The Ethics of Expert Communication

Abstract

Giving expert advice to policymakers and the public is one of the most directly impactful activities that scientists engage in. Besides having an influence on policy and behavior, it also affects how science is perceived and trusted. Yet, the activity of expert communication is only very rarely couched in terms of scientific integrity. This paper argues that expert communication is an ethically sensitive activity, and proposes a normative framework for expert communication. One of the most central framing decisions and the fundamental dilemma of expert communication is termed the tradeoff between actionability and transparency.

Keywords: Expert Communication – Science Communication – Scientific Integrity – Framing – Honesty – Manipulation

1. Introduction

How should science be most effectively communicated to the public and policymakers? In the past decades, communication scientists have come to realize that some seemingly obvious strategies do not always have the intended consequences. The straightforward "educate" strategy, where the public is provided with the relevant scientific facts and theories (perhaps in non-technical, popularized format), does not always work (Kahan et al. 2012). Moreover, the perhaps even more widespread "communicate the consensus strategy", where the public is told what the scientific consensus is on some matter, is increasingly controversial. While some have strongly supported this strategy (van der Linden et al. 2015), others point to growing evidence that the strategy causes resistance among some listeners (Bolsen and Druckman 2018; Chinn and Hart 2021).

In particular, political identity seems to be an increasingly important factor in determining the effectiveness of science communication. For instance, it has been

suggested that highlighting geo-engineering as a potential climate change measure (as opposed to reducing greenhouse gas emissions) can further acceptance of climate change science among those who tend to distrust it, by appealing to the values of human ingenuity and technological progress (Kahan et al. 2015). In general, appealing to scientific consensus in a communication apparently risks being seen as manipulative and politicized by a significant minority (Chinn and Hart 2021)

These developments raise the important normative question: what does it mean for a scientific expert to communicate *honestly*? Does honest communication mean an exhaustive chronicling of the extant scientific studies, including those that conflict with each other? Or does honest communication entail focusing on the "main message", such as the areas of consensus? Is tailoring the message to the audience (like highlighting geo-engineering as a potential response to climate change) also a form of honest communication? In short, scientists must choose from a range of communication strategies, and from a range of possible "messages" and "narratives". All these strategies may avoid falsehoods and be consistent with the underlying science, and yet some strategies may veer into the *biased, misleading,* or even *manipulative*. How can scientists acting in an expert capacity communicate persuasively and effectively, while still communicating honestly?

In enquiring about the meaning of "honesty" in expert communication, we thus cannot ignore a crucial concept in communication science: *framing*. Framing largely refers to how some issues are foregrounded in a communication (e.g., by mentioning them first, by dwelling on them for longer, or by analyzing them in more detail) and others are backgrounded (see e.g. Druckman and Lupia 2017). The fact that each and every act of communication involves some framing is taken for granted by science communication scholars. Yet, this basic fact does not always make its way into the broader academic and public discourse, where the view that expert communication simply involves mirroring "what *the* science says" holds surprising sway.

Currently, in the domain of scientific integrity there is typically little to no acknowledgment of the difficulties of determining just what "honesty" means for a particular scientific communication. For instance, in the European Code of Conduct for Scientific Integrity (ALLEA 2017), the only reference to expert communication is the stipulation that scientists must be "honest in their communication to the general public in traditional and social media" (ALLEA 2017, 7). Honesty, in turn, is left relatively undefined beyond characterizing it as "transparent, fair, full and unbiased"

(ALLEA 2017, 4). However, exhaustively conveying all information is impossible for a scientist communicating to the public or policymakers, and hence a scientist must exercise *judgment* in order to choose the appropriate framing. And once a framing is chosen, the ethics of expert communication cannot avoid another central distinction in communication science: that between persuasion and manipulation (Druckman and Lupia 2017).

The goal of this paper is to argue that expert communication is an *intrinsically ethical activity*. By an "ethical activity" I mean that the act of expert communication is the outcome of a process of individual deliberation which is (and must be) guided by ethical values. And by "intrinsically ethical" I mean that the act of expert communication is ethical in virtue of the nature of expert communication, and so is *always* an ethical activity. In other words, expert communication cannot be claimed to be a neutral technical-scientific activity as long as certain conditions are met (e.g., as long as the expert avoids making overt policy recommendations); even though the ethical dimension of expert communication is in some instances so subtle as to be negligable, it is always present.

This view is not obvious, and the main rival view I will consider is the *value-neutral view* where expert communication is seen as an activity lacking in any ethical or moral-normative valence as long as it meets certain conditions. These conditions typically include refraining from speaking out on areas outside one's domain of expertise, including policymaking. The phrase "ivory tower", while often pejorative, aptly captures what is at stake: the value-neutral view holds that scientists should remain in the ivory tower, and as long as they do so, they are freed from needing to consider any ethical obligations when acting in an expert capacity.

