



How to balance *Balanced Reporting* and *Reliable Reporting*

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Abstract The paper draws on philosophy of science to help resolve a tension between two central journalistic ideals: That of resenting diverse viewpoints (*Balanced Reporting*) and that of presenting the most reliable testimony (*Reliable Reporting*). While both of these ideals are valuable, they may be in tension. This is particularly so when it comes to scientific testimony and science reporting. Thus, we face a hard question:

The Question of Balance

How should *Balanced Reporting* and *Reliable Reporting* be balanced in science reporting?

The present paper contributes substantive proposals in a manner that integrates philosophy of science with the recent empirical literature on science communication. Specifically, I articulate and evaluate strategies for balancing *Balanced Reporting* and *Reliable Reporting*. First, I provide a diagnosis of the conflict between them that is informed by philosophy of science. On this basis, I provide restrictions of both *Balanced Reporting* and *Reliable Reporting*. The restrictions are unified because they are inspired by similar reflections about the epistemic basis of science reporting—namely scientific justification. Moreover, I note some empirical work that supports the restrictions as well as some empirical work that indicates some limitations of them. Thus, the paper exemplifies how an empirically informed philosophy of science may bear on a question of societal concern.

Keywords Public scientific testimony · Science reporting · Balance norm

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1 Introduction

In this paper, I draw on philosophy of science to help resolve a tension between two central journalistic ideals: That of presenting diverse viewpoints in a balanced manner (*Balanced Reporting*) and that of presenting the most reliably based hypothesis (*Reliable Reporting*). While both of these ideals are valuable, they may be in tension with one another. This is particularly so when it comes to science reporting. Thus, we face a hard question:

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How should *Balanced Reporting* and *Reliable Reporting* be balanced in science reporting?

The Question of Balance has only recently been discussed by philosophers (Simion 2017; Figdor 2018). But it should be addressed by philosophy of science as it pursues ameliorative aims, such as articulating norms and guidelines for varieties of scientific testimony. Moreover, it should also be addressed by a descriptive philosophy of science. The scientific enterprise sustains itself by playing certain roles in society, and public scientific testimony is central to those roles. Hence, an adequate description of science as a self-sustaining social enterprise must include a principled characterization of the norms governing public scientific testimony.

Fortunately, philosophy of science contains resources for addressing both the ameliorative and descriptive questions that arise from *The Question of Balance*. For example, the debates may be informed by philosophical discussions about the nature of science and its role in society (such as Douglas 2009; Kitcher 2003, 2011). More specifically, debates about the epistemic norms of scientific testimony are pertinent to *The Question of Balance* (Fricker 2002; Douven and Cuypers 2009; Steele 2012; Gerken 2013, 2015, forthcoming a, b). Finally, I will argue that reflection on the nature of scientific justification may inform answers to *The Question of Balance*.

Philosophers of science are far from alone in investigating these issues. In recent years, *The Question of Balance* has been empirically addressed by communication scientists, sociologists and social psychologists, who have formed a new interdisciplinary field: *Science of science communication* (Fischhoff 2013; Dunwoody 2014; Kahan 2015; Jamieson et al. 2017). Balanced science reporting has also been the topic of heated public debate (e.g., Read 2018; Porritt et al. 2018). I think it is fair to say that the interdisciplinary debate about *Balanced Reporting* has been more intense than the philosophical discussions of it. Moreover, most relevant work in philosophy of science has largely been conducted in isolation from the interdisciplinary work. This is unfortunate since philosophical reflection on these issues should be empirically informed and because philosophy can contribute with both conceptual clarification and substantive insights.

The contribution of the present paper is to set forth novel substantive proposals in a manner that introduces the important empirical literature to the philosophy of science. Hence, it exemplifies an integration of empirical and philosophical resources. Concretely, I will put this approach to work in articulating and critically evaluating strategies for balancing *Balanced Reporting* and *Reliable Reporting* in a

manner that resolves the conflict between them. Before I begin, I want to recognize that there are important and complex connections to debates concerning values in science (Douglas 2009) and epistemic injustice (Fricker 2007). Space dictates that I set these complex issues aside given my aim of focusing on integrating philosophical and empirical work. But my hope is that explicating the conflict between *Balanced Reporting* and *Reliable Reporting* and providing empirically informed philosophical arguments for a principled conflict resolution will provide a sound basis for addressing these further issues (Gerken forthcoming a, b). So, here's the plan:

In Sect. 2, I describe a widely accepted role of scientific testimony in deliberative democracy in relation to the two mentioned journalistic ideals for science reporting: *Balanced Reporting* and *Reliable Reporting*. I also note some of the recent criticism of *Balanced Reporting*.

In Sect. 3, I argue, on the basis of considerations about scientific justification, for another norm of science reporting—*Justification Reporting*—and consider its prospects and limits.

In Sect. 4, I consider how the reflections on scientific justification may guide a revision of *Reliable Reporting*. On this basis, I develop a revised principle: *Inclusive Reliable Reporting*.

In Sect. 5, I consider how the reflections on scientific justification may guide a revision of *Balanced Reporting*. On this basis, I develop such a revised principle: *Epistemically Balanced Reporting*.

In Sect. 6, I consider some limitations of the revised principles and argue that they do not provide any reason to abandon them.

In Sect. 7, I conclude by drawing some more general lessons concerning the epistemology of scientific testimony and its role in deliberative democracy.

2 Public scientific testimony and public deliberation

Public scientific testimony plays a privileged role in deliberative democracy. A central reason for this is that science is epistemically authoritative given that, on most issues investigated by science, it provides the most reliable type of warrant that we possess. Consequently, a central role for scientists in deliberative democracies is to contribute to public discourse and decisionmaking by providing expert scientific testimony (Kitcher 1990, 2011; Fricker 2002; Douglas 2009; Figdor 2010, 2018).

Terminologically speaking, the phrase 'public scientific testimony' will (unless qualified) denote both *scientific expert testimony* by the scientists themselves and mediated *science reporting* by, for example, science journalists. Although the opportunity to communicate directly with the relevant laypersons is increasingly available to scientists, the public's beliefs about contemporary science and its acceptance of scientific findings are largely based on science reporting (Kohring and Matthes 2007; Anderson 2011; Feinstein 2011; Hawley 2012; Almassi 2012; Keren 2018; Kovaka forthcoming). Science reporting may seek to convey hypotheses about the world or the sociology of scientists' views, practices, controversies etc.

Since these aims come with different requirements and desiderata and I cannot discuss everything, I will focus on the former type of science reporting.

Science reporting is subject to norms and guidelines concerning the presentation of findings and hypotheses.¹ Sometimes they are similar to the norms and guidelines governing scientific expert testimony directed at non-scientists (Gerken 2015, forthcoming a). But often they reflect norms and guidelines more intrinsic to journalism (Figdor 2010; Dunwoody 2014). The idea of *Balanced Reporting* is drawn from journalism, and it is a matter of controversy whether it applies to scientific expert testimony. So, I will address an important and unresolved tension between two principles of science reporting: *Balanced Reporting* and *Reliable Reporting*. I begin by presenting them in turn.

