Received: 1 November 2022 | Revised: 13 November 2023 | Accepted: 17 November 2023

DOI: 10.1111/bioe.13249

SPECIAL ISSUE: IAB 16TH WORLD CONGRESS

bioethics WILEY

The ethics of expert communication

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Abstract

Despite its public visibility and impact on policy, the activity of expert communication rarely receives more than a passing mention in codes of scientific integrity. This paper makes the case for an ethics of expert communication, introducing a framework where expert communication is represented as an intrinsically ethical activity of a deliberative agent. Ethical expert communication cannot be ensured by complying with various requirements, such as restricting communications to one's area of expertise or disclosing conflicts of interest. Expert communication involves morally laden trade-offs that must be weighed by a deliberative agent. A basic normative framework is introduced, and concrete provisions are proposed for codes of scientific integrity.

KEYWORDS

expert communication, framing, honesty, manipulation, science communication, scientific integrity

1 | INTRODUCTION

The rule that scientists should communicate "honestly" when providing expert advice to policy-makers is not only common sense; it is also widely prescribed in codes of conduct.[1] And while honesty rarely receives an explicit definition, it does tend to be used interchangeably with "transparency." For instance, in the latest European Code of Conduct for Research Integrity, scientists are expected to be "transparent about assumptions and values (…) as well as the [about] the robustness of the evidence, including remaining uncertainties and knowledge gaps."[2] Similarly, the AAAS's declaration on the ethics of science and policy strongly emphasizes transparency (together with reproducibility) as a defining feature of integrous scientific experts.[3]

Insofar transparency is a *value*, opposed to dissembling or deception, its ethical desirability is not in question. However, the question this paper would like to raise is a different one: do such transparency requirements work as ethical guidance? In general, real contexts may not allow one to simultaneously maximize equally desirable values. What is needed from guidance is an indication of how to navigate competing values—not merely to point to the importance of each value separately.

Here is a first example to make the matter slightly more concrete. Consider a scientist at a major public health organization who is called upon to give a recommendation in response to some emerging public health crisis—perhaps the spread of an infectious disease (Covid-19, HPV, etc.) or the spread of harmful behaviors (alcoholism, opioid addiction, etc.). Whatever it is, the scientist is in a privileged epistemic position to both diagnose the causes of the crisis, as well as identify possible remedial interventions. How should they craft the recommendation? At one extreme, they could simply walk the public or policy makers through the scientific state-of-the-art, and highlight the underlying assumptions and uncertainties when presenting

[1]Desmond, H., & Dierickx, K. (2021). Research integrity codes of conduct in Europe: Understanding the divergences. *Bioethics*, *35*(5), 414–428.
[2]All European Academies (ALLEA). (2023). *The European Code of Conduct for Research Integrity—Revised Edition 2023*. Berlin. https://doi.org/10.26356/ECOC.
[3]American Association for the Advancement of Science (AAAS). (2017). Ethics & principles for science & society policy-making: The Brussels declaration.

possible responses to the crisis. At the other extreme, the scientist would simply stipulate what the "safe" course of action is, even though the recommendation may place undue burdens on some segments of the population who are less at risk. Clearly, the scientist must find some middle between these extremes. However, guiding the scientist toward the value of "transparency" does not help in finding this middle.

This trade-off has long plagued expert communication: how much activism should a scientist allow in their expert communications? The *locus classicus* of this trade-off is James Hansen's testimony to the U.S. Congress in 1988 that he had "99% confidence" that the greenhouse effect was causing a long-term warming trend. At the time, his communications were criticized by peers as not transparently conveying the confidence intervals generated by state-of-the-art climatological models.[4] However, Hansen thought of his communication as the *more honest* path, as evidenced by his statement: "I feel I was only trying to report an accurate description of our scientific research."[5]

The purpose of this paper is to introduce an ethics of expert communication in a way that acknowledges the ambiguities and challenges in achieving "genuinely honest" communication. Its main negative argument is that genuine honesty cannot be achieved by complying with various types of transparency requirements, such as being transparent about assumptions and values,[6] the limits of one's expertise,[7] or conflicts of interest.[8] Its positive argument is that ethical expert communication inevitably involves a complex deliberation about sometimes competing values.

In developing these arguments, two major claims are advanced. The first claim is one about the nature of expert communication: it is a complex, sensitive activity requiring considerable individual judgment. All communication requires a *framing decision*: some information is included or foregrounded, and other information is excluded or background.[9] As trivial as this claim would be in the context of communication science, for the field of scientific integrity, it holds important, yet-to-be-drawn lessons. To this end, a vision of expert communication is sketched where expert communication sits in the middle between education and policy, between knowledge and action. Any scientist communicating as an expert must make a fundamental framing decision on whether, so to speak, to prioritize knowledge or action. More precisely: the scientist must decide to what extent they should transparently convey the scientific state-of-the-art (warts and all), and to what extent they should anticipate the audience's needs and present the scientific state-of-art in such a way that it can directly inform their decision-making. The upshot of this first claim is primarily to support the negative argument of the paper, namely that it does not make sense to spell out the ethics of expert communication in terms of transparency requirements alone.

The second, constructive claim is that framing decisions are *ethical* decisions that are better captured by the distinction between *persuasive* and *manipulative* communication, and the interplay between the values of *care* and *respect*. Experts must always weigh care and respect, sometimes prioritizing the first (when consequences can be estimated with relative certainty) but often prioritizing the second (since such certainty is rare). This is a very difficult task that requires an understanding not just of the science but also of the various goals, values, and interests of the intended audience. An ethics of expert communication cannot give universal solutions on how to resolve such challenges, but it can offer basic principles and outline how one can reason about ethical trade-offs.

The paper is structured as follows. Section 2 aims at getting a more precise grasp on the core phenomenon; based on this, Section 3 introduces the "fundamental dilemma for expert communication" to show how transparency always competes with actionability in expert communication. Section 4 argues why this trade-off is a specifically *ethical* one, and sketches how an ethics of expert communication could be developed by situating persuasion and manipulation within some standard normative-ethical frameworks (deontological, consequentialist, and virtue-ethical frameworks are discussed). Section 5 attempts to distill the argument of this paper into a type of stipulation suitable for inclusion in codes of scientific integrity. The goal here is not to advocate for any particular formulation, but rather to illustrate how some of the general and abstract considerations discussed in this paper could translate into concrete stipulations. Section 6 concludes.