The value-neutral view remains influential in popular discourse, has been defended in academic articles (Gerken 2018), and is reflected in one of the few policy documents to delve into the challenges of expert communication:

> Researchers should resist speaking or writing with the authority of science or scholarship on complex, unresolved topics outside their areas of expertise. Researchers can risk their credibility by becoming advocates for public policy issues that can be resolved only with inputs from outside the research community (IAC-IAP 2012, 27).

Note that this view does not absolve scientific experts from *any* ethical responsibility. They have responsibilities to not arrogate public policy decisions, and to respect the trust which has is placed in them. Nonetheless, these responsibilities remain extrinsic to the act of expert communication. As long as these responsibilities are met, scientific experts can go about their communication without worrying about the ethical import of their communication.

This paper, in arguing that expert communication is *intrinsically ethical,* will seek to establish three insights: (1) expert communication always involves at least one framing decision: the trade-off between actionability and transparency, (2) expert communication should not be evaluated along the honest-dishonest axis, but along the more informative persuasive-manipulative axis, (3) the complexity of deciding what framing to use is a complex deliberation that can be aided by normative-ethical frameworks. These three insights occupy the middle three sections of this paper. These middle sections will be prefaced by a basic anatomy of the act of expert communication, and followed by a broader discussion of the implications for codes of scientific integrity.

2. The Basic Anatomy of Expert Communication

The term "expert" is an essentially contested one: if someone in possession of a particular competence or body of knowledge is deemed an "expert", this includes a value judgment about the authority, trustworthiness, and prestige that can be assigned to that person. Hence it is notoriously difficult to ground the distinction between "experts" and "non-experts" in relatively neutral facts about competence or knowledge alone (Watson 2020). Nonetheless, in order to analyze the anatomy of expert communication, we must begin by defining "expert communication" with some precision.

2.1 What is Expert Communication

By "expert communication" I mean any communication by a scientist who (1) is perceived as having trustworthy scientific expertise in the domain they are asked to communicate about, and (2) where the goal of the communication is not merely to inform, but to provide information that is deemed useful for the goals and concerns of the target audience.

The first condition thus defines scientific experts in terms of their perceived intellectual authority, and is most in line with "social role accounts" of expertise (Watson 2020, ch. 6). The second condition is the more crucial one of the two: its function is to distinguish expert communication from science education or popularization. The goal of science popularization or science education could be said to inform in order to provide *understanding*. By contrast, expert communication ultimately aims at providing *actionable* information for the target audience. Understanding and actionability are not mutually exclusive, and expert communication always involves conveying some understanding of the science. However, in expert communication, the primary aim is actionability; understanding is secondary.

This characterization of expert communication is crucial for the analysis of this paper, so consider the following illustrative example. First, a quantum physicist engaging in science popularization or education will try to make the target audience understand some of the basics of quantum physics. This is not necessarily the case if the same physicist would be called upon for expert advice – for instance, by the CEO of a quantum computing start-up. The CEO wants to know how to direct investment, wants to make a maximally informed decision. They could ask the physicist to give an overview of what computing speeds could be theoretically achievable through quantum computing. In doing so, the CEO is not necessarily asking to be educated. They are not interested in understanding the subtleties of the nature of wave-particle duality or the weird metaphysics involved in the uncertainty principle. They want to know from the expert what is possible, and what the trade-offs are so they can make a business decision. They want *actionable* information from the expert – achieving scientific understanding is secondary.

The domain of public health is also a source of numerous illustrations of the difference between science education/popularization and expert communication. When an expert instructs the public to wash their hands and to avoid touching door handles to prevent the transmission of some virus, this is an instance of expert communication that does *not* involve educating the public about the science. An act of science education would involve explaining how viruses replicate, pass to the hands, and to what extent they can survive on surfaces. Note that *effective* expert communication plausibly involves at least some degree of science

education/popularization; these examples simply illustrate the difference between expert communication and science education/popularization.

Table 1 summarizes this basic distinction and further contrasts expert communication with other forms of scientific communication where the target audience consists of scientific peers. A scientific publication, like science popularization, aims at providing understanding to the target audience, but because an audience of scientific peers is so different from a general audience, the format of the communication is very different. Similarly, scientists can publish "calls to action" from their peers, such as advertising a particularly promising research program, and here the scientists will focus only on providing the information that is useful for the goals of their peers.

Intended audience Goal	Scientific peers	General public Policy-makers
Understanding	*Scientific publication*	*Popularization/education*
Actionability	*Research program advocacy*	*Expert Communication*

Table 1: Some basic types of communication a scientist can engage in

Much more could be said about this and how precisely boundaries should be drawn between the different types of science communication.[1] However, in the context of this paper, this should suffice to have an initial grasp on what expert distinctions should be read as stipulative definitions, to help avoid unnecessary confusions about terminology.