2.1 Balance and reliability

The journalistic ideal of *balance* consists in a broad commitment to representing diverse viewpoints in a manner that does not favor any one of them. The ideal of balance has been articulated in many ways. The following characterization by Nelkin figures in Angler's science journalism textbook:

Reporters try to maintain balance by quoting scientific sources representing opposing sides of a controversy... (Nelkin 1987: 19. Cited in Angler 2017: 17).

Entman provides a similar widely shared characterization:

'Balance aims for neutrality. It requires that reporters present the views of legitimate spokespersons of the conflicting sides in any significant dispute, and provide both sides with roughly equal attention' (Entman 1989: 30. See also Dixon and Clarke 2013: 360).

For example, BBC's editorial guidelines contain several non-equivalent formulations of balance norms or related norms, such as the following labelled 'Impartiality': 4.2.1.:

We must do all we can to ensure that 'controversial subjects' are treated with due impartiality in all our output (BBC 2018a).²

¹ I take *norms* to be objective benchmarks of assessment that the agent need not have any cognitive access to, whereas *guidelines* are prescriptive and met only if they are, in some sense, *followed* by the agent (Gerken 2017, 2018a). Often the guideline will be a simplified approximation of the norm which it is feasible to follow. Here I will primarily be concerned with the underlying norms. Philosophy of science can contribute to the articulation of principled norms, whereas it is a more interdisciplinary task to articulate implementable guidelines. However, in this case, the guidelines may not need to differ much from the norms. So, I will occasionally consider the principles *qua* guidelines.

² Importantly, the principle appears to be severely qualified elsewhere in BBC's editorial guidelines. Consider, for example, the following under the headline 'Due Weight': 4.4.2: "we should seek to achieve 'due weight'. For example, minority views should not necessarily be given equal weight to the prevailing consensus" (BBC 2018a, b). Given the tension between these formulations, the conflict that the present paper addresses is very much present in actual editorial guidelines.

Given the differences in formulations and labels, I will consider a general version of *Balanced Reporting* and then consider whether it may be restricted. Moreover, I will, for simplicity's sake, primarily consider cases that concern opposing views of the same proposition rather than more complex disagreements. So, for the present purpose, I will consider the following provisional formulation:

Balanced Reporting

Science reporters should, whenever feasible, report opposing hypotheses in a manner that does not favor any one of them.

Balanced Reporting articulates an ideal that journalistic practice only approximates in a manner that is dictated by the practical concerns and idiosyncratic aspects of the news story. Nevertheless, it is still worth diagnosing the principled flaws of such normative ideals in order to use the diagnosis to articulate better ideals. Even though some flaws of contemporary science reporting lie with the implementation of the ideals, better ideals will *ceteris paribus* further better science reporting.

The notion of *favoring* a hypothesis that is operative in *Balanced Reporting* amounts to the idea of presenting the hypothesis in a positive way—e.g., in a way that may reasonably be expected to correlate with audience acceptance of the hypothesis. So, this formulation of *Balanced Reporting* reflects the scientific values of objectivity, neutrality and open-mindedness, as well as general journalistic norms and guidelines. However, *Balanced Reporting* has increasingly come under fire. In their influential article 'Balance as bias', Boykoff and Boykoff cite Gelbspan in motivating the view that *Balanced Reporting* is problematic in science reporting:

The professional canon of journalistic fairness requires reporters who write about a controversy to present competing points of view. When the issue is of a political or social nature, fairness—presenting the most compelling arguments of both sides with equal weight—is a fundamental check on biased reporting. But this canon causes problems when it is applied to issues of science. It seems to demand that journalists present competing points of views on a scientific question as though they had equal scientific weight, when actually they do not (Gelbspan 1998: 57–58).

Boykoff and Boykoff themselves argue that *Balanced Reporting* gives rise to biased reporting because giving equal space to opposing views is misleading when they are not equally well warranted. Specifically, they argue that the coverage of anthropogenic global warming (henceforth 'AGW') in prestigious US newspapers has given disproportionate space and weight to AGW-deniers (Boykoff and Boykoff 2004). Similar arguments against *Balanced Reporting* concern other divisive issues. For example, Mooney and Nisbet argued that in the US debates between creationism and evolutionary biology, coverage was misleadingly balanced (Mooney and Nisbet 2005; Figdor 2013, 2018). Further examples include risks associated with GMO crops, vaccine-autism links, gun control etc.

Philosophers have also argued against *Balanced Reporting*. For example, Simion argues that such reporting—which she labels 'He Said/She Said reporting'—violates general norms of informative speech acts unless the reporting is subject to particular urgency considerations (Simion 2017). I will not assess the argument

here, except to note that *Balanced Reporting* is attacked from both philosophical and empirical flanks.

The bad epistemic consequence of *Balanced Reporting* that epistemic non-equals are perceived as equals goes against another fundamental norm of journalistic reporting. This is the norm of reliability.³ This norm goes by many names, but the core of it is the idea that since objective journalistic reporting is committed to truth, only the most reliably based hypotheses should be reported. Given that scientific testimony is supposed to play the role of the highest epistemic authority, science reporting is by no means an exception to the general norm of reliability. We may provisionally articulate it as follows:

Reliable Reporting

Science reporters should, whenever feasible, report the most reliably based hypotheses and avoid reporting hypotheses that are not reliably based.

Reliable Reporting may be hard to implement in the reality of the media world since it may be infeasible to avoid hypotheses that are not reliably based.⁴ But here I will consider a more principled conflict. Both *Balanced Reporting* and *Reliable Reporting* reflect journalistic values that align closely with scientific values. But as the criticism of *Balanced Reporting* clearly indicates, they may come in conflict when balanced reporting involves otherwise avoidable unreliable sources or when reliable reporting excludes perspectives that are not reliably based (Soffer 2009). The conflict is problematic given the general appeal of both principles. As many have argued, it may be problematic to sacrifice reliability to ensure balanced reporting. On the other hand, it may seem authoritarian and even oppressive to exclude less reliable minority voices from debates that bear on their welfare.

Thus, resolving this conflict may be seen as instantiating a more general problem in the philosophy of science: The problem of carving out a privileged and authoritative role for a meritocratic scientific enterprise in a democratic society that seeks to respect cognitive and normative diversity. In Kitcher's words, this is the problem of "integrating expertise with democratic values" (Kitcher 2011: 11). So, while the conflict between *Balanced Reporting* and *Reliable Reporting* is an important conflict in its own right, it also reflects a general conundrum concerning scientific testimony and its role in epistemically diverse liberal democracies.

2.2 Banning balance?

Critics of *Balanced Reporting* may respond to *The Question of Balance* simply by banning balanced reporting in science reporting. After all, *Reliable Reporting* seems crucial. So, if *Balanced Reporting* works against it, rejecting it altogether straightforwardly resolves *The Question of Balance*.

³ I will articulate the norm in terms of reliability of the basis of a hypothesis where the basis may refer to the usual bearers of reliability, such as sources or processes. However, the principle does not hinge on a reliabilist framework. For example, it could be rearticulated in evidentialist terms.

⁴ Thanks here to Carrie Figdor.

