendency of not being perceived as "warm." Another study found that more personal communication (e.g., selfies, in contrast to pictures of apparatuses or diagrams) on social media leads to a greater perception of trustworthiness (Jarreau et al. 2019). Again, the personal dimension of communication seems positively correlated with trust in science.

Therefore, playing into the charismatic line may have large payoffs in terms of increased trust in science, especially for scientists who have good communicative skills and winning personalities.[14] Strategies that draw on personal charisma may have better chances to reach large audiences in today's media environment. And to be sure, not all communication based on charismatic authority is morally wrong, all things considered. If important goods are at stake, worries about using the wrong means of communication may seem a luxury that needs to be set aside. And one should also grant that there can be many shades of gray in the ethical evaluation of charismatic communication. Using drastic or funny language while presenting a rational argument, for example, may be considered less problematic than mongering fear or other emotions in ways that overshadow the rational core of the argument.[15]

And yet, drawing on charismatic authority is a form of trespassing in the sense that it neglects the *reasons* why individuals should trust scientists and replaces them with

[14]There is a variation of this argument that is of particular relevance for building trust in science among specific groups: that of identity-based communication. Certain social groups have been historically alienated from science as an institution. This holds, for example, for ethnic minorities who have suffered discrimination and harm from scientists and were excluded from processes of knowledge production (e.g., Grasswick 2010, 2018; Fernàndez Pinto 2020, p. 1006). It is a straightforward idea to ask scientists *from those groups* to help build trust in science, by communicating directly with them (this may raise additional questions about a fair division of labor within the academic community, but for reasons of scope, I will not discuss these here). For the doctor–patient relation, it has been found that "perceived personal similarity" leads to higher trust and other positive outcomes (Street et al. 2008, quoted in Goldenberg 2023, p. 372). And yet, the fact that someone belongs to the same demographic group is not, on its own, the right normative reason for trusting science. One could maybe say that this fact can take away *countervailing* reasons, e.g., a worry that the person lacks understanding or benevolence towards a certain group. Once the air has been cleared of that suspicion, as it were, questions about well-placed trust, as discussed in this paper, come to the fore.

[15]One can here draw on the literature on the "ethics of persuasion" to draw distinctions. See e.g., Blumenthal-Barby 2012 on the ethics of persuasion in the context of bioethics and communication about health, who distinguishes between "reason-bypassing" and "reason-countering" non-argumentative forms of influence.

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different reasons. The implicit message of science communication should not be: "trust me because it is *me* who says this," but rather "trust me because we (!) did this according to the best possible scientific methods and standards." Using charisma to build trust in science remains a problematic strategy in this sense, and it is made worse by the fact that *un*trustworthy actors often exploit charismatic strategies as well, sometimes even by playing precisely the role of charismatic scientist that is here under discussion. Especially when one thinks about the trust relation between science and society as a long-term, structural relation, it becomes clear that this relation should be based on the right reasons for trusting science, not on the fact of having charismatic people as the public faces of science.

Another way of putting this point is that different goals of science communication can here stand in tension with each other. Intemann (2020: 282) suggests the following goals: "(1) accuracy, (2) understandability, (3) predictive relevancy, (4) generating enthusiasm/interest, and (5) facilitating trust." These goals can conflict (ibid.), and here they indeed do: accuracy (especially about the process of knowledge generation and the reasons why science is trust*worthy*) and maybe also predictive relevancy pull toward an emphasis on the *system* of science, but enthusiasm/interest and trust pull in the charisma-based direction.

Is this a problem that scientists simply have to live with, at least in the current media environment? To be sure, they can try to find outlets for science communication that offer more favorable circumstances, in which there is a chance to be clear about the limitations of one's own expertise and the systematic reliance of scientific knowledge on the scientific system as a whole. But this will not always be feasible. In the next section, I suggest another strategy, which has not received enough attention in the discussion about trust in science and the ethics of science communication: to think of it as a team task.

4. Building public trust in science as a team task

If one takes a broader historical and sociological perspective, it becomes clear that the communication between science and society has often been embedded in structures that included more people than just "the scientist" and "the audience." In the 20th century, star scientists with their own TV programs coexisted with many science journalists in less visible, but structurally important roles for regularly bringing updates about scientific insights to the public. Since the rise of the internet, however, with advertising money shifting to the online sphere, many newspapers had to reduce staff or completely shut down their science desks because of financial problems (Weingart and Guenther 2016). Other channels of communication went via membership organizations, e.g., unions or NGOs that had ties to research institutions in areas relevant to them, and these continue to exist – but a lack of funds in many such organizations can also lead to a thinning out of the "intermediary experts" that can help translate and contextualize relevant scientific findings.