2.2 Framing the Message of Expert Communication

The message of expert communication consists of *scientific assertions* (Figure 2). Thus, expert communication – as will be understood here – does not involve assertions about policy. Sometimes scientists do *in fact* make assertions about the relative appropriateness of policies, but in doing so, they are acting as (proto-)policy-makers, not as scientific experts. Even though the distinction can be murky in

[1] For instance, one could hold that the most successful scientific publications are forms of "research program advocacy", where scientific results are portrayed in such a way as to be "useful" to other scientists (Latour 1987). Compare Table 1 also with Table 5.1 in (Elliott 2017, p. 51).

practice, *de jure* there is a difference between a scientific expert (who is called on for advice) and a policy-maker (who makes the decision about policy). Hence the message of expert communication should be understood as an assertion about the relevant science.[2]

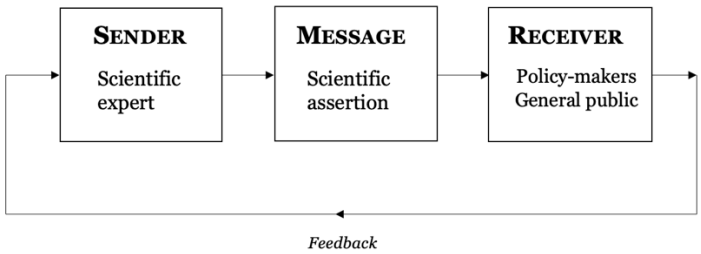

Figure 1: A sender-receiver model of expert communication

However, standard sender-receiver models are insufficiently fine-grained for the purposes of this paper. The crucial question concerns *how* the message is crafted: which data and hypotheses are foregrounded in the expert communication, and which data and hypotheses are backgrounded? The quantum physicist speaking to quantum computing CEOs will foreground the superposition and entanglement of quantum states (since this is crucial to how quantum computers operate), and may background many elements that usually feature in science popularization (photoelectric effect or black-body radiation). Or to take an example from climate science: a climate science expert appearing in a three-minute segment on a news channel cannot read out the latest IPCC report. They must make a selection of what information to foreground and what information to background. The assertions they make about the causes and the predictive models of climate change are not dictated by an IPCC report, let alone the ensemble of models, hypotheses, and data that characterize the scientific state of the art.

One type of framing decision concerns highlighting either unlikely worst-case scenarios or the most likely scenario. Does the scientist talk about climate change as "potentially catastrophic", or as "very challenging, but likely not catastrophic"? Does

[2] Another reason for restricting the message of expert communication in this way, is that if one were conversely to allow "expert communication" to include policy-making, then expert communication would, by definition, be an intrinsically normative activity, and the "ethics of expert communication" would be reduced to a species of the ethics of policy-making. Restricting the message of expert communication to scientific assertions only makes the conclusion that expert communication is an intrinsically ethical activity more interesting and worthwhile.

the virologist emphasize the fact the case-fatality rate is "only" 1% for a certain virus, or do they emphasize the fact that even a 1% case-fatality rate translates into millions of deaths if no action is undertaken? Other framing decisions include the degree of attention to be given to unorthodox views, or the extent to which scientific uncertainty should be emphasized. When engaging in expert communication, should a scientist acknowledge the uncertainty of a model or prediction (and risk the finding not being taken seriously), or does the scientist play down the uncertainty (and risk being accused of dishonesty)?[3]

Framing decisions are determined by many factors, including the (1) level of scientific education of the target audience, (2) the political identity of the target audience, (3) widespread cognitive biases, such as the tendency to either overestimate or underestimate low-probability events (e.g. de Bruin, Parker, and Maurer 2011). One particularly important factor for expert communication, grounded in the definition of expert communication given in the previous subsection, centers on the goals and concerns of the intended audience. If a virologist is acting as a scientific expert, they will likely foreground different information depending on whether they are addressing a group of biotech entrepreneurs, a group of health insurance managers, or a group of policy-makers thinking about how to design lockdowns in the best way. The first group will be most interested in elements in the scientific state of the art (e.g., new vaccination mechanisms) that are most useful for their commercial interests; the second group will be most interested in how to deliver the most cost-effective therapies to patients; the third group will be most interested in safeguarding public health while minimizing damage to the economy or to general well-being. Figure 3 summarizes how framing decisions are shaped by both the science and by the goals of the listeners, even though the assertions in turn are used

[3] A classic example here is James Hansen's choice in 1988 to claim he had "99% confidence" that the greenhouse effect was causing a long-term warming trend. This choice of communication strategy was criticized by peers at the time as not sufficiently transparent about the true confidence intervals.