A slightly less radical resolution of the balancing act is to take *Reliable Reporting* to trump *Balanced Reporting* in all cases of conflict. But several critics appear to prefer the more radical resolution. Indeed, a ban on *Balanced Reporting* may even have been implemented in places. In a 2007 study, Boykoff provides evidence that balance is declining in climate science reporting and suggests "... that we may now be flogging a dead norm" (Boykoff 2007: 479).⁵ Boykoff regards this as "cause for optimism", which reinforces the notion that many theorists prefer a simple ban on balance.

Meanwhile, the debate has moved from academic circles to the public sphere. A recent example is Read's '*I won't go on the BBC if it supplies climate change deniers as 'balance'*' in *The Guardian* (Read 2018). A few weeks later, 57 politicians, scientists and writers followed suit in a letter to *The Guardian*: "Balance implies equal weight. But this then creates a false equivalence between an overwhelming scientific consensus and a lobby, heavily funded by vested interests, that exists simply to sow doubt to serve those interests" (Porritt et al. 2018). These public disputes indicate that *Balanced Reporting* remains influential in science reporting. Why else would the objectors object? But they also indicate that hostility toward *Balanced Reporting* has expanded.

I will not argue that the bad press that *Balanced Reporting* has been getting is undeserved. But I will argue that philosophy of science offers a novel perspective according to which both *Reliable Reporting* and *Balanced Reporting* may be restricted in a unified manner. Moreover, I will suggest that this conflict resolution is preferable to a complete ban on *Balanced Reporting* or a resolution according to which *Balanced Reporting* (as stated) is trumped by *Reliable Reporting* (as stated) in every case of conflict.

For one thing, *Balanced Reporting* reflects scientific values. For example, a critical stance according to which scientific hypotheses should always be scrutinized from other perspectives is central to scientific practice. It goes back, at least, to Popper's view that constant *attempted falsification* from multiple perspectives is a defining feature of scientific practice: "Every source, every suggestion, is welcome; and every source, every suggestion, is open to critical examination" (Popper 1963: 27). Similarly, Merton argued that *organized skepticism* is part of the scientific ethos (Merton 1942/1973). More recently, Kitcher and Strevens have highlighted the centrality of a critical scientific community and have noted that this is partly explained by the fact that scientists have incentives to pursue novel, high-risk projects that are critical of the status quo (Kitcher 1992, 1993, 2003; Strevens 2003). Furthermore, feminist philosophers of science have emphasized the epistemic benefits of a plurality of critical minority perspectives in science (Longino 1990, 2002; Harding 1991). All of these frameworks are controversial, and the present argument does not rely on any of them. I mention a wide selection of views simply to indicate the broad agreement on the assumption that the scientific community should leave room for a plurality of critical perspectives. This broad

⁵ Coincidentally (in the literal sense of the term), Fox News retired their motto 'Fair & Balanced' in June 2017.

assumption is well put by Hoyningen-Huene: “With respect to the social structure of science, the scientific community must be organized in such a way that all knowledge claims are scrutinized by its members from as many possible different points of view” (Hoyningen-Huene 2013: 109). Hoyningen-Huene uses this assumption as a premise in an argument for a more controversial conclusion—roughly, that science is characterized by its systematicity. But, as in the other cases, one can accept the premise without agreeing with this conclusion.

Importantly, the scientific value of critical scrutiny aligns with objectivity and neutrality ideals in journalism, such as the idea that a journalist should set aside her own preconceptions. Such journalistic neutrality values may even be inspired by scientific values. For example, one study suggests that journalists historically sought to adopt “an ethic and an integrity in keeping with the broader culture’s acclaim for science and non-partisanship.” (Schudson 2001: 165). In sum, *Balanced Reporting* is motivated by values that reflect ideals that are central to scientific methodology.

Another consideration is that even science journalists are frequently laypersons with regard to many of the scientific matters they report on (Figdor 2017; Gerken forthcoming a). So, in cases of esoteric scientific dispute, science reporters will not always be capable of adjudicating on a scientific dispute although they have some resources for making a judgment (Goldman 2001). Hence, it may seem both epistemically reasonable and generally fair-minded to report conflicting testimonies (Dunwoody 2014). Crucially, however, this does not entail that they should be reported “in a manner that does not favor any one view” as *Balanced Reporting* requires. Rather, I will argue that it is more appropriate to restrict *Balanced Reporting* than to abandon it entirely or to adopt a hard-and-fast rule according to which *Reliable Reporting* always trumps *Balanced Reporting* in conflict cases. Instead, I will pursue a resolution of the conflict by rearticulating both principles in a unified manner that reflects that they are principles of *science* reporting. Indeed, the distinctive contribution of philosophy of science to this debate may be that of guiding such a principled and unified restriction. Here I have argued that it seems rash to exempt science reporting from a journalistic guideline that is motivated by ideas that are central to science. Although science reporting should not directly import scientific values, it should not be unnecessarily at odds with the nature of the relevant science either. For example, recipients should not align their beliefs with the relevant science because of manipulation, threats etc. but due to some appreciation of its epistemic force (Gerken forthcoming a, b). So, I will explore a restriction of *Balanced Reporting* that is not at odds with scientific values. I begin the exploration with a more precise diagnosis of the conflict that gives rise to *The Question of Balance*.

2.3 Diagnosing the tension

So far, reflection informed by the philosophy of science suggests that it would be an overreaction to completely abandon *Balanced Reporting* in science reporting since it is motivated by values central to science itself. Similar reasons suggest that the negative component of *Reliable Reporting* is too radical, and this speaks against simply taking it to trump *Balanced Reporting* in all cases of conflict. So, the conflict

between the two principles is indicative of intrinsic flaws in both of them. However, philosophy of science contains resources to help diagnose the intrinsic problems with the principles.

A good start consists in specifying the sense in which *Balanced Reporting* is biased. The short answer is that it is epistemically misleading. The cases in which *Balanced Reporting* wreaks epistemic havoc typically have the following character: Scientifically well-warranted testimony and conflicting but (scientifically) unwarranted testimonies are presented in a manner that gives them equal weight. Thus, *Balanced Reporting* encourages mixing up social controversy with scientific controversy.⁶

However, assessing scientific testimony typically requires scientific competence that the lay audience lacks. In consequence, the lay audience is likely to form beliefs in a manner that does not align with the actual epistemic strength of the conflicting testimonies.⁷ This account suggests that the trouble with *Balanced Reporting* is not that it is entirely flawed but rather that it is overly general and that it may, therefore, be misapplied. Given this diagnosis, a productive response would be to articulate a restricted version of *Balanced Reporting*—one that is designed to be apt for science reporting. To do so is a central aim of what follows.

Let us turn to *Reliable Reporting*, which may initially seem so compelling that it is beyond critical assessment (but see Dixon and Clarke 2013; Figdor 2018). However, reflection on scientific virtues, such as organized skepticism and open-mindedness, suggests that one aspect of *Reliable Reporting* is overly categorical. In the present formulation, *Reliable Reporting* consists of a positive claim that “science reporters should, whenever feasible, report the most reliably based hypotheses” and a negative one that science reporters should, whenever feasible, “avoid reporting hypotheses that are not reliably based.” I will argue that this negative component is overly categorical. For example, it rules out reporting on novel hypotheses that are not yet tested or legitimate confounders to the most reliably based hypotheses.⁸ However, novel and surprising hypotheses are prized within science.⁹ This is not to deny that novel hypotheses must meet a minimal epistemic threshold to be taken seriously. But this threshold may be cast in terms of the potential for *becoming* reliably based rather than in terms *being* reliably based. Since hypotheses that are not reliably based due to their novelty play an important part in science, a categorical ban on them in science reporting seems far too rigid.