2 | THE BASIC ANATOMY OF EXPERT COMMUNICATION

What is expert communication? We must inevitably operate with some implicit understanding of the target phenomenon in order to develop an ethics of it. Nonetheless, some caveats are in order, given the several ongoing debates on the question. One caveat concerns the question of how to demarcate "genuine," trustworthy experts from "ersatz," nontrustworthy experts?[10] Another asks whether scientific experts giving policy advice are still acting in scientific capacity, or whether are they acting as de facto policymakers?[11]

On the first question, this paper can remain agnostic. In principle, whether or not some practitioner is categorized as a pseudo-scientific ersatz expert, they can still convey their (pseudo-)expert advice in an ethical or unethical way.[12] This means an ethics of expert

[4]Kerr, R. A. (1989). Hansen vs. the World on the greenhouse threat. *Science*, *244*(4908), 1041–1043. https://doi.org/10.1126/science.244.4908.1041

[5]Pool, R. (1990). Struggling to Do Science for Society. *Science*, *248*(4956), 672–673.

[6]ALLEA, op. cit. note 1, p. 9.

[7]Gerken, M. (2018). Expert trespassing testimony and the ethics of science communication. *Journal for General Philosophy of Science*, *49*(3), 299–318. (2012). *Responsible conduct in the global research enterprise: A policy report*. https://www.interacademies.org/publication/responsible-conduct-global-research-enterprise

[8]IAC-IAP, op. cit. note 6, p. 27.

[9]See recent overview in: Jamieson, K. H., Kahan, D., & Scheufele, D. A. (2017). *The Oxford handbook of the science of science communication*. Oxford University Press.

[10]For an overview, see Watson, J. C. (2020). *Expertise: A philosophical introduction*. Bloomsbury Publishing.

[11]For an overview, see Gundersen, T. (2018). Scientists as experts: A distinct role? *Studies in History and Philosophy of Science Part A*, *69*, 52–59.

[12]Consider two types of astrologers. The first astrologer is aware that astrology is a pseudoscience and is only interested in telling people what they want to believe in order to

communication can be developed without an account of how to demarcate genuine from ersatz experts. The second question cannot be avoided in this paper, and to that end, I will stipulate that an expert communication is a *scientific* communication. In other words, there is a difference between expert advice and policy-making. Even though this will be motivated later on, I will not stress-test this stipulation by means of candidate counterexamples and alternative views. Hence, it is important to emphasize that the definition I introduce here should be understood as an *operational* definition, that is to be evaluated according to its conceptual fruitfulness for constructing an ethics rather than according to its robustness against counterexamples. In that sense, the definition of expert communication is like an idealized scientific model that may be false but can be used to do interesting work.

With these caveats in place, the following definition encapsulates some of the major features of how "expert communication" will be understood. By *expert communication*, I mean any communication by a scientist that:

(1) is perceived as authoritative in virtue of their position of epistemic prestige and trustworthiness,
(2) conveys an assertion about the scientific state-of-the-art, and
(3) does so in a way that readily informs decision-making about possible courses of action.

Phrased more succinctly: expert communication is authoritative, actionable science communication. I will now motivate each stipulation.

2.1 | Expert communication is perceived as authoritative

It is obviously not the case that *everyone* perceives (scientific) expert communication as authoritative. Science denial and conspiracy theorizing are alive and well.[13] However, one should also not overestimate the importance of this type of distrust. Professions (esp. medicine and engineering) tend to define themselves as "science-based."[14] Corporations rely on scientific research (R&D) for their business models and are by now larger funders of science than governments.[15] And science is an authority for policy-makers, as reflected in the ideal of "evidence-based policy-making."[16] Science today may not be universally trusted, but it does possess a relatively undisputed position of epistemic authority among powerful groups.

Does this imply a subjectivist understanding of expertise: science is authoritative because it is perceived as authoritative? Here it is helpful to recall an older (and now relatively forgotten) debate held in the 1970s and 1980s about the meaning of "professionalism": which activities get to call themselves a "profession"? This debate was never settled, and arguably some of the most valuable contributions[17] showed why the debate *cannot* be entirely settled, since the label of "professional"—just as the label of "expert"—invariably entails a value judgment about the authority, trustworthiness, and prestige that should be assigned to that person. This means that this label will be *essentially contested*: different individuals, factions, or disciplines will compete for the status of "professional."

Similarly, the label of "expertise" is essentially contested, and it was by a gradual, historical process that science has come assume the authority, credibility, and "expertise" it today is perceived to have.[18] In fact, until well into the 19th century many "scientists" would have been categorized as "natural philosophers" (the term "scientist" having been coined in 1834 by Whewell[19]). And it took a while for the methods of modern science to be integrated into the professions. For instance, physicians until late in the 19th century had to be persuaded of the "numerical method" of Pierre Louis, the precursor of the method of randomized control trials.[20]

The lesson here is not that any activity or group of practitioners can be called an expert. Rather, the motivation for this first stipulation is that the perceived authority of expert communication has a significant *social reality* (which is why it is also a historically contingent feature). Later on, it will be argued that this feature is what makes expert communication a topic of interest to ethics because the *words* of experts can impact the *lives* and *livelihoods* of nonexperts. It is because of this authority that the act of communication becomes a morally valenced act.

2.2 | Expert communication is science communication

Is expert communication a form of science communication, or is it some sly form of de facto policy-making?[21] It is helpful here to

sell them astrological readings. The second genuinely believes that astrology accurately conveys (a part of) the structure of the world, and is very scrupulous about conveying a nuanced astrological reading according to the standard rules of the field. Astrology may be a pseudo-science, but in some genuine sense (not further analyzed here) there is an ethical distinction to be made between the latter "honest" astrologer and the former "charlatan" astrologer.

[13]For an overview, see Douglas, K. M., Uscinski, J. E., Sutton, R. M., Cichocka, A., Nefes, T., Ang, C. S., & Deravi, F. (2019). Understanding conspiracy theories. *Political Psychology*, *40*(S1), 3–35.

[14]Brante, T. (2011). Professions as Science-Based Occupations. *Professions and Professionalism*, *1*(1), 4–20.

[15]UNESCO Institute for Statistics. (2020). *Global Investments in R&D*. Retrieved from: http://uis.unesco.org/sites/default/files/documents/fs59-global-investments-rd-2020-en.pdf

[16]Cairney, P. (2016). *The politics of evidence-based policy making*. Palgrave Macmillan.

[17]See Abbott, A. (1988). *The system of professions: An essay on the division of expert labor*. University of Chicago Press; Larson, M. S. (1977). *The rise of professionalism: A sociological analysis*. University of California Press; Freidson, E. (1970). *Profession of medicine: A study of the sociology of applied knowledge*. University of Chicago Press.