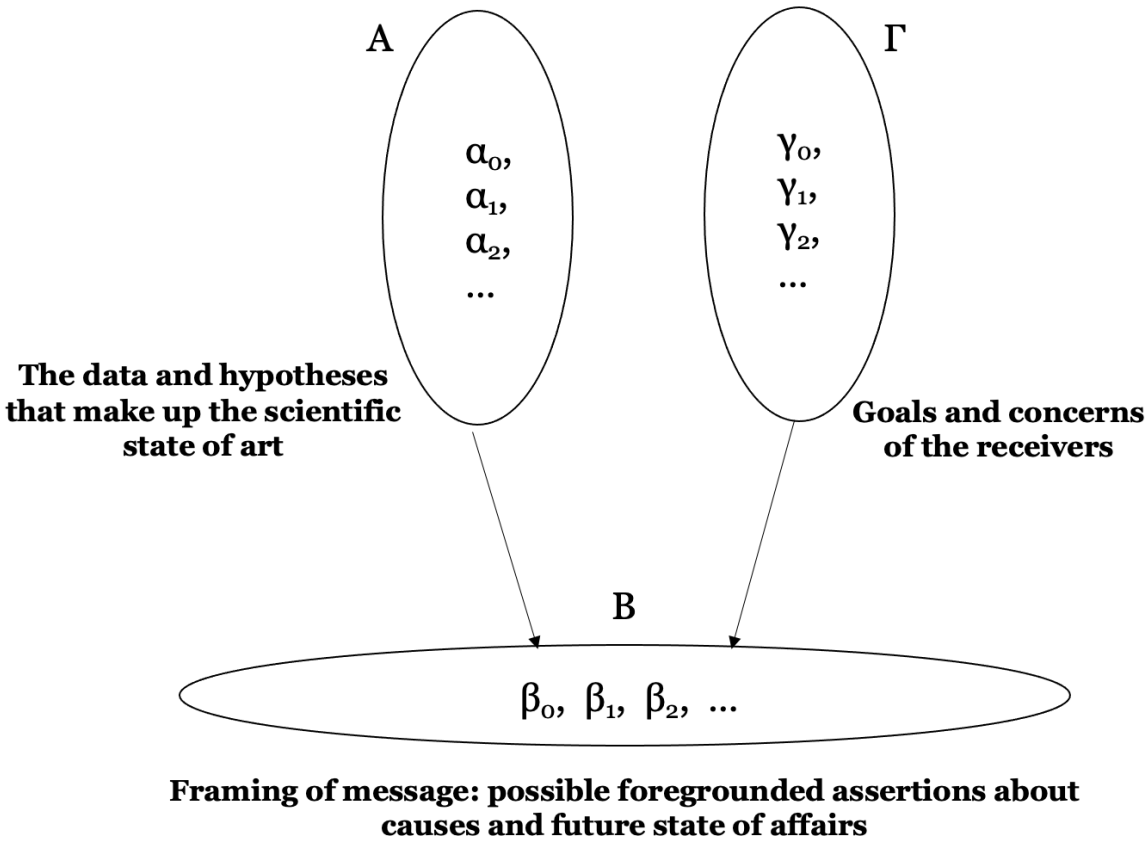

Figure 2: In crafting a message, scientists need to choose what assertions to foreground β in their communication, based on the scientific state of the art α, but also (and less obviously) based on what the general public or policy-makers need to know for their own purposes γ.

3. The Fundamental Dilemma for Expert Communication

With this basic anatomy in place, we can now identify the basic *framing decision* that every expert communication involves. For instance, consider the scientist deliberating on whether to acknowledge the low probability of the worst-case scenario (of, e.g., climate change or a pandemic). The scientist wants the target audience to take the worst-case scenario seriously and to take prudential measures. However, if the audience understands how unlikely the worst-case scenario is, they may simply carry on as before.[4] Here the scientist faces a dilemma: convey the science as neutrally as

[4] Some humans tend to act as if a low-probability event has *zero* probability. For instance, after the first laws on the use of seatbelts were passed, some drivers refused to wear seatbelts because they believed that they personally would not get into a car accident. (Camerer and Kunreuther 1989)

possible, or frame the message so that the practical implications as to how receivers should respond are very clear?

The dilemma can be stated in general terms: in framing the message, does one prioritize actionability or transparency about the scientific state of the art? If the latter is prioritized, the risk is that receivers of the message will draw the wrong conclusions. If the former is prioritized, the scope of misinterpretation may be diminished, but the danger is that the framing will be seen as *manipulative*. I call this the fundamental dilemma of expert communication (FDEC):

> **The FDEC.** Scientists acting in the capacity of expert face a dilemma between: (1) prioritizing the actionability of their communications, (2) prioritizing scientific transparency, where the scientific state-of-the-art is scrupulously communicated.

The FDEC is not always an obviously *ethical* dilemma. Sometimes there is simply too little at stake. However, the FDEC is always present, and when there is enough at stake, the FDEC does assume an overtly ethical dimension.