It is against this broader historical context that the calls for more science communication need to be understood. To some extent, PR departments of universities and free-lance science communication experts have filled the gaps, with science communication having "developed into an industry" (Weingart and Guenther 2016: 1). However, while the older model of science journalism was guided by journalistic standards (and other intermediate experts probably by the interests of their audiences), in many of the new forms of science communication, the motives are not immediately

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clear. Weingart and Joubert (2019) distinguish between two types of science communication activities, each with several subcategories: the first type is "driven almost exclusively by educational objectives, is executed without an institutional interest influencing its contents, serving only the interests of the target audience" (2019: 8). In cases of type two, in contrast, the communicator (typically a political agency, a university, or an academic organization) entertains other interests: "in self-promotion, in augmenting institutional prominence, and in attracting attention" (ibid.). Weingart and Joubert call for clarity about motives, because a "conflation of motives ... ultimately threatens the credibility of science as an institution, of scientific organisations and the mission of science communication" (ibid., 3).

This is an important warning, but it does not mean that scientists who want to build trust in science cannot benefit from looking at some of the historical practices and what worked well in them. Specifically, I want to argue that the fact that science journalism was often a team approach, with clearly defined roles, can help address the two types of trespassing that I have discussed above: trespassing between disciplinary fields and trespassing between forms of authority.

I hasten to add that I do not take this to be a one-size-fits-all solution; all answers to these challenges need to be highly sensitive to the different contexts and issues at stake. For example, in crisis situations in which human lives are at risk, prioritizing effectiveness through charisma may be morally legitimate and even required. This may bring short-term gains in trust; however, these need to be weighed against possible losses, namely, the perpetuation of a wrong picture of how science functions and of what justifies its authority, which may create risks of backfiring in the longer term.

What, then, do I mean by a team approach? Scientists can work in teams (e.g., at the level of research institutes or university, or research alliances across institutions), supported by communication experts who help them place their message in a way that takes into account the characteristics of different media and the best chances of reaching the target audience, all while paying an eye to the values of science communication, such as integrity, accessibility, sensitivity to the specific audience and its needs, etc. They can also, depending on the opportunity and the state of evidence in a certain field, invite colleagues who are critical of their own interpretations of the data and might suggest different ones, so that the audience sees the process of scientific deliberation in action. When it comes to policy issues, they can write reports together, carefully weighing the insights from different lines of research.

Such an approach would take up Watson's (2022) notion of "epistemic neighbourliness" from the context of interdisciplinary research and transpose it to contexts of public engagement and "building trust in science." Watson (2022: 16–18) uses the notion of "councils of trust" whose collaboration can create conditions of trustworthiness for lay people. They would consist of "several experts in overlapping fields" who together can vouch for certain information, as when the family physician can tell the family that vaccines do not cause autism because he is part of such networks. To function well, these experts must be "free to disagree" (ibid., p. 17), and they must be "from neighboring, or "linked" domains" (ibid., p. 18). My suggestion to see science communication as a team approach can be understood as a strategy that builds such "councils of trust" for the audience. Watson is fully aware, of course, that this approach can also run into problems, but nonetheless suggests that the insights of such a council can "justify novices in identifying and trusting relevant experts" (ibid., 20).

The division of labor within such a team approach does not have to stop at scientific personnel, however. By drawing the circle even more widely, the role of charismatic

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authority can, where necessary, be integrated into a team approach, without falling back into old-fashioned clichés of "science stars" (good-looking elderly males in laboratory coats). The model I here have in mind could be called "the charismatic presenter who explains the process of science."[16] Having relatable, charismatic communicators is important for winning trust in science. But these need not be "science stars" themselves – they can be science journalists who explain to the audience how science works and how they get information from scientists, e.g., by checking peer-reviewed studies and meta-analyses and talking to different researchers. Of course, this is a demanding task, and it typically requires a whole team in the background. This is a luxury that few science journalists enjoy these days. But it may be the best way of preventing the perpetuation of a problematic view of science and yet harvesting the benefits of charisma in terms of building trust.

Rather than calling on *all* scientists to be communicators, scientific institutions might want to consider how they could support such models, as a way to addressing the problems of trespassing between disciplines and between types of authority.[17] This is likely to lead to better outcomes than if all scientists, individually, communicate about the results of their own studies in an unmediated and uncoordinated process (see also Slater and Scholfield 2022). Such unmediated communication – which social media invites[18] – can all too easily fail to provide context or to balance the results, where necessary, against other research results, explaining their significance and relevance. The audience might also all too easily get the impression that there is an unorganized cacophony of voices in science, none of which is, per se, particularly trustworthy, especially if their claims clash. Therefore, the best strategy for individual scientists may often be *not* to always try to communicate directly, on their own, but rather to find opportunities to participate in team-based approaches to science communication – or to help build them where necessary. They can, for example, help science journalists find the best experts to talk to, to understand the relation between new studies and the state of the art, or to judge the degree of certainty with which they should communicate certain claims to their audience.[19]

Before concluding, let me respond to two objections. The first is that the "team approach" can lead to new ethical problems and dilemmas. For example, there might be a problematic distribution of credits, or the invisibilisation of certain groups already

[16]I am here inspired by the example of the science journalist Mai Thi Nguyen-Kim – see e.g., https://www.youtube.com/watch?v = Nn2rJrKwENI.