[18]Gieryn, T. F. (1999). *Cultural boundaries of science: Credibility on the line*. University of Chicago Press; Gieryn, T. F. (1983). Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists. *American Sociological Review*, *48*(6), 781–795.

[19]Gayon, J. (2009). Philosophy of biology: An historico-critical characterization. In A. Brenner & J. Gayon (Eds.), *French studies in the philosophy of science: Contemporary research in France* (pp. 201–212). Springer.

[20]Rangachari, P. K. (1997). Evidence-based medicine: Old French wine with a new Canadian label? *Journal of the Royal Society of Medicine*, *90*(5), 280–284.

[21]Gundersen (op. cit. n. 11): 52–59; Jasanoff, S. (1987). Contested boundaries in policy-relevant science. *Social Studies of Science*, *17*, 195–230.

acknowledge that what we think of as "expert communication" is a broad category that unifies a diversity of communication types. Roger Pielke[22] makes a helpful distinction between four different policy-related roles that a scientist can assume: Pure Scientist (the scientist simply summarizes the scientific state-of-the-art), Science Arbiter (the scientist helps policy-makers navigate the state-of-the-art, but lets policy-makers come up with their own policy options), Honest Broker (the scientist outlines and evaluates various policy options, but lets policy-makers choose), and Issue Advocate (the scientist actively pushes for a particular policy). These four categories[23] provide a rough typology of expert communication and show how in some forms of expert communication, the science can be emphasized, while in other forms, policy is emphasized.

For purposes here, the only limitation placed on "expert communication" is that the advice it contains primarily or exclusively appeals to scientific assertions. This maintains the distinction between two types of "issue advocacy": a scientist pushing for a particular policy based on their scientific expertise, and the scientist pushing for that policy in the name of other considerations, such as moral principles (e.g., human rights) or because they have a political mandate to do so (e.g., while occupying public office). Why should this distinction be maintained? Here is one view: the first type of issue advocacy *influences* ethical and political deliberation, by highlighting the seriousness of a neglected issue, but does not *determine* it, since policy-makers will make the final decision on how to weigh this issue against other issues. By contrast, the second type pre-empts normative deliberation, either in principle (by appealing to absolute moral values) or in practice (by possessing political power).

This stipulation does not imply that expert communication is always easily distinguishable from policy (cf. S. Jasanoff, 1990). The expert advice "Drinking no more than fourteen units of alcohol per week safeguards long-term health" conveys a certain summary of the scientific state-of-the-art, and gives receivers the freedom to use this information as they wish. However, this advice can quickly morph into the imperative "Drink no more than fourteen units of alcohol per week." This is an assertion about how people ought to act. Thus expert communications can be presented as imperatives, or conversely, imperatives can masquerade as expert communications. The stipulation in this paper is that imperatives are not "expert communications"—even though imperatives may, confusingly, occasionally be uttered by scientific experts. Expert communication involves the conveying of *scientific assertions*, even though the underlying *aims* and *intended effects* of expert communication can vary considerably.

2.3 | Expert communication is actionable

The last definitional stipulation serves to distinguish expert communication from other types of science communication. Communication formats of scientific publications or conference talks are not forms of "expert communication." Here scientists are communicating to their peers. Expert communication, as understood here, will not be understood as communication to peers. In expert communication, the intended audience is one that is assumed to not possess the same type and degree of scientific background as the speaker.

Teaching and popularization are forms of communication that consist of assertions about the scientific state-of-the-art and are also aimed at nonpeers (i.e., students, or the general public). However, while all these communication formats involve communicating science in one way or another, expert communications should be distinguished from educational or popularizing communications. Expert communication gives rise to ethical challenges that are quite distinct from those arising from teaching science, which arguably falls under the ethics of pedagogy and teaching professionalism.[24] More fundamentally, it involves different *aims*. In contrast to education or popularization, the primary goal in expert communication is not to provide some purely epistemic value, such as knowledge or understanding, but rather to provide *actionable* information that can be directly used to inform the target audience's decision-making.

This is a crucial stipulation for the ethics of expert communication, but I would argue it makes intuitive sense. Consider a public health recommendation, such as "Washing your hands prevents infection" or "Drinking no more than fourteen units of alcohol per week safeguards long-term health." These are expert communications insofar as their *primary* aim is to guide action, and not to educate about the science. By contrast, if an expert primarily aimed to educate, one would expect the communication to include information about the nature of virus replication, transmission, and survival outside of hosts; or would involve explaining the biochemical mechanisms or physiological effects of alcohol consumption. To the extent this does not happen in a science communication, education can be judged to *not* be the primary aim and the more clearly the communication resembles an "expert communication" (this is a question of degree: see next section). Expert communication thus can be thought of as an ideal type where the primary aim is actionability and where understanding is secondary.

3 | THE FUNDAMENTAL DILEMMA FOR EXPERT COMMUNICATION

So let expert communications be authoritative, actionable science communications. The question for this paper is: how should scientists craft them? This section introduces the notion of *framing* as an

[22]Pielke, R. A. (2007). *The honest broker: Making sense of science in policy and politics*. Cambridge University Press.

[23]Kevin Elliott makes a similar distinction between "clean-hands-science" (objectivity prioritized) and "advocacy" (where service to society is prioritized), and the in between category of "modified clean-hands-science." (See Elliott, K. C. (2017). *A tapestry of values*. Oxford University Press.) As will become apparent later, both Elliott's and Pielke's taxonomy describe different resolutions to the fundamental dilemma of expert communication.

[24]Evans, L. (2008). Professionalism, professionality and the development of education professionals. *British Journal of Educational Studies*, *56*(1), 20–38. https://www.jstor.org/stable/20479569; Campbell, E. (2003). *The ethical teacher*. McGraw-Hill Education.

unavoidable feature of *any* communication. Expert communication in particular is argued to generate a characteristic framing decision because experts need to decide to what extent to prioritize conveying the scientific state-of-the-art against prioritizing anticipating the needs and interests of the intended audience. Expert communications sit in between educational instruction and policy imperative, and this hybrid nature is what generates the ethics of expert communication.

3.1 | Framing the state-of-the-art

A scientist must decide which data and hypotheses to be foreground in expert communication, and which data and hypotheses to background. This is the concept of framing, and an oft-cited formal definition is the following:

> To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described.[25]

In this definition of framing, there are two elements: a selection, and an intention motivating that selection. The intention is shaped by the goals and interests of the audience (as perceived by the speaker), as well as by the goals and interests of the speaker.