Let us consider an example from an area of science not yet discussed: meteorology. The general public is, in general, very interested what the weather will be in the future. For some segments of the population (e.g., farmers, pilots) the interest goes even further, since even normal variations in the weather have a direct impact on their professional activities. Due to this great concern about the weather, many meteorologists are employed as scientific experts providing actionable advice to the public. The most visible of these meteorologists are those who actually deliver the expert communication, as weather announcers on radio or TV. However, these are (of course) supported by a whole community of meteorologists who work behind the scenes on gathering observations and tweaking complex predictive models. Meteorological models draw on large amounts of data, and integrate a large number of assumptions (e.g. about parameter values) and deliver uncertain predictions. Most of this information about data, parameter values, and confidence intervals will not be communicated by the weather announcer. When tuning in for the weather report, listeners are not interested in a discussion about meteorology or of the inner workings of weather services; they want clear statements about what tomorrow's weather will likely be. Hence the community of meteorologists working towards shaping the

weather report, must select only a small fraction of the scientific information to be communicated. At most some probability of rain will be communicated. However, rarely will listeners ever hear, for instance, about the differences between the numerical models of the European "Integrated Forecasting System" and those of the U.S. "Global Forecast System". Such elements are backgrounded for the purposes of prioritizing the actionability of the weather report.

How the weather report is framed is often approximately ethically neutral. Typically meteorologists are not held morally accountable for their communication. However, that judgment can change radically if a potentially catastrophic weather formation arises (e.g., a hurricane). Then the tradeoffs inherent in the FDEC become much more apparent. Meteorologists must then pay great attention to how they frame their messages: do they emphasize actionability by, e.g., emphasizing the potential danger of the hurricane (despite the significant probability the hurricane would lose strength before landfall)? Or do they only communicate whatever probabilities the models have come up with, and risk that a large segment of the population takes no precautionary measures, with potentially disastrous consequences?

In the academic literature on the subject, it is noted how meteorologists, in such circumstances, often 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 (Roulston and Smith 2004). This decision has an ethical dimension: to underemphasize the dangers could put lives at risk. However, the FDEC does not have a formulaic resolution even in the case of weather forecasting. If actionability is prioritized too often – i.e., if the message is shaped too often so as to directly help some of the interests and goals of the public – weather forecasting communities can lose credibility and trust. The well-known cost of false alarms is the desensitization of the public to future weather warnings (LeClerc and Joslyn 2015).

Some readers may have noticed by now that the FDEC follows from how "expert communication" was analyzed in the previous sections. The framing of expert communication can be influenced by many factors, but one essential element is that the goals, interests, and concerns of the receivers shape the framing. This in turn follows from the *actionability* requirement of expert communication: expert communication is shaped such that it can guide action. (In this sense, experts *interpret* the science for the public and decision-makers: they translate the science into terms that are usable for the goals of public and decision-makers.) Expert communication,

however, guides but does not control the responses of the receivers. It informs the receivers' decisions without actually seeking to take those decisions. Hence expert communication involves the values of actionability *and* transparency. Since they cannot be simultaneously maximized, the expert must deliberate how to find the right balance between both. This is why the trade-off is "fundamental": it is a feature of what expert communication *is*.

The FDEC has two broader implications. First, the FDEC undermines the value-neutral view on expert communication. The value-neutral view holds that expert communication simply consists in revealing the scientific state-of-the-art to non-experts, and that the only normative dangers faced by experts arise when they advance claims beyond their domain of expertise (e.g., claims about what policies should be undertaken). The FDEC, together with the preceding analysis of the anatomy of expert communication, shows that the value-neutral view rests on a misguided abstraction of what expert communication actually involves. In fact, the value-neutral view rests on a misconception of what *communication* as such entails. As emphasized above, every communication involves some framing – choosing what information to foreground – and expert communication crucially is framed with the goals and interests of the receivers in mind (whether the general public, politicians, or corporate leaders). Expert communication involves a *selection* of what elements of the scientific state-of-the-art should be foregrounded.

Second, the FDEC shows that it does not make sense to think of *honest* expert communication as "transparent" expert communication. Every communication involves foregrounding some data and hypotheses while backgrounding others, and expert communication must select the elements of the state-of-the-art that help the target audience make decisions. Instead of analyzing honesty through transparency, it is more promising to distinguish honest communication from *manipulative* communication. The following section briefly fleshes out this distinction in more detail.

4. Honesty as Non-Manipulation

There are several ways in which (honest) communication can be demarcated from (dishonest) manipulative communication. An expert can convey "merely actionable" information if they highlight elements of the scientific state-of-the-art that are useful

for the decision-making of the receiver, and if they remain neutral on what precise course of action the receiver decides on. However, expert communication can also seek to *persuade* – foregrounding elements so that the decision-making is tilted towards one option rather than another – while still remaining honest.

One way to understand the difference is by bringing the *agency* of the receiver into the conceptual picture. Persuasion refers to a type of framing that respects the agency of the receiver, while the framing inherent in manipulative communication does not respect the agency of the receiver. Agency – as understood here – refers to the capacity of the receiver to make their own decisions about how to further their own goals and interests. Persuasive expert communication, by highlighting the important information in the scientific state-of-the-art, in fact can *contribute* to the receiver's agency, by contributing to their capacity to make an informed decision about how to further their goals or interests. Manipulative expert communication, by contrast, aims to control the decisions of the receiver. The receiver is not treated as an agent, but as an object (or tool) that can be used to further the interests or goals of the expert.