⁶ Thanks to Åsa Wikforss for pushing this point and to Karen Kovaka for suggesting the characterization in terms of equivocation on ‘controversial.’

⁷ I elaborate on this point in Gerken (2018a).

⁸ Of course, novel, untested hypotheses might run afoul of other news criteria. Generally, reporting clear-cut findings may be more newsworthy. (I say ‘generally’ because reporting on new radical ideas about sexy topics figures prominently in more sensationalist science reporting).

⁹ This is not to deny that scientists are often dismissive of novel hypotheses or minority criticism. As Kuhn famously argued, in *normal science*, alternative perspectives about fundamental assumptions may be ignored (Kuhn 1962). But this must be counterbalanced by arguments that novel discoveries are highly prioritized in the scientific community (Strevens 2003).

Similarly, a hypothesis, H^* , that is a confounder to an accepted scientific hypothesis, H , may be worth controlling for even though H^* is not reliably based. Indeed, this may be a way of increasing the scientific justification for H . For example, if the background evidence is logically compatible with a confounding explanation but suggests that it is fairly unlikely, a cognitive psychologist may still opt to control for it. Likewise, medical scientists may want to investigate whether a drug has a side-effect even though background evidence does not suggest that the drug has such a side-effect. So, in general, a hypothesis may play a role in scientific inquiry when the available evidence suggests that it is fairly unlikely but does not speak directly to it. So, a hypothesis that is not reliably based may play an important role in scientific practice.

Furthermore, as already noted, feminist philosophers of science have argued that minorities may articulate hypotheses that represent epistemically valuable perspectives (Longino 1990, 2002; Harding 1991). In some cases, the minorities may be epistemically privileged vis-à-vis the hypothesis in question due to their standpoint (Harding 1991). But, in other cases, the minorities may identify the (socially) relevant hypotheses but lack the resources to provide a reliable basis for them. If hypotheses arising from such perspectives are epistemically valuable to include in scientific practice, it seems unreasonable to exclude them entirely from science reporting. Of course, there are important differences between scientific practice and science reporting. Some types of dissent that are appropriate in science are not appropriate in science reporting. But it is a reasonable desideratum that recipients of science reporting align their beliefs with the scientific justification and do so with some appreciation of the epistemic authority of science, rather than, for example, out of fear of repercussions. Hence, it is *ceteris paribus* a good thing if science reporting is not at odds with scientific practice.

Finally, while we are concerned with the epistemic side of the matter here, it should not be lost on us that there may be a moral obligation to include minority views in science reporting that informs public debate (Figdor 2017, 2018). The considerations sketched here do not support the conclusion that hypotheses that are not reliably based should be reported *on a par* with the most reliably based hypotheses. However, they do support the conclusion that the negative component of *Reliable Reporting* which bans reporting such sources is overly categorical and, therefore, standing in need of qualification.

2.4 Concluding diagnosis

An assessment informed by philosophy of science suggests the following diagnosis: *Balanced Reporting* is epistemically misleading in certain contexts of science communication, whereas the negative component of *Reliable Reporting* is overly categorical. Thus, the conflict between the principles indicates intrinsic flaws in each of them.

This diagnosis guides a constructive answer to *The Question of Balance* by suggesting two ways forward. First, given that *Balanced Reporting* and *Reliable Reporting* are overly general and overly categorical, it is worth considering whether they may be restricted rather than abandoned. This suggestion is augmented by

reflection on the fact that both principles are motivated by values that closely resemble central scientific virtues. Second, although the critical focus has been almost exclusively directed at *Balanced Reporting*, there is also reason to pursue a restriction of the negative component of *Reliable Reporting*.

Thus, I contend that philosophy of science may inform the pursuit of a unified restriction of the principles qua principles of *science* reporting. In particular, I propose to consider the epistemic basis of public scientific testimony from the perspective of philosophy of science.

3 Scientific justification and public scientific testimony

Why do we value scientific testimony? Why is it reasonable to privilege it in public deliberation and decision-making? The answer to such questions is, at least in large part, that scientific testimony is based on our epistemically superior investigation of the world: Science.

Scientific testimony rests on scientific justification, which is our epistemically superior form of justification in a restricted sense: For most hypotheses investigated by scientific methods, scientists are generally more reliable than those investigating them with unscientific methods. So, despite considerable variance in scientific methods and their degree of reliability, scientific testimony may be expected to be more likely to be true than testimony from non-scientific sources. Reflection on the nature and structure of scientific justification may provide guidance in addressing *The Question of Balance*. Yet more specifically, I will argue that three central properties of scientific justification bear on the question.

The first property of scientific justification is the just noted one that it is the epistemically superior kind of justification. While the history of science indicates that scientific justification is far from infallible, it remains true that it is more truth-conducive than other types of justification—perhaps with a few exceptions.¹⁰ The present discussion presupposes this assumption since *The Question of Balance* arises exactly because scientific justification is epistemically superior to alternative types of justification. This is why science has a claim to play a special role in public deliberation and why science reporting is important. So, although some qualifications may be required, I will not here argue further for the assumption that scientific justification is epistemically *superior* in the restricted sense.¹¹

The second property of scientific justification is that it comes in degrees. Philosophers of science have long highlighted that empirical scientific hypotheses and theories about matters of public interest are typically justified by induction or abduction (Hall and Hájek 2002; Lipton 2004). It is extremely rare that empirical

¹⁰ Beliefs about our own phenomenological states are candidates for beliefs better justified by a non-scientific source. Insofar as philosophy is not science, some philosophical theses and theories are other candidates.

¹¹ Of course, there are grand debates about the capacity of science to produce true or verisimilar hypotheses. But due to the grandness of these debates, they must be set aside here (but see Gerken 2018b, forthcoming a, b).

scientists possess justification that amounts to a proof. Occasionally, scientific claims are justified by direct observation. But since some observations are more reliable than others, even such occasions give rise to questions concerning the degree of scientific justification. Furthermore, in cases of direct observation, *The Question of Balance* is less likely to arise since it is harder to dispute what is directly observed. So, the sort of scientific hypotheses and theories that tend to be disputed are typically justified to a degree by induction or abduction. That is, scientific justification is typically *gradable*.

The third property of scientific justification is that it is typically *discursive justification*. Discursive justification is a kind of epistemic justification that is articulable (Gerken 2012, forthcoming a, c). This is a less basic property than the previous ones. So, to motivate it, a canonical formulation is in order.

Discursive Justification

S's warrant for believing that p is a discursive justification iff S is able to articulate some epistemic reasons for believing or accepting that p .¹²

Paradigmatically, Scientific justification is discursive justification. Generally, scientists are expected to be able to provide reasons for their results, hypotheses and theories (Gerken 2015). Such reasons may consist of observational evidence or more theoretical results of their experiments.