This means that the same body of scientific knowledge may be framed very differently according to the target audience. A virologist will focus on very different aspects of the science depending on whether they are addressing a group of biotech entrepreneurs, a group of health insurance actuaries, or a group of politicians. Entrepreneurs may be primarily interested in developing a profitable product; actuaries in estimating risks of rare diseases with costly treatments; and politicians (perhaps) in how to promote public health while safeguarding public finances. Giving expert advice thus involves anticipating (to some degree) the goals and interests of the audience, and selecting the most relevant parts of the science—all while not actually distorting the science.

Note that framing is not unique to expert communication. Insofar scholarly publication and education intend to promote certain causal interpretations of theories and data, also publication and education involve framing. In fact, framing simply entails an intentional selective presentation of information. A form of science communication *without* framing would involve the scientist (absurdly) reading out, line by line, the hundreds or thousands of scientific articles pertaining to some issue. And even then, the selection of which articles are relevant to the topic that the intended audience wants to know about is itself a framing decision. Such communication is only possible as a thought experiment—and even then, it is a machine-like activity that lacks the intentionality typically associated with human communication.

The science of science communication[26] is increasingly charting how important framing decisions are for expert communications to be accepted or rejected, trusted or distrusted. For instance, the traditional "deficit model" of communication, where expert communication mimics educational communication, has been observed to not always have the intended effect, partially because the public can come to suspect that nonscientific values shape the communication.[27] Another major framing strategy is to highlight what the scientific consensus is on a particular strategy.[28] (e.g., van der Linden et al., 2015). There is some ongoing debate about the effectiveness of this strategy, with some arguing that the framing strategy is experienced by some receivers as manipulative or politicized.[29] In fact, finding ways to frame scientific knowledge differently according to the political identity of the receivers is one area of intense interest.[30]

Framing decisions thus may anticipate the goals, interests, and values (even political values) of the intended audience. They may also anticipate cognitive biases, especially those regarding uncertainty and probabilities. For instance, many members of the public have the tendency to either overestimate or underestimate low-probability events.[31] Knowing this may dissuade the virologist from communicating that the case-fatality rate is 1% for a certain virus, and instead emphasize the fact that millions of deaths will occur if no action is undertaken. In general, how to communicate uncertainty is one of the most important framing decisions scientific experts must make.[32]

We need not further discuss the science of science communication: the only lesson we need to draw is that framing decisions shape the content of expert communication and help determine the effectiveness of such communications. Figure 1 summarizes how framing decisions are shaped by both the science and the goals of the listeners.

[25]Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, *43*(4), 52.

[26]Kahan, D. M. (2015). What is the "science of science communication"? *Journal of Science Communication*, *14*(03), Y04. https://doi.org/10.22323/2.14030404

[27]Simis, M. J., Madden, H., Cacciatore, M. A., & Yeo, S. K. (2016). The lure of rationality: Why does the deficit model persist in science communication? *Public Understanding of Science*, *25*(4), 400–414; Kahan, D. M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change*, *2*(10), 732–735.

[28]E.g., van der Linden, S. L., Leiserowitz, A. A., Feinberg, G. D., & Maibach, E. W. (2015). The scientific consensus on climate change as a gateway belief: Experimental evidence. *PLOS ONE*, *10*(2), e0118489.

[29]Chinn, S., & Hart, P. S. (2021). Climate change consensus messages cause reactance. *Environmental Communication*, 1–9; Bolsen, T., & Druckman, J. N. (2018). Do partisanship and politicization undermine the impact of a scientific consensus message about climate change? *Group Processes & Intergroup Relations*, *21*(3), 389–402.

[30]Kahan, D. M., Jenkins-Smith, H., Tarantola, T., Silva, C. L., & Braman, D. (2015). Geoengineering and climate change polarization: Testing a two-channel model of science communication. *The Annals of the American Academy of Political and Social Science*, *658*(1), 192–222.

[31]E.g., de Bruin, W. B., Parker, A. M., & Maurer, J. (2011). Assessing small non-zero perceptions of chance: The case of H1N1 (swine) flu risks. *Journal of Risk and Uncertainty*, *42*(2), 145–159.

[32]Ratcliff, C. L., & Wicke, R. (2022). How the public evaluates media representations of uncertain science: An integrated explanatory framework. *Public Understanding of Science*, (32) 4, 410-427; Gustafson, A., & Rice, R. E. (2020). A review of the effects of uncertainty in public science communication. *Public Understanding of Science*, *29*(6), 614–633.

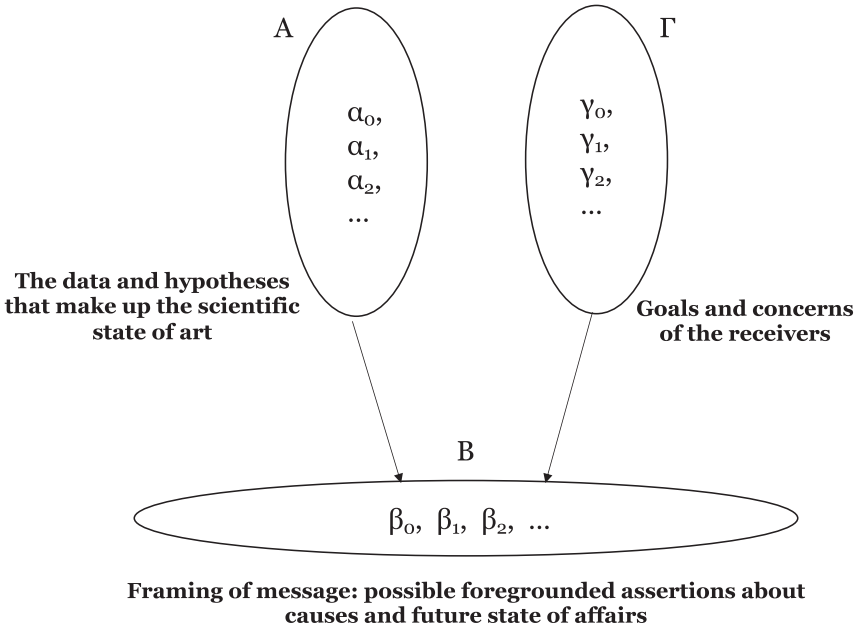

FIGURE 1 In crafting a message, scientists need to choose what assertions to foreground β in their communication, based on the scientific state of the art α, but also (and less obviously) based on what the general public or policy-makers need to know for their own purposes γ.