[17]An additional problem that this approach, if implemented well, could address, is the structural overwork that reins in many academic systems and that only gets worse if there is a default assumption that "science communication" belongs to the tasks of *every* academic.

[18]For reasons of space, I cannot discuss the additional problems of social media in science communication, from the algorithm-driven attention economy to trolls or even threats. Note that my call to not always communicate individually is *not* driven by a resignation in the face of these problems; in the all-too-nonideal reality, however, these very different kinds of arguments might pull in the same direction.

[19]A potential objection to this view is that there might be a loss *for scientists themselves* if they do not interact directly with members of the public anymore, from which they might get inspiration or new perspectives (or a stroke for their ego). I might have to accept this as a bullet to bite for the sake of a more important good, namely, more sustainable, structural ways of building public trust in science. I take it, however, that the forms of interaction with the public that are most likely to deliver valuable insights for scientists, e.g., visits to schools and interaction with pupils there, could continue to coexist alongside more structured team approaches – or they could happen in teams as well, so that scientists as the *members* of these teams could continue to benefit from direct interactions.

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marginalized in science (e.g., researchers of color) might be continued. Or there might be genuine questions about how to think of the boundaries of the relevant "teams" – are those meant to be the same people over a longer period of time, or might the constellation vary from topic to topic? How, for example, should one deal with different research paradigms in these contexts, which differ not only in methodologies but also in the underlying ontologies and values?

In response, let me grant that such questions can arise and need to be handled with care and ethical responsibility. Sometimes, a team approach may require painful compromises, e.g., when deciding whom to "send out" to the media. In a public health emergency, a team may decide to send out the stereotypical authority figure (the elderly man in the lab coat) because it is really important that as many people as possible trust the message – even though they would otherwise prefer to send out a young person of color in order to break with precisely that stereotype. Such judgment calls will require contextual sensitivity and practical wisdom – but then, this is also true for science communication *in general,* at least in today's difficult media environment. Teams are, arguably, in a better position to take these ethical challenges seriously and think through them from different perspectives than individual scientists on their own. In other words, the very fact that science communication raises various ethical issues is, in fact, another argument for doing it in teams rather than alone, and the teams can then also deal with the new ethical challenges that may arise *in the team approach*.

A second objection is that the *team* versus *individual* issue is ultimately less important than another issue: that of communicating about *results* or *processes*. As many commentators on trust in science have pointed out, there is a tension between communicating a (seemingly clear) result and communicating about the process of creating scientific knowledge, in all its messiness and provisionality. A focus on the latter can mean that scientists communicate with lots of caveats and caution. But as Naomi and Oreskes (2010: 687) once famously remarked, referring to such a style of communication: "Although this care and nuance is intellectually scrupulous and admirable, being so philosophical about the 'factual' nature of climate change doesn't serve public communication."

In response, let me suggest that these two challenges are both important, and they both require attention from the scientific community, but also from the community of science journalists and other mediating instances. Both groups need to, on the one hand, position themselves within the current very non-ideal media landscapes, but also, on the other, ask themselves how they can contribute to improvements over the status quo, i.e., developing ways of communicating in which "care and nuance" are *not* rejected by the public. Teams of scientists need to be aware of this challenge and deliberate about the best ways of dealing with it. Arguably, in some countries, the science communication around the coronavirus pandemic did contain some positive movements in this direction, for example, regular in-depth interviews with scientists discussing the latest state of the art and the most recent developments that gave the audience a vivid sense of results *and* processes of scientific enquiry. While scientists can play a role in this, it is essential that (science) journalists and the media also do their share in moving in this direction.

5. Conclusion

In this paper, I have argued that we should understand the task of "building trust in science" as a team task. I have motivated this argument by discussing two kinds of trespassing in science communication, especially in dialogical forms: trespassing between disciplines, and trespassing between different forms of authority. Both need not

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be problematic per se, but both come with considerable risks of harm, depending on context. Avoiding these harms requires sensitivity to context and audience, but often, a team-based approach is likely to offer the best chances for effective communication that, at the same time, avoids problematic forms of trespassing.

This result should not come as a surprise: given that science itself is a highly social endeavor, with a sophisticated division of labor that in turn requires complex checks and balanced, would not it be, on the contrary, be surprising if science communication, in all its different forms, was something that all researchers could do individually, alongside their daily work, as a kind of glorified hobby? Instead, scientists should consider the task of "building trust in science" as one that concerns their community as a whole, and for which different, clearly defined roles are needed in different contexts. This also requires a different approach for the institutions of science, e.g., universities: for example, instead of sending all their researchers onto social media (which is conveniently low-cost) they should think of more sophisticated (but potentially also more expensive) approaches that help teams of scientists to communicate in different ways with different audiences, with professional support. This is the best bet for ensuring that the values of science and science communication are upheld in today's challenging media environment.

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