The requirement of being able to provide reasons derives from the scientific ideals of objectivity and replicability. It is commonly recognized that scientific hypotheses and theories are supposed to be objective in the sense that they have an intersubjective epistemic basis: "the objectivity of scientific statements lies in the fact that they can be inter-subjectively tested" (Popper 1934/2002: 22). In practice, this idea is manifested in the ideal of *replicability* (Hansson 2008). However, other scientists are not in a position to attempt replications unless both the data and the methodology that are used in justifying the scientific hypotheses are articulated (Winsberg et al. 2014; Gerken 2015). So, replicability requires that the reasons for believing or accepting these hypotheses are articulated and this, in turn, amounts to providing discursive justification for them.

A further reason why scientific justification is typically discursive is that science is an increasingly collaborative affair (Thagard 1997; Wray 2015). However, collaboration requires intra-scientific testimony between collaborating scientists (Fricker 2002). Such intra-scientific testimony is ordinarily governed by epistemic norms that require *discursive* justification (Gerken 2015). The claim here is *not* that in every case of intra-scientific testimony collaborating scientists articulate justification. The claim is merely that, if prompted, collaborating scientists are generally, although not invariably, able to articulate central aspects of the bits justification that they are responsible for. So, even though scientific justification is distributed in collaborative science, it is nevertheless discursive in nature and, arguably, this is a prerequisite for a well-functioning scientific collaboration.

¹² I have added the 'and accepting' to the characterization in order to allow for the widely held idea that the scientific community may accept a theory or hypothesis that is not believed.

Finally, the discursive nature of scientific justification is often conventionalized in publication practices. In most empirical fields, publications in scientific journals involve distinct sections that describe the methodology and results as well as discussions of the conclusions drawn. Such sections all articulate pieces of the scientific justification for the resulting hypotheses or theories. While there are variations across fields, it is a central and partly defining aspect of scientific practice to present the evidence and methodology in a way prescribed by more or less explicit disciplinary conventions. Thus, discursive justification reflects central aspects of scientific practice.

I have highlighted three important properties of scientific justification—namely, that it is *epistemically superior*, *gradable* and *discursive*. Since these properties form part of the epistemic basis of scientific testimony and, therefore, help explain why we value it, they may help guide principles of science reporting.¹³ In particular, I will argue that by reflecting on the nature of scientific justification, *Reliable Reporting* and *Balanced Reporting* may be revised in a manner that alleviates some of their individual problems and resolves the conflict between them.

4 Inclusive Reliable Reporting

As noted, *Reliable Reporting* consists of a positive requirement (report the most reliably based hypotheses) and a negative one (avoid reporting hypotheses that are not reliably based). However, as also noted, the various strands of motivation for *Balanced Reporting* provide some reason to think that the negative component of *Reliable Reporting* is overly categorical.

Fortunately, the three highlighted properties of scientific justification—epistemic superiority, gradability and articulability—provide important bearings for a revision of *Reliable Reporting*. In particular, they may guide a revision that allows the principle to continue to serve its purpose of favoring reliable sources but in a manner that allows a range of perspectives. The core idea of my revision-strategy is to exploit the highlighted properties of the epistemic basis of scientific testimony in public science reporting.

The very idea of reliable reporting as a rationale for favoring scientific testimony is motivated by the assumption that scientific justification is epistemically superior. However, because scientific justification is gradable, it is often possible to indicate the degree of scientific justification that a given hypothesis enjoys. And often,

¹³ A more ambitious suggestion (that I will not rely on here) is the following principle:

Justification Reporting

Science reporters should, whenever feasible, report aspects of the nature and strength of scientific justification or lack thereof for a reported scientific hypothesis.

Since *Justification Reporting* is not required for the ensuing argument, I will not motivate it here (but I do in Gerken forthcoming a, b, c). For those who find it agreeable, it provides a unified rationale for the restrictions of both *Balanced Reporting* and *Reliable Reporting* that I am about to propose.

competing claims may be compared in terms of the degree of scientific justification underwriting them.

One reason why this is possible is that scientific justification is typically discursive justification and, hence, one that may be articulated. Of course, the articulation of the underlying type and degree of scientific justification is not always feasible in science reporting, and, even when it is, simplification is required. Nevertheless, in many conflict cases, it is feasible to compare conflicting claims in terms of their respective scientific justifications, if any.

So, by indicating the nature and strength of the scientific justification for and against competing claims one may, in accordance with the positive component of *Reliable Reporting*, favor the most reliable ones. Recall that we value and privilege scientific testimony because it is epistemically superior in virtue of being underwritten by scientific justification. So, indicating the degree and nature of the scientific justification is perhaps the most straightforward way to favor the epistemically superior source. In consequence, I propose the following revision of *Reliable Reporting*:

Inclusive Reliable Reporting

Science reporters should, whenever feasible, report hypotheses in a manner that favors the most reliably based ones by indicating the nature and strength of their respective scientific justifications.

The idea underlying *Inclusive Reliable Reporting* squarely remains the positive requirement to favor the most reliably based hypotheses in science reporting. But whereas the original principle ruled out reporting differing perspectives and critical opposition, such inclusive scientific reporting is permitted by the present reformulation. However, the principle does not require or even encourage science reporters to report epistemically inferior views. Indeed, the principle is consistent with leaving such views unmentioned in many science communication contexts.

Moreover, *Inclusive Reliable Reporting* provides some specific guidance concerning how reliability or lack thereof should be indicated. This is because the principle requires that science reporting favor the most reliably based hypothesis by indicating the nature and degree of scientific justification for the relevant hypotheses under discussion. Since such indication is a comparative exercise, the reporting will explicitly favor the epistemically strongest hypothesis. Since scientific justification is characterized by its being gradable and discursive, it is, at least in principle, possible to articulate its basic nature and its degree of reliability. Of course, there will be science communication contexts in which it is not feasible to do so in a manner that will indicate the degree of reliability to a layperson audience. This is why the principle is equipped with a ‘whenever feasible’ clause. However, there are many science communication contexts in which it is fairly straightforward to indicate the relevant nature and strength of the scientific justification for a reported hypothesis.

Thus, *Inclusive Reliable Reporting* is, in one sense, weaker than *Reliable Reporting* because it permits (although it does not require) the reporting of less reliable hypotheses and sources. However, it is, in another sense, stronger because it

requires favoring the most reliably based hypotheses in a specific manner—namely, by reporting the nature and strength of the relevant scientific justification.

5 Epistemically Balanced Reporting

Since *Inclusive Reliable Reporting* does not feature a negative component which bans reporting less reliably based hypotheses, one dimension of the conflict with *Balanced Reporting* is resolved. But conflict remains. Specifically, *Inclusive Reliable Reporting* conflicts with *Balanced Reporting*'s requirement that reporting should "not favor any one hypothesis." After all, to present one hypothesis as scientifically justified and another as scientifically unjustified is typically to favor the former in the sense of presenting it in a positive manner that may be reasonably expected to correlate with audience acceptance of it. Likewise, to present one hypothesis as *better* scientifically justified than another is typically to favor it in this sense, and *Inclusive Reliable Reporting* demands this mode of science reporting whenever feasible.