3.2 | The trade-off between actionability and transparency

Expert communications have a hybrid structure. They are not imperatives, but neither are they detached musings about the structure of reality. They convey the scientific state-of-the-art, but in such a way that they can inform decision-making. This raises a permanent challenge for anyone crafting an expert communication: how far should one go in anticipating the goals and interests of the intended audience?

Consider first a relatively innocuous illustration: weather announcements. The demand for knowledge about future weather is nearly constant and certainly recession-proof. The general public has an interest to know what tomorrow's weather will roughly be; certain groups (e.g., farmers, pilots, roof workers) also have a professional interest. Weather announcements can be thought of as *expert communications* that cater to these interests. It is rather unusual to see weather announcements in this way, so let us unpack this a little. Decisions on how to craft weather communications are not made by the public-facing weather announcers alone. They are shaped by a whole community of meteorologists employed across various meteorological institutes, working behind the scenes on gathering observations and tweaking complex predictive models. Meteorological models draw on large amounts of data, integrate a large number of assumptions (e.g., about parameter values), and deliver uncertain predictions. In this sense, weather announcements can be thought of as scientific assertions. They are also actionable. When tuning in for the weather report, listeners are not interested in understanding, for instance, the differences between the numerical models of the European "Integrated Forecasting System" and those of the US "Global Forecast System." They will be even less motivated to understand the Navier–Stokes equations, nonlinear dynamics, or the numerical challenges that arise from forecasting systems with a very large number of degrees of freedom. Listeners want *actionable* statements about what tomorrow's weather will likely be. They are only interested in the information that is relevant to the decisions they need to make in their daily and professional lives, such as: Should I pack an umbrella or not? Or, will tomorrow be a good day to harvest the crops? Hence the community of meteorologists working toward shaping the weather report must select only a small fraction of the scientific information to be communicated.

Weather announcements fall strongly toward the actionability side of what can be called the fundamental dilemma for expert communication (FDEC):

> **The FDEC**. Scientists acting in the capacity of expert face a trade-off between: (1) prioritizing the actionability of their communications, (2) prioritizing the transparent conveying of the scientific state-of-the-art.

In other contexts, scientists may opt to give more weight to conveying the state-of-the-art, for instance, when communicating about the health consequences of certain lifestyle habits (drinking alcohol, watching screens, etc.). A scientist here may judge that the public may be less likely to follow the advice, if they do not to some degree understand the underlying science. Nonetheless, the more the scientist conveys the *exact* state-of-the-art—as conveyed by the multitude of published articles, so not the textbook version—the greater difficulty the public will have in interpreting the uncertainty that inevitably arises. What if some scientific study suggests that drinking alcohol has health benefits? Or if another shows that the negative effects of smoking can be mitigated by other lifestyle choices? Thus, the scientist may legitimately decide to preinterpret this apparent uncertainty, and, for instance, to downplay or ignore some of the studies that disagree with the consensus.

While the trade-off between transparency and actionability can be made in any number of ways, it is termed "fundamental" because it follows from expert communication's defining hybrid structure as contrasted with other types of science communication, namely, how expert communication conveys the state-of-the-art but is framed in such a way as to inform the decision-making of the intended audience. These two elements of transparency and actionability are essential: as motivated in the previous section, if either one is absent, the communication ceases to be an expert communication. Moreover, they cannot be simultaneously maximized, since an optimally actionable assertion is an explicit imperative ("do this!"), which involves an actionable assertion without communicating any scientific justification. Expert communication has this hybrid structure where the two elements must coexist in tension with each other. It is up to the individual scientist to make a judgment on *how precisely* these elements are to be combined. This combination cannot in general be predetermined by transparency requirements: individual deliberation is needed. The next section argues that this deliberation is an *ethical* deliberation.

4 | THE ETHICS OF EXPERT COMMUNICATION

Recall the example of James Hansen's decision to summarize the state-of-the-art of climate science as conveying "99% confidence" in climate change, and especially his belief that this was "an accurate description" of the science.[33] His justification for making this claim is particularly fascinating. As reported by Kerr,[34] a particular observation was foregrounded in his reasoning: the increase in atmospheric carbon dioxide, from 280 parts per million in the 19th century to 350 parts per million in the mid-1980s. The evidence of this increase *was* incontrovertible in the 1980s, and combined with a general understanding of the mechanics of the greenhouse effect, he concluded "It's just inconceivable that that is not affecting our climate (…) It's just a logical, well-reasoned conclusion that the greenhouse is here now."[35] So even though there was at the time no *direct* empirical evidence for the impact of the greenhouse effect, Hansen disagreed with peers in *how much* importance to attach to different parts of the scientific state-of-the-art in expert communication. He downplayed the lack of direct empirical evidence and highlighted the strong, *prima facie* reason to expect a greenhouse effect given the increase in atmospheric carbon dioxide. And though he was, of course, correct, his framing decision given the scientific state-of-the-art raises important questions about what "genuine honesty" means. His peers thought he was being dishonest, but in light of Hansen's own reasoning, there is an important sense in which he *was* being honest.

A satisfactory ethics of expert communication would help guide scientists in how to reason about what the "genuinely" honest course of communication is. Note thus that we do not need to *reject* the value of honesty outright (contrast with: John 2018)—we only need to reject the somewhat simplistic identification of honesty with transparency, as well as the idea that one can ensure ethical communication through various transparency requirements. The purpose of this section is to outline some general principles that can aid in deliberation about "good" and "bad" framing decisions. However, first, we argue why expert communication is intrinsically ethical.

4.1 | Why the FDEC is an ethical dilemma

The trade-off between actionability and transparency is, in itself, not necessarily an ethical trade-off. Even though we have until now largely used "experts" as synonymous with "scientific experts," one can be an expert in any area of human knowledge. For instance, "Monopoly experts," i.e., Monopoly players who are no mere dilettantes but have a deep understanding of possible strategies they use to win a game of Monopoly, may also face the fundamental dilemma of expert communication when conveying advice to their neophyte friends. They may opt for simple directions (buy or do not buy) or for detailed explanations of the underlying calculations. However, unless we are to veer into the comic, the act of giving Monopoly advice is not a particularly morally valenced act. Communications about which imaginary properties to buy with imaginary money are simply not consequential enough. However, the same cannot be held of the activity of giving scientific advice.

