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On the Harms of Agnotological Practices and How to Address Them

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Abstract

Although science is our most reliable producer of knowledge, it can also be used to create ignorance, unjustified doubt, and misinformation. In doing so, agnotological practices result not only in epistemic harms but also in social ones. A way to prevent or minimize such harms is to impede these ignorance-producing practices. In this paper, I explore various challenges to such a proposal. I first argue that reliably identifying agnotological practices in a way that permits the prevention of relevant harms is more difficult than it might appear. I focus on an identifying criterion that many find apt for the task: bad faith motives. I then consider an objection --that reliable criteria are unnecessary to successfully address the concerns raised by agnotological strategies-- and I show that it fails. I conclude by exploring other ways of conceptualizing the problems attributed to agnotological practices. In particular, I challenge the focus on misinformation as the main problem of concern.

Keywords: agnotological practices; ignorance-producing research; scientific dissent; bad faith motives; misinformation; trust

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Introduction

Science is arguably one of our most reliable producers of knowledge. Nonetheless, evidence shows that laypeople often hold beliefs that are inconsistent with current scientific knowledge. For instance, only about 57% of adults in the USA believe that human activity plays