But I submit that this is an upshot that we want. Recall that according to the diagnosis of *Balanced Reporting*, its central problem is that it is often epistemically misleading. Hence, the trouble with *Balanced Reporting* is the component which demands that opposing hypotheses be reported without favoring any one of them. More specifically, given the diagnosis that *Balanced Reporting* tends to be epistemically misleading, the restriction of the mode of presentation should be an *epistemic* one. The aim, then, will be to preserve representation of diverse viewpoints on socially controversial issues in a manner that does not misleadingly present them as epistemic equals when they are not. In slogan:

Balanced reporting should be epistemically balanced.

Of course, the slogan only provides a coarse and, well, sloganistic resolution that immediately raises the following question: *How* should science reporting be epistemically balanced? Of course, this is, to a large extent, a contextual matter depending on practicalities of the journalistic reality. Nevertheless, some principled things may be said, and again it is helpful to reflect on the highlighted properties of scientific justification. Given that scientific justification is gradable and articulable, one can often provide epistemically balanced reporting by indicating the nature and strength of the relevant scientific justification. Given that scientific justification is epistemically superior, one thereby favors the epistemically best hypothesis in cases where views supported by strong scientific justification are in conflict with views that enjoy inferior scientific justification or none at all.

The scientific justification for views that are held on dogma, ideology, speculation or anecdote will be minimal at best, and this too is something that may be reported (For an example, see Sect. 6.1 below). In contrast, scientific views are typically well scientifically justified, and this may often be reported in a manner that is appreciable by laypersons given the fact that scientific justification is discursive in nature.

Thus, reflection on the properties of scientific justification gives us a clue about how *Balanced Reporting* may be restricted in a manner that addresses its problematic features. Specifically, rearticulating *Balanced Reporting* by replacing its second part is a way to provide a concrete epistemic restriction that furthers epistemically balanced reporting. Consequently, I propose the following principle:

Epistemically Balanced Reporting

Science reporters should, whenever feasible, report opposing hypotheses in a manner that reflects the nature and strength of their respective scientific justifications or lack thereof.

Epistemically Balanced Reporting retains what may be recognized as an attractive property of *Balanced Reporting*—namely, that opposing hypotheses be reported such that a wide range of perspectives on an issue may be considered. But it does so in a manner that counters the misleading appearance of epistemic equality between non-equals. This is because *Epistemically Balanced Reporting* also requires that the nature and strength of the scientific justification of relevant views be explicitly reported.

As noted, the principle leaves ample room for different implementations since this is a highly contextual matter that depends on the nature of the news story, the media platform, the target audience and so forth. But, in general, the reporting should optimally take a form that is appreciable by the target audience. This involves appropriate simplifications (Miller 2009). Far more controversially, it might involve value-based reporting (Kahan 2015; Dixon et al. 2017). Finally, *Epistemically Balanced Reporting* is compatible with, but does not entail, no-platforming policies for hypotheses that do not meet a minimal threshold of scientific justification (Simpson and Srinivasan 2018; Levy 2019). That is, the principle does not require that two opposing hypotheses be reported. What it requires is that insofar as the opposing hypotheses are reported, this is done by indicating the strength and nature of the scientific justification. For example, *Epistemically Balanced Reporting* does not require that flat Earth theories be reported in a story about tectonic plate movement. What it requires is that it be clarified that there is no undefeated scientific justification for such theories insofar as they are reported in the story.

In general, then, *Epistemically Balanced Reporting* does not do all the work in editorial decisions about what to include. Moreover, there is a step from *Epistemically Balanced Reporting* to specific editorial guidelines for science writers and their editors. What the principle aims to provide is a philosophical foundation in terms of a norm. Building concrete editorial guidelines on this basis requires extra-philosophical work that journalists are better equipped to carry out.¹⁴

However, *Epistemically Balanced Reporting* does include some specifics about implementation that distinguish it from existing proposals that are sometimes labeled *Weight-of-Evidence Reporting* (Dunwoody 2005; Dixon and Clarke 2013;

¹⁴ That said, I have presented *Epistemically Balanced Reporting* to science journalists (see the acknowledgements section) who have generally responded that they found it useful as stated.

Clarke et al. 2015a, b; Dunwoody and Kohl 2017). *Weight-of-Evidence* approaches also focus on reporting the strength of evidence, but they often recommend doing so via consensus reporting. Consequently, Dunwoody and Kohl recommend a relabeling: “Although this concept has been labeled “weight of evidence” in past studies, we relabel it here “weight of experts” to more accurately capture its emphasis on communicating the distribution of expertise rather than evidence per se” (Dunwoody and Kohl 2017: 339).

In contrast, the present principles focus on reporting the strength of the scientific justification by explicitly reflecting its nature in a manner appreciable by the target audience. This makes a real difference in terms of implementation. For example, *Epistemically Balanced Reporting* recommends noting in laypersons’ terms that a hypothesis is warranted by, for example, a randomized controlled clinical trial and explaining, again in a simplified manner, why this provides fairly strong scientific justification. In contrast, *Weight-of-Experts* approaches (even if labelled *Weight-of-Evidence*) focusing on consensus recommend reporting agreement among scientists. Although scientific consensus typically does indicate strong epistemic justification, consensus reporting has been criticized on the grounds that laypersons may see it as indicating partisan values rather than epistemic strength (Kahan 2017; Kovaka forthcoming; Gerken forthcoming a, b). Nevertheless, consensus information may have a place in science reporting as it may work in unison with a focus on scientific justification. Specifically, a focus on scientific justification may explain the basis of scientific consensus (Gerken forthcoming a, b).¹⁵

Importantly, a good deal of evidence indicates that laypersons are receptive to reported specifics about scientific justification. Of course, the principles set forth here are novel and, hence, not yet directly tested. But indirect empirical support may be extrapolated from existing empirical research given some auxiliary assumptions. For example, studies showing an impact of reporting scientific explanations support that laypersons appreciate justification given the auxiliary assumption that reporting a scientific explanation is akin to reporting abductive scientific justification (McCain and Poston 2014; McCain 2015). Let’s consider some of this evidence (for elaboration, see Gerken forthcoming a, b).

In a recent study, Ranney and Clark found increased acceptance that AGW is real when participants were exposed to mechanistic explanations of the greenhouse effect or statistical data (Ranney and Clark 2016. See also Clark et al. 2013). Other studies have found a positive effect of climate change knowledge on Australian lay participants’ beliefs about the “causes and consequences of climate change” (Guy et al. 2014), and similar effects were found among US undergraduate students (Bedford 2015). Another study found that focusing on an argument’s mechanistic explanatory power led to a reduction in biased evaluations among both Democrats

¹⁵ There are differences between existing versions of *Weight-of-Evidence Reporting*, with (Dixon and Clarke 2013; Clarke et al. 2015a) aligning more with the present approach than (Dunwoody and Kohl 2017). However, the ‘Evidentiary Balance’ condition in (Clarke et al. 2015a) includes a mix of justification reporting and consensus reporting (see also Clarke et al. 2015b). So, Clarke et al.’s empirical evidence only provides *indirect* evidence for *Epistemically Balanced Reporting*, which may be seen as forming a specific brand of *Weight-of-Evidence Reporting* or as a broadly congenial alternative to it.

and Republicans, and the author hence recommended including mechanistic explanations in science reporting (Johnson 2017). Clarke and colleagues found that participants in conditions highlighting the strength of evidence and scientific consensus were more certain that there is no correlation between vaccines and autism than participants who received “controversy-based” information (Clarke et al. 2015a). Finally, Wood and Porter tested 10,100 participants on 52 divisive topics and found impressive evidence that “By and large, citizens heed factual information, even when such information challenges their ideological commitments” (Wood and Porter 2019). These studies and others indicate that articulating select aspects of the scientific justification in science reporting may be an effective communication strategy. Of course, we should not expect that doing so will resolve all challenges of science communication, and some challenges will be discussed below. But although it would be premature to draw overly strong conclusions from the available empirical work on science reporting, the noted findings may be taken to lend some empirical support to *Epistemically Balanced Reporting*. Overall, then, there is a considerable case for *Epistemically Balanced Reporting* that derives from both philosophy of science and empirical work on science communication.