Recall the example of weather announcements: should an announcer mistakenly forecast sunshine, they may face annoyance, but typically not *moral* indignation. However, what if a deadly hurricane materializes instead of sunshine? This is a very different situation, and the moral dimension of weather announcements then quickly materializes. In fact, meteorologists are only too aware of this sudden *moral* responsibility, and interestingly, something of an ethics of expert communication has arisen spontaneously among meteorologists.[36] Some have promoted the default strategy to err on the side of caution and emphasize the *possibility* rather than the *probability* of the worst-case scenario, just so that the general population will make the requisite preparations.[37] However, others have pointed out that too many false alarms can lead to forecasting communities to lose credibility and trust and desensitize the public to future weather warnings.[38] Even though, unsurprisingly, no universal rule has been found, the lesson for us is that meteorologists must morally deliberate on how to frame weather forecasts once the stakes are sufficiently high.

[33]Pool, op. cit. note 4, p. 672
[34]Kerr, op. cit. note 3, pp. 1041–1043.
[35]Ibid: 1043.

[36]LeClerc, J., & Joslyn, S. (2015). The cry wolf effect and weather-related decision making. *Risk Analysis*, *35*(3), 385–395; Roulston, M. S., & Smith, L. A. (2004). The boy who cried wolf revisited: the impact of false alarm intolerance on cost–loss scenarios. *Weather and Forecasting*, *19*(2), 391–397.
[37]Roulston and Smith, op. cit. note 25, pp. 391–397.
[38]LeClerc and Joslyn, op. cit. note 25, pp. 385–395.

Another, and arguably paradigmatic, example of morally charged expert communication consists of public health recommendations, for three reasons. First, these recommendations directly impact something all humans care dearly about: their health. A wrong recommendation, whether about the safety of a drug, building material, surgical intervention, or a lifestyle choice such as smoking,[39] can directly and dramatically contribute to illness and premature deaths. Hence the stakes are very high. Second, public health recommendations often concern some type of *collective action*, whether this is the regulation of a product (mandatory safety standards, disincentivizing through tax, incentivizing through subsidy, etc.) or a policy mandating some action (lockdown, vaccination, etc.). This means that public health recommendations impact individual liberty, sometimes strongly (e.g., lockdowns, safety standards) and sometimes weakly through nudging (taxes, subsidies). Any policy on collective action creates relative winners and relative losers, and thus public health communication can rapidly become ethically and even politically charged.

The third reason why public health recommendations are so morally charged is because they require so much balancing and deliberation, and this enhances individual responsibility for the communication. Compare public health recommendations with nuclear safety recommendations: the latter also have morally valenced outcomes but are based on standard safety procedures and protocals which are generated by relatively precise predictions based on nuclear physics and materials engineering. By contrast, clinical trials rarely involve black-and-white generalizations about the safety or efficacy of some drugs, building materials, surgical interventions, lifestyle choices, and so on.[40] The scientist crafting public health recommendations will, in general, need to employ more individual judgment and discretion compared to the scientist applying nuclear safety protocols. With this greater role for individual responsibility also comes greater moral culpability.

To generalize, the trade-off between prioritizing actionability and prioritizing as described by the FDEC is an ethical trade-off in the case of expert science communication because of the *authority* of scientific knowledge and its influence exerted over lives and livelihoods. This influence is very apparent in public health recommendations, but in general, the opinions of scientific experts help shape professions, corporations, and political discourse. This is why expert communication (of science) should be considered to be a morally charged activity, even though this moral dimension can vary in intensity according to the size of the moral stakes involved.

4.2 | Persuasion, Manipulation, and Paternalism

Expert communication invariably involves significant framing decisions; therefore, an ethics of expert communication, if it is to give guidance, must help scientists reason about the ethical dimensions of these framing decisions. Broad transparency requirements cannot help here, since they do not acknowledge that a selection of information by means of a framing is an essential feature of expert communication. To identify what "genuine" honesty means, an ethics of expert communication must help make sense of the distinction between *honest framing* and *dishonest framing*. One intuitive way of doing this is by means of the distinction between *persuasion* and *manipulation*. Both involve framing, but the latter does so in a "dishonest" way.

What is the difference between persuasion and manipulation? Persuasion is typically defined as a communication aimed to elicit a desired response in the receiver, but in such a way that the receiver maintains free choice.[41] By contrast, manipulation is "a persuasion technique that occurs when a communicator hides his or her true persuasive goals, hoping to mislead the recipient by delivering an overt message that disguises its true intent."[42] In other words, a person who is being manipulated is not *genuinely* free. Yet, manipulative communication does respect some sense of freedom in the receiver, because there is yet another meaningful distinction to be made between manipulative communication and outright *coercion*.

For purposes here, let us rephrase the difference between persuasion and manipulation in more overtly ethical terms by bringing the *agency* of the receiver into the conceptual picture. Agency—as understood here—refers to the capacity of an individual to make their own decisions about how to further their own goals and interests. An action that "respects" someone's agency is, roughly, an action that does not compromise this capacity. Persuasion then could be understood to refer to a type of framing that respects the agency of the receiver. Persuasive communication *contributes* to the receiver's agency, by contributing to their capacity to make an informed decision about how to further their goals or interests. By contrast, manipulative communication aims to *control* the receiver's decision-making, and in so doing, actively undermines the receiver's agency. Such manipulation aims at controlling decision-making (for instance by withholding crucial information) but without aiming at controlling the actual responses of the receiver (since that would be coercion): it compromises without eliminating the agency of the receiver.

How should one deliberate about choosing a non-manipulative framing? Consider a nuclear physicist observing a radiation leak at a power plant, without being able to measure its intensity. Should the physicist alert all surrounding residents to a "highly dangerous and potentially cancerous" leak? Even though this communication is not entirely transparent (it does not explicitly convey that the physicist does not know exactly how dangerous the leak is) and even though the communication has a direct difference-making impact on subsequent behavior (e.g., panic or evacuation), yet one would not tend to judge this communication to be "manipulative." The physicist

[39]Oreskes, N., & Conway, E. M. (2010). *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Publishing.
[40]See e.g., Stegenga, J. (2018). *Medical nihilism*. Oxford University Press.
[41]See review of definitions in Perloff, R. M. (2017). *The dynamics of persuasion: Communication and attitudes in the 21st century* (pp. 21-22). Routledge.
[42]Ibid: 43*r*

reasonably assumes receivers have a strong interest in their own health, and hence the communication allows them to make an informed decision. A lung disease specialist conveying the message "smoking kills," even though it is a fact that some people can chain-smoke for a whole lifetime without much adverse effect, is similarly seeking to persuade rather than manipulate.