This characterization of the difference between manipulation and persuasion helps account for how it can be objectively difficult to judge whether a particular communicative act is manipulative or merely persuasive. For instance, consider a nuclear physicist observing a radiation leak at a power plant, without being able to measure the intensity of the leak. Should the physicist alert all surrounding residents to a "highly dangerous and potentially cancerous" leak? Even though this communication is not entirely transparent (the physicist does not know 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 reasonably assumes receivers have a strong interest in their own health, and hence the communication allows them to make an informed decision. Similarly, a lung disease specialist conveying the message "smoking kills" is similarly seeking to persuade. In sum, persuasive but honest communication requires that the sender of the message make some assumptions about the goals, interests, or needs of the receiver.

A category that sits in between persuasive and manipulative communication is what can 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 because (1) not all relevant information for an informed decision is conveyed to the receiver, (2) the sender believes the receiver does not have the educational background or cognitive capacity to correctly interpret the relevant information, (3) the sender wishes to contribute to the good of the receiver. Paternalistic communication shares element (1) with honest, persuasive communication, but shares element 3 with manipulative communication.

As the distinction between persuasion and manipulation inherits many of the difficulties surrounding the meaning of autonomy and informed consent, there is much more to be said about the distinction. However, the lesson to be drawn here is that the category of honest expert communication can be contrasted with that of manipulative expert communication. Even if some information must be backgrounded (and thus, even if one cannot be maximally transparent), this does not mean that honest communication is not possible. Some instances of expert communication remain neutral on what decisions the receiver takes (e.g., by plotting out various climate change scenarios). However, expert communication can even seek to persuade ("smoking kills") while remaining honest, even though the more strongly persuasive the communication becomes, the greater the risk that it becomes manipulative.

5. The Ethical Nature of Expert Communication

How precisely scientists communicate to non-scientists would not matter much if science were a relatively marginal presence in society, without much influence on how communities are organized. In particular, if scientists were still predominantly concerned with predicting the movements of heavenly bodies (as they were in the 17th century), there would be little need for bringing attention to the ethics of how scientists communicate to non-scientists. However, science today has a very large degree of influence across society, whether one considers professions (many of which define themselves as "science-based"), corporations (who invest heavily in R&D: UNESCO Institute for Statistics 2020), or policy-making (where "evidence-based policy-making" is often viewed as an ideal (Cairney 2016)). The opinions of scientific experts have a non-negligeable impact on these communities and activities. Given this position of trust and prestige, if expert communication is conducted in a dishonest way, this can be an ethically problematic act. In this section I briefly discuss

deontological, consequentialist, and virtue ethical frameworks to highlight the lines of enquiry along which the ethics of expert communication could be further developed.

The deontology of expert communication. In a deontological approach to expert communication, scientists deliberating on framing decisions (by addressing, for instance, the trade-offs inherent to the FDEC) structure their reasoning in terms of duties. One specific duty that would plausibly feature in any deontological framework would be the duty to be *honest* towards the receivers of the communication. As discussed in the previous section, this entails the duty to highlight the scientific elements (data, hypotheses) that respect and contribute to the agency of the receivers (e.g., public or policymakers), by allowing them to make an informed decision on the matter at hand, or by highlighting scientific elements that can reasonably be assumed to be crucial for the interests of the receivers.

A deontological framework would also need to offer guidelines on how to reason about conflicting duties. Thus, for instance, the duty to be honest can sometimes come into conflict with the duty to prevent harm – especially in precarious and pressing circumstances, where rapid action needs to be undertaken. Such circumstances show that the duty to be honest is a *prima facie* duty that can be overridden by other duties such as the duty to prevent harm. In such circumstances, a scientist can be ethically justified in engaging in a more paternalistic style of communication.

A consistently deontological approach would need to identify higher-level duties that guide how the scientist should balance conflicting duties. The infinite regress entailed by this approach (i.e., what if two higher-level duties conflict?) is a challenge and a likely weakness for the deontological approach

The consequentialism of expert communication. In a consequentialist approach, a scientist deliberates on framing decisions according to the consequences they would likely have. For instance, a scientist deliberating on whether to adopt a "communicate the consensus" strategy may come to decide against it when they have good reason to believe that one of the likely consequences of using that strategy would be to be perceived by the receivers as manipulative.

The consequentialism of expert communication would thus be highly informed by the nascent "science of science communication" (Kahan 2015; Jamieson, Kahan, and Scheufele 2017). The issue of *deliberating* on communication strategy would thereby be almost entirely reduced to the question of *knowing* the consequences that communication strategies would likely have on receivers. In other words, in balancing

two communication strategies against each other, the *empirical evidence* for the consequences would play a decisive role.