6 Limitations and challenges

I would be a bad proponent of *Epistemically Balanced Reporting* if I did not recognize a number of challenges to it. So, in this section, I will try my hand at modesty in the age of overselling by noting some of the limitations of *Epistemically Balanced Reporting*. In doing so, I hope to begin to distinguish science communication contexts in which *Epistemically Balanced Reporting* should be waived from those in which it is reasonable.

6.1 Feasibility

Epistemically Balanced Reporting may be waived if it is infeasible to articulate the relevant justification. In such cases, it may often be reasonable to let *Inclusive Reliable Reporting* trump *Epistemically Balanced Reporting*. Without attempting a taxonomy, we may recognize three obstacles to the feasibility of articulating the relevant justification. The first obstacle is that science reporters often lack the expertise to acquire the relevant scientific justification well enough to report it with reasonable accuracy. The second obstacle is that on many media platforms, space or time only allows for reporting *the finding*. The third and related obstacle is that science journalists are operating in an attention economy insofar as they need to generate a reasonably high level of attention (Dunwoody 2014; Figdor 2017). Insofar as simply reporting a (novel and surprising) finding tends to be more clickable than reporting the nature and degree of justification for it, journalists are under pressure to produce the former type of reporting. Relatedly, some media owners may, for reasons having to do with profit or politics, not share the norms set forth here.

Nevertheless, the articulation of scientific justification in a manner comprehensible to laypersons may reasonably be regarded as a defeasible guideline that reflects an important ideal of science reporting. Moreover, the infeasibility of providing at least some discursive justification for reported claims is frequently overestimated. I do not say that the task is an easy one since it involves both some substantive insight and a great deal of pedagogical sophistication. However, it is far from a practically impossible one, and skilled science journalists provide daily evidence of the feasibility of not merely reporting scientific findings but also the justification for them. So, in many science communication contexts, it is perfectly feasible to indicate the respective scientific justifications for diverging scientific hypotheses. Indeed, part of the journalistic work consists in finding the right level of reporting of scientific justification that is appropriate to the science communication context. This involves considerations pertaining to the platform, target audience, general news criteria and such. It would be hubristic to think that philosophy of science may guide the context-dependent details of these journalistic tasks. Thus, the present principles do not speak to these aspects of their implementation. But, again, skilled science journalists are capable of differentiating the reporting of scientific justification depending on platform and context.

For example, a CNN story ‘MMR vaccine does not cause autism, another study confirms’ details a nationwide cohort study (Hviid et al. 2019). Apart from emphasizing the large scale of the cohort study, Wakefield’s 1998 study, which linked autism to the MMR vaccine, is discussed and dismissed: “Wakefield altered or misrepresented information on the 12 children who were the basis for the conclusion of his study” (CNN 2019). Moreover, the counter-evidence is presented, in part, by a medical expert who is cited as saying, ““At this point, you’ve had 17 previous studies done in seven countries, three different continents, involving hundreds of thousands of children”” (CNN 2019).

Given the format of the story, *Epistemically Balanced Reporting* is implemented in a sparse way insofar as it flags the autism hypothesis as “a myth” and explicates specific reasons why the scientific justification for the hypothesis is entirely discredited. Perhaps one could wish for more detail about the scientific justification. On the other hand, the sparse implementation may be appropriate, or the only thing feasible, in a short news story that involves science reporting, but which primarily aims to inform about vaccines, not the science of vaccines.

However, more dedicated science reports about the vaccine-autism hypothesis provide more detail about the nature and strength of the scientific justification against the hypothesis and the feeble nature of the alleged scientific justification for it. Examples that feature plenty of such science reporting are *BBC Radio 4’s* half-hour ‘Science Betrayed’ (BBC 2011) and *BBC 4’s* hour-long ‘*In the wake of Wakefield*’ (BBC 2018b). These science reports address specifics of Wakefield’s 1998 study and its flaws, such as cherry-picking participants, misrepresentation of the timing between MMR vaccination and onset of symptoms of autism etc. This is juxtaposed with scientific justification against the autism hypothesis—numerous replication failures, meta-studies etc.

Finally, it is worth considering types of science reporting that go beyond science reporting in news media. Examples include information about vaccine safety

provided by health organizations and hospitals. For example, the website of *Children's Hospital of Philadelphia* addresses the autism concern by explaining that in support of the autism hypothesis, “Dr. Wakefield described 12 children with developmental delay—eight had autism. All of these children had intestinal complaints and developed autism within 1 month of receiving MMR” (Children’s Hospital of Philadelphia 2018). The text then outlines the reasons why the study was retracted. For example, it explains that the first symptoms of autism should be expected after receiving MMR simply due to the age at which it is received and notes that “determination of whether MMR causes autism is best made by studying the incidence of autism in **both** vaccinated and unvaccinated children. This wasn’t done” (Children’s Hospital of Philadelphia 2018). The rebuttal of Wakefield’s 1998 and 2002 articles is juxtaposed with simple descriptions of studies providing scientific justification against the hypothesis—large-scale cohort studies, meta-analysis etc. While the example represents a mix of science reporting and scientific expert testimony, I include it to illustrate that *Epistemically Balanced Reporting* can serve a variety of science communication contexts.

These examples represent how it is feasible to implement *Epistemically Balanced Reporting* in various kinds of science reporting. I have just considered a few cases, but it should be clear that context and platform determine the degree of elaboration of scientific justification. In particular, the cases exemplify that *Epistemically Balanced Reporting* clearly favors a hypothesis by comparing the strength and nature of the scientific justification for and against it in laypersons’ terms. Such explications of scientific justification may rely implicitly or explicitly on devices, such as the *Levels of Evidence Pyramid*, which are popular in communicating medical sciences (Berlin and Golub 2014; Murad et al. 2016). While philosophers of science may find much to criticize in such devices, they may be helpful for science communication because they allow for comparisons of scientific justification.

Finally, the examples illustrate how *Epistemically Balanced Reporting* permits an important type of science reporting—namely, the *rebuttal*—that a complete ban on balance appears to rule out. Since I take myth-busting to be an important form of science reporting, I take the fact that it standardly exemplifies *Epistemically Balanced Reporting* to be a point in favor of the principle.