Seeking to persuade without being manipulative thus runs into a different category of communication, which could be termed "paternalistic communication." For instance, a scientific expert could downplay some danger (whether from a radiation leak, toxic substance, or lethal virus) in the belief that foregrounding the danger would lead to panic and that such panic would be against the best interests of the receiver. This is paternalistic insofar (1) not all potentially relevant information for an informed decision is conveyed to the receiver, (2) the sender believes the receiver does not have the educational background, cognitive capacity, or moral capacity[43] to correctly interpret and act on the potentially relevant information, (3) the sender wishes to contribute to the good of the receiver.

In paternalistic communication, the sender decides that their own agency (i.e., capacity for deliberation about courses of action) takes precedence over the agency of the receivers, and that therefore they must deliberate *which* of the receivers' goals to prioritize. For instance, in emergencies, many members of the public exhibit hoarding behaviors when informed of the dangers,[44] but such behaviors restrict the availability of essential goods. Thus a trade-off emerges between two interests or goals of receivers: the interest of being fully informed, and the interest of being able to access essential goods. A paternalistic communication will decide how these two interests should be weighed, and then choose the appropriate framing.

Whether or not this respects the receivers' agency depends on the particular circumstances. Consider, for instance, a fire breaking out somewhere in a building where a crowd is packed to listen to a rock concert. Interrupting the rock concert to inform the crowd that a fire has broken out would risk a stampede and thereby endanger lives. Consequently, the crowd is asked to leave while *not* informing them of the fire. Whether this is manipulative depends on how exactly the communication is constructed. For instance, if the communication conveys explicitly false information (e.g., the audience is told one of the band members faces a sudden medical emergency), this could be judged as manipulation, albeit of the paternalistic and benevolent variety. But if the crowd is entreated to leave, for instance, by telling them there is too little time to explain and by asking them to simply trust the organizers, this could be judged as a persuasive and paternalistic communication.

In general, the paternalistic communication strategy is ethically fraught, since senders may overestimate their capacity to decide which of the receivers' goals to prioritize. In emergencies, hoarding behaviors may materialize—but the senders may overestimate the likelihood or danger of such behaviors. Downplaying the dangers can withhold the opportunity for members of the public to take appropriate measures. By making wrong or unjustified decisions about others' agency, paternalistic communication risks to rapidly, despite the best of intentions, become manipulative.

As the distinction between persuasion and manipulation inherits many of the difficulties surrounding the meaning of autonomy and informed consent, it is not possible to here attempt general rules for distinguishing between persuasion and manipulation. Nonetheless, the distinction is ethically relevant and can be connected to the fundamental dilemma of expert communication (see Figure 2): one could be led to manipulative communications by (overly) prioritizing actionability. The underlying intentions could be noble—whether to minimize harm from a fire or an impending health crisis—and in exceptional circumstances even ethically justified, but by and large, manipulative communication is ethically fraught. Instead, ethically justified expert communication is as a rule (with potential exceptions) to be located in the category of persuasive communication, and values such as care and respect can guide scientists in deciding how to frame the science, and in particular, how to make the trade-off between transparency and actionability.

4.3 | The virtues of expert communication

Even in the absence of a full analysis of the distinction between persuasive and manipulative framing, it is still possible to point to some general ethical principles that can aid in deliberating about this difference. This is where normative ethics plays a role in the ethics of expert communication: according to what types of principle should scientists organize their reasoning?

Paternalistic communication points to the role a utilitarian framework may play insofar downstream consequences can be predicted (e.g., stampedes in crowded arenas). If these consequences are known, the utilitarian can simply compare the expected costs and benefits of the various framing decisions, over different time frames, and choose the framing with the best overall consequences. However, it is difficult to use a utilitarian framework to deliberate on how to persuade without becoming manipulative. A manipulative strategy may have the best overall consequences. Another factor limiting the applicability of a utilitarian framework is that it is often difficult to predict how the public will receive a particular communication, not least because reception can vary dramatically according to the precise political or religious background beliefs of receivers.[45]

Ethical deliberation could also be conducted along deontological lines. For instance, one could introduce a duty to accurately represent the state-of-the-art, as well as a duty (as an expert) to

[43]The receiver may have the cognitive capacity to interpret the information but may respond in an overly self-serving fashion. Thanks to an anonymous reviewer for pointing this out.

[44]David, J., Visvalingam, S., & Norberg, M. M. (2021). Why did all the toilet paper disappear? Distinguishing between panic buying and hoarding during COVID-19. *Psychiatry Research*, *303*, 114062.

[45]Chinn, Hart (op. cit. n. 29): 1–9; Bolsen, Druckman (op. cit. n. 29): 389–402.

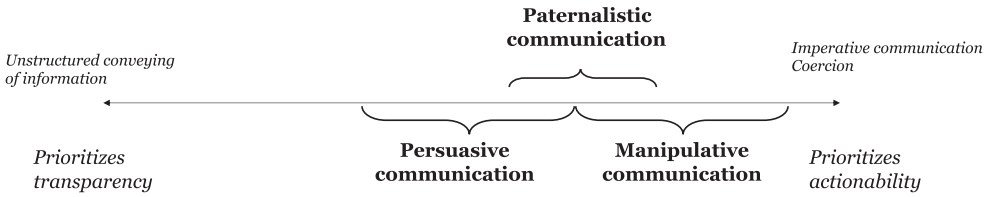

FIGURE 2 A basic typology of expert communications, corresponding to different ways of resolving the fundamental dilemma. If scientific state-of-the-art is entirely deprioritized in favor of actionability, imperative communication or outright coercion results. Conversely, if actionability is entirely deprioritized, then the communication loses all framing and collapses into an unstructured conveying of information. Finally, in order to contrast it with science teaching/popularization, expert communication is placed toward the actionability side of the spectrum.

present this state-of-the-art in such a way that respects and contributes to the agency of the receivers (e.g., public or policy-makers). Also, the basic transparency requirements are easily conceptualized as duties.[46] However, some of the most difficult challenges in expert communication arise from conflicting duties. The example of paternalistic communication illustrates how the duty to respect the agency of receivers can conflict with the duty to prevent harm—especially in precarious and pressing circumstances, where rapid action needs to be undertaken. This points to the presence of a potentially large number of higher-level duties that guide how the scientist should deal with conflicting lower-level duties in various circumstances.