The challenge for the consequentialist approach lies, first, in obtaining reliable predictive evidence for various communication strategies. It is doubtful whether it is realistic to hope for this, given the complexity of the act of communication: the effectiveness of the communication depends on the personal idiosyncrasies of the receiver, and exhibits a significant degree of path-dependence and context-sensitivity (so that a communication strategy that has worked in the past may not work in the future: think of meteorologists erring on the side of caution).

The second challenge lies in balancing the relative benefit of two types of consequence. For instance, communicating paternalistically can provide beneficial consequences in the short term (by avoiding physical harm), but could damage the trustworthiness of scientists (and science) over the longer term. How does one weight the relative benefit of avoiding physical harm in the short term versus safeguarding trustworthiness over the longer term? According to (hedonistic) utilitarian theory, it should be possible to translate such types of consequence into differences in pain and pleasure. However, until it is clear how precisely a scientist should do that, a utilitarian approach may struggle in providing concrete guidance to the scientist weighing harm against trustworthiness.

The virtue ethics of expert communication. In the virtue-ethical approach, the scientist structures their deliberation in terms of virtues. Honesty is a virtue, as are respect, trustworthiness, benevolence, and most importantly, practical wisdom. What precisely constitutes an honest *framing* is something that ultimately the scientist must decide on by exercising their judgment (through practical wisdom). The different virtues can conflict with each other: benevolence can sometimes conflict with respect, as it can with honesty. However, in the virtue-ethical approach, conflicts are also resolved through the exercise of practical wisdom.

The challenge for the virtue-ethical approach here – as always with this approach– lies in the seeming refusal to further specify what it means to decide with "practical wisdom" beyond seemingly tautological statements such as acting with "correctness regarding what is beneficial, about the right thing, in the right way, and at the right time" (Aristotle 2000: 1142b). Addressing such concerns obviously go beyond the scope of this paper; however, it is worthwhile to note that the other ethical frameworks run into structurally similar problems when faced with the challenge of

weighing one duty against another, or one type of beneficial consequence against another.

Moreover, when we look at how codes of scientific integrity are currently written, many of them are couched in a virtue-ethical framework. Codes often start out by listing a number of *values* that are central to science: for instance, honesty, respect, accountability, and reliability (ALLEA 2017). All of these values can also be read as *virtues,* referring to habits of honest behavior, or of respectful, accountable, or reliable behavior. The next section outlines some concrete consequences of how codes of conduct could ideally be amended in light of the ethics of expert communication.

6. Implications for Scientific Integrity

Before doing so, it is important to first acknowledge the *communicative function* of codes of conduct. Codes of conduct are consensus statements on the professional ethics of a professional community (Desmond 2020), and may serve various functions: (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. The legal function of codes of conduct for scientific integrity is still ambiguous (though see, for instance, (Desmond and Dierickx 2021b). These various functions can be balanced in various ways, and that helps explain why the length of available codes of conduct vary dramatically (Desmond and Dierickx 2021a, Figure 3).

This means that the ethics of expert communication can be acknowledged in a variety of ways in codes of conduct, ranging from the very concise mentions of some key values, virtues, or duties, to detailed expositions of the rationale for the ethics of expert communication. Since this article represents such a rationale, in this section I will focus only on how extant codes of conduct could concisely be amended as to acknowledge the ethics of expert communication.

Currently, honesty in communications to the general public is acknowledged as an important aspect of scientific integrity in the leading documents of eleven countries (BE, CH, FR, HR, IE, IT, LV, NL, NO, PT, SE: *see* BLINDED[5]). However, in many of these documents, "honesty" and "transparency" are used more or less interchangeably, although in none of these documents is there an acknowledgment of some of the

[5] <A co-authored study, currently under review, of the content of leading regulatory documents in the European context. List of consulted documents added to bibliography.>

complexities involved in determining the meaning of honesty (e.g., the distinction between persuasion and manipulation).

If, for purposes here, one were to compress an ethical guidance on expert communication into a single sentence, it would resemble the sentence in the left column of the following table. The reason for including each clause is explicated in the right column.

Text	Communicative function
"Communication to the public and policy-makers is a sensitive issue,	Conveys that there is no single right way to do expert communication, and that individual judgment must be exercised
whereby scientists must make the best judgment on what areas of science to highlight,	Emphasizes again the importance of individual judgment, and of the role that framing plays.
in order to provide an honest, scientifically grounded, and actionable message while avoiding all forms of distortion and manipulation."	Highlights some ideals (honest, scientifically grounded, actionable) while also acknowledging some of main dangers.

7. 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 importance of framing in expert communication is gradually becoming established through the advent of the science of science communication, and there is an ethical dimension to framing decisions that should be more widely acknowledged.