But while *Epistemically Balanced Reporting* is compatible with the best contemporary science reporting, it conflicts with other prominent science reporting practices. For example, science communicators sometimes opt to provide balanced reporting without any attempt at epistemic balance. They simply report both sides without favoring any one of them. In other such contexts, science communicators exclusively report the hypothesis that they regard as the most reliable one. However, the arguments for *Epistemically Balanced Reporting* suggest that to restrict oneself to these two options is to presuppose a false dilemma. Within many science communication contexts, it is often feasible to report both hypotheses in a manner that makes it clear that they differ—perhaps radically—in the scientific justification that they enjoy.

So, it should be granted that there are science communication contexts in which it is not feasible to report the nature or degree of scientific justification. But it is crucial to recognize that there are also contexts in which the perceived infeasibility

of doing so leads science communicators to omit information about scientific justification. In such cases, *Epistemically Balanced Reporting* provides an important ideal that science reporters should take into account. More generally, the feasibility clause should not be taken to suggest that it is *easy* to override *Epistemically Balanced Reporting*. In many cases, science reporters who fail to articulate the nature and strength of the relevant scientific justification simply fail to approach an important normative ideal. In other cases, science reporters approach the ideal to varying degrees.

So, while challenges pertaining to the feasibility of following *Epistemically Balanced Reporting* in practice should not be ignored, the ideal that the principle articulates should not be ignored either. The principal contribution of philosophy of science is often to articulate ideals for scientific practice—including the practice of public scientific testimony. Even if an ideal cannot always be reached in practice, it may provide an important practical bearing for science reporting. It may do so directly or it may be helpful in implementing more concrete workable guidelines, such as editorial guidelines.

However, *Epistemically Balanced Reporting* is not merely an overly abstract normative ideal that cannot gain any traction with journalistic practice. Reflection on the most egregious examples of balanced reporting indicates that some contemporary science reporting is still guided by a misguided principle of *Balanced Reporting*. In contrast, reflection on some of the best science reporting indicates that there are plenty of science communication contexts in which it is practically feasible to indicate the nature and degree of the scientific justification of opposing views. Consequently, *Epistemically Balanced Reporting* may sometimes serve as a guideline for science reporting.

6.2 Motivated cognition

Roughly, motivated cognition is the tendency to privilege or discard information such that one's antecedent views are favored (Kunda 1990; Hart and Nisbet 2012; Sinatra et al. 2014). In the science of science communication, much attention has been given to a specific variety of motivated cognition labelled *identity-protective cognition*. This is, roughly, reasoning that concerns antecedent views or presuppositions that are central to the protection of the subject's social identity (Sherman and Cohen 2006; Kahan et al. 2011, 2012; Lewandowsky et al. 2018).

These psychological phenomena constitute important obstacles for science communication about divisive matters and the idea of balanced reporting. After all, deniers of AGW, for example, will be apt at finding problems with the justification for the thesis that AGW exists and may regard any reported justification for its denial as vindicating their antecedent view. So, motivated cognition may be seen as a reason to ban balanced science reporting on divisive issues.

However, while motivated cognition presents a tenacious problem, it would be an overreaction to take it as a reason to reject *Epistemically Balanced Reporting*. Although *Epistemically Balanced Reporting* is by no means immune to the problem of motivated cognition, it may be a reasonable science communication strategy compared to the alternatives. As mentioned, one prominent alternative to *Balanced*

Reporting—namely, *Consensus Reporting*—is the view that science reporters should, whenever feasible, report the scientific consensus or lack thereof for a reported scientific view. However, science communication guided by *Consensus Reporting* has been empirically argued to trigger motivated reasoning (Hart and Nisbet 2012; Kahan et al. 2011). In fact, some evidence suggests that consensus reporting may generate so-called *backfire effects* that consist in further polarization and perhaps even decreased trust in public scientific testimony (Nyhan and Reifler 2010; Hart and Nisbet 2012; Kahan et al. 2011).

In contrast, the noted empirical work indicating that laypersons are responsive to discursive justification in science reporting does not indicate any backfire effects (Ranney and Clark 2016; Guy et al. 2014; Bedford 2015; Johnson 2017). In this regard, the noted 10.100 participant study of 52 divisive issues deserves particular attention since it provided virtually no evidence of a backfire effect, leading Wood and Porter to conclude that “The backfire effect is far less prevalent than existing research would indicate” (Wood and Porter 2019). Overall, the currently available evidence suggests that motivated cognition should be taken seriously but also that its impact should not be overestimated. While motivated cognition may *impede* epistemically balanced science reporting, it is unlikely to render it a counterproductive and polarizing communication strategy.

In this context, it is important to note that *Epistemically Balanced Reporting* and *Inclusive Reliable Reporting* do not merely reflect a so-called ‘deficit model’ according to which one only needs to supply laypersons with the missing scientific facts (for criticism, see Sturgis and Allum 2004; Weber and Stern 2011; Keren 2018). Explicating the nature and strength of the scientific justification is very different from merely supplying the scientific findings. As noted, much of the empirical work suggests that science reporting is effective when it includes scientific justifications in a proper format (e.g., in terms of mechanistic explanations, Johnson 2017). Indeed, the available evidence suggests that science reporting that heeds *Epistemically Balanced Reporting* can have a positive effect and no backfire effects in many science communication contexts.

In sum, *Epistemically Balanced Reporting* will by no means resolve all the problems that arise from motivated cognition and identity-protective cognition. But it fares comparatively well with regard to these tenacious general problems (Gerken forthcoming a, b). So, *Epistemically Balanced Reporting* may be seen as an important component in a comprehensive strategy for addressing problems arising from motivated cognition.

7 Concluding considerations

My central conclusion is not that *Inclusive Reliable Reporting*, *Epistemically Balanced Reporting* or their combination should be seen as a “silver bullet” that may resolve all the challenges of science communication. Nevertheless, they improve on *Reliable Reporting* and *Balanced Reporting* in a manner that renders their underlying ideas and motivations compatible. As such, they provide a philosophically principled answer to *The Question of Balance* that is informed by

both empirical work and philosophy of science. In particular, the conflict is resolved in a unified manner because both principles are revised by appealing to the same general features of scientific justification.

This resolution to *The Question of Balance* is important because it provides some broad principles for science reporting. But it is also important because it provides a central piece of the larger puzzle that consists in reconciling the authority of expertise with a respect for diverse viewpoints (Longino 1990, 2002; Kitcher 2011). The present proposal provides space for different perspectives, but it differentiates between them in a manner that respects the epistemic authority of science.

The two revised principles reflect on the nature of scientific justification in a unified manner, and they have some empirical support. Moreover, they are not radically revisionary insofar as they are congenial to some of the best existing public science reporting—including rebuttals, myth busting etc. However, I have sought to be forthright that the principles will not resolve all the challenges of science reporting. Further progress requires both empirical investigations concerning the folk epistemology of laypersons' reception of scientific testimony as well as philosophical developments concerning, for example, the structure of scientific justification. Yet further investigations may explore how the issue connects to epistemic injustice (Gerken forthcoming b). Thus, the present paper indicates that philosophers of science and social epistemologists should engage with the rich body of empirical work on science communication. But it also emphasizes how philosophy may contribute to the interdisciplinary science of science communication.

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