A third option is that of virtue ethics. This does not necessarily compete with utilitarian or deontological reasoning—it seems plausible that there are specific uses for the latter types of reasoning when consequences are known with relative certainty, or when duties do not conflict—but because virtue ethics prescribes individual deliberation and practical wisdom, it is the most natural normative framework to use in reasoning about the trade-offs that arise from expert communication. The fundamental dilemma of expert communication, in effect, describes how the scientist must choose how much to anticipate the interests and goals of the intended audience. If there is "too little" anticipation, the scientist is not providing useful and focused expert advice. If there is "too much" anticipation, and the scientist is deciding to an excessive extent on what the audience should or should not hear, then this becomes manipulative. A "genuinely honest" framing corresponds to the golden mean between the undesirable extremes.

The tension between the virtues of *care* and *respect* encapsulates this trade-off in more explicitly virtue-ethical terms. Expert communication should respect the agency of the receiver, but should also exhibit care toward the goals and interests of the receivers. In some forms of communication, such as paternalistic communication, care is prioritized over respect. In general, practical wisdom is needed to chart the right course and to discern, depending on the particular context, what a "caring communication" or "respectful communication" means.

In this way, the virtue ethics of expert communication inherits all the strengths and weaknesses of virtue ethics in general. In particular, the concept of practical wisdom seems frustratingly vague, with even Aristotle not going further than seemingly unhelpful definitions such as acting with "correctness regarding what is beneficial, about the right thing, in the right way, and at the right time".[47] Critics view this as a weakness.[48] However, if one could *predecide* what the outcome of the exercise of practical wisdom would be (or should be), then one would have found a rule for good action, thereby dispensing with the need for practical wisdom.

In this way, some classic normative-ethical frameworks can be repurposed to help deliberate about genuinely honest framing (persuasive but not manipulative). Different frameworks (in terms of utilities, duties, or virtues) have different strengths and limitations. While it is not attempted here, a fuller account of the ethics of expert communication would identify the conditions in which each framework is applicable.

5 | IMPLICATIONS FOR CODES OF CONDUCT OF SCIENTIFIC INTEGRITY

If we are to attempt to draw concrete lessons from these considerations for codes of conduct, it is important to note that codes of conduct are themselves the result of framing decisions. The length of available codes of conduct varies dramatically (Desmond & Dierickx, 2021a, figure 3), and this reflects how they serve various functions to varying extents[49]: (1) provide ethical guidance for individual practitioners; (2) create a shared ethos of publicly acknowledged norms and values; (3) provide a gray-area legal document that can provide a basis for judges deciding on tort or disciplinary cases. Thus, there cannot be any single "correct" way of conveying the ethics of expert communication in codes of conduct.

In particular, some transparency requirements may be important to list in a deontological fashion, especially if it is important to formulate this

[46]Gerken, op. cit. note 6, pp. 299–318; IAC-IAP, op. cit. note 6.

[47]Aristotle. (2000). *Nicomachean ethics*. Cambridge University Press. 1142b.

[48]Hursthouse, R., & Pettigrove, G. (2022). Virtue ethics. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy* (Winter 2022). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/win2022/entries/ethics-virtue/

[49]Desmond, H. (2020). Professionalism in science: Competence, autonomy, and service. *Science and Engineering Ethics*, *26*(3), 1287–1313.

responsibility with sufficient precision for legal contexts. This already happens with select parts of the code, namely provisions regarding the most serious forms of misconduct (falsification, fabrication, and plagiarism). Here codes of conduct all appear to adopt a uniform and precise wording, likely due to legal ramifications.[50]

However, providing ethical guidance for individuals is also an important function, and in this restricted sense, current codes of conduct do not necessarily offer sufficient guidance with regard to expert communication. Honesty in communications to the general public is acknowledged in the leading documents of 11 countries.[51] However, in many of these documents, "honesty" and "transparency" are used more or less interchangeably. Moreover, none of these documents acknowledge the type of trade-offs faced by Hansen, or thus the complexities involved in determining what "genuine" honesty means.

In this sense, there could be space for an explicit acknowledgment of the ethics of expert communication along the lines sketched in this paper. If one were to compress ethical guidance on expert communication into a few short sentences, it would resemble the provisions in the left column of the following table. The rationale for including each is explicated in the right column.

Text	Communicative function
"Providing expert advice to the public and policy-makers is an important and sometimes sensitive task.	Conveys that scientists should view good expert communication as an element of scientific integrity.
Scientists must make the best judgment on what areas of science to highlight.	Emphasizes the role of individual judgment in considering the consequences of, and values underlying, framing decisions
They must aim to provide an honest, scientifically grounded, and actionable message while avoiding all forms of distortion and especially manipulation."	Highlights some ideals (honest, scientifically grounded, actionable) while also acknowledging some of the main dangers.

6 | CONCLUSION

To admit that transparency cannot and should not be maximized in expert communication could seem, at first glance, to allow for the justification of manipulation and disinformation. However, not only does all communication involve some framing, but *effective* communication is always very dependent on making judicious framing choices. The science of science communication has established the importance of framing in expert communication, but there is also an ethical dimension to framing decisions that should be more widely acknowledged, especially in the field of scientific integrity.

In this paper, I provided a basic rationale for the ethics of expert communication, based on one particularly fundamental framing decision: how to balance the goal of allowing the intended audience to understand the state-of-the-art, with the goal of providing actionable advice. In expert communication, understanding is never entirely prioritized for its own sake (otherwise it would be a form of science education or popularization), and hence elements of the scientific state-of-the-art are left out if they are deemed insufficiently relevant for the decisions that the public or policy-makers (or corporate leaders) need to make. Nonetheless, if scientists presume too much about what is relevant for the receivers of the message, they risk taking away opportunities for the receivers to make up their own minds. In such cases, prioritizing actionability can lead to expert communication adopting a paternalistic or even a manipulative dimension.

The existence of this fundamental trade-off is not recognized in the popular view that scientists can simply convey the scientific state-of-the-art and avoid difficult and potentially ethically valenced trade-offs. However, that view is based on an abstraction of what communication involves and takes communication science insufficiently into account. The ethics of expert communication deserves some implicit representation in codes of conduct as an integral part of scientific integrity.

ACKNOWLEDGMENTS

Open Access funding enabled and organized by Projekt DEAL.

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How to cite this article: Desmond, H. (2024). The ethics of expert communication. *Bioethics*, *38*, 33–43. https://doi.org/10.1111/bioe.13249

[50]Desmond, H., & Dierickx, K. (2021). Research integrity codes of conduct in Europe: Understanding the divergences. *Bioethics*, *35*(5), 414–428.

[51]BE, CH, FR, HR, IE, IT, LV, NL, NO, PT, SE: for references see Ambrosj, J., Desmond, H., & Dierickx, K. (2023). The value-free ideal in codes of conduct for research integrity. *Synthese*, *202*(5), 133.