In this paper I provide a basic rationale for the ethics of expert communication, based on one particularly fundamental framing decision: how to balance transparency with actionability when conveying scientific knowledge to the public and policy-

makers. In expert communication, understanding is never entirely prioritized (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 scientific integrity, and courses on science communication – which many science students follow during their studies – should integrate a class or even a module on the ethics of science communication.

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Consulted Codes of Conduct

1. **BE**
   Title: Code of Ethics for Scientific Research in Belgium.
   Author: Royal Flemish Academy of Belgium for Science and the Arts, The Royal Academy of Science, Letters and Fine Arts of Belgium.
   URL: http://www.belspo.be/belspo/organisation/publ/eth_code_nl.stm
   Date: 2009
   Word Count: ca. 2290
   Language of document: Dutch

2. **CH**
   Title: Scientific integrity: principles and rules of procedure.
   Author: Swiss Academies of Arts and Sciences
   Date: 2008
   URL: http://www.akademien-schweiz.ch/en/dms/E/Publications/Guidelines-and-Recommendations/e_Integrity.pdf
   Word Count: ca. 5350
   Language of document: English

3. **FR**
   Title: Integrity and responsibility in research practices: a guide
   Author: CNRS-CPU
   Date: March 2017
   URL: http://www4.cnrs-dir.fr/comets/IMG/pdf/comets-guide-en.pdf
   Word Count: ca. 8090
   Language of document: English

4. **HR**
   Title: Etički Kodeks Odbora za Etiku u Znanosti i Visokom Obrazovanju (Ethical Code of the Board of Ethics in Science and Higher Education).
   Author: Agency for Science and Higher Education (ASHE)
   Date: 2015 (consolidated text).
   URL:
   https://www.azvo.hr/images/stories/tijela_agencije/Eticki_kodeks_OEZVO_pro%C4%8Di%C5%A1%C4%87eni_tekst_nakon_izmjena_i_dopuna_s_8._sjednice_15.6.15.doc
   Word Count: ca. 2170
   Language of document: Croatian

5. **IE**
   Title: National Policy Statement on Ensuring Research Integrity in Ireland
   Date: June 2014
   Authors:
   Irish Universities Association (IUA)
   Health Research Board (HRB)
   Royal Irish Academy (RIA)
   Science Foundation Ireland (SFI)
   Institutes of Technology Ireland(IoTI)
   Higher Education Authority (HEA)
   Dublin Institute of Technology (DIT)
   Enterprise Ireland (EI)
   Teagasc
   Irish Research Council (IRC)
   Royal College of Surgeons in Ireland (RCSI)
   Quality and Quali cations Ireland (QQI)
   URL:
   http://hea.ie/assets/uploads/2017/04/National-Policy-Statement-on-Ensuring-Research-Integrity-in-Ireland-2014.pdf
   Word Count: ca. 5170
   Language of document: English

6. **IT**
   Title: Linee guida per l'integrità nella ricercar (Guidelines for Research Integrity)
   Date: 10 June 2015
   Authors: Commission for Research Ethics and Bioethics of the Natinoal Center for Research (Commissione per l'Etica della Ricerca e la Bioetica del CNR)

URL:
https://www.cnr.it/sites/default/files/public/media/doc_istituzionali/linee-guida-integrita-nella-ricerca-cnr-commissione_etica.pdf?v=1
Word Count: ca. 7650
Language of document: Italian

7. **LV**
   Title: Scientist's Code of Ethics
   Date: 2017 (reapproval of 1997 code)
   Author: Latvian Academy of Science, Latvian Council of Science
   URL:
   https://www.lzp.gov.lv/index.php?option=com_content&task=view&id=149&Itemid=113
   Word Count: ca. 1920
   Language of document: English

8. **NL**
   Title: Netherlands Code of Conduct for Research Integrity
   Date: 2018
   Authors: Koninklijke Nederlandse Akademie van Wetenschappen (KNAW), et al.
   URL: https://doi.org/10.17026/dans-2cj-nvwu
   Word Count: ca. 7250
   Language of document: Dutch

9. **NO**
   Title: General guidelines for research ethics
   Date: September 2014
   Authors: The Norwegian National Research Ethics Committees
   URL: https://www.etikkom.no/globalassets/general-guidelines.pdf
   Word Count: ca. 880
   Language of document: English

10. **PT**
    Title: Integridade na Investigação Científica: Recomendação (Integrity in Scientific Research: Recommendation)
    Author: Conselho Nacional de Ética para as Ciências da Vida (National Council of Ethics for the Life Sciences)
    Date: 2018
    URL:
    http://www.cnecv.pt/admin/files/data/docs/1523888172_IntegridadeCNECV2018.
    Word Count: ca. 4850
    Language of document: Portuguese

11. **SE**
    Title: Good Research Practice
    Author: Swedish Research Council

Date: July 2017
URL:
https://www.vr.se/download/18.5639980c162791bbfe697882/1529480529472/Good-Research-Practice_VR_2017.pdf
Word Count: ca. 44 000
Language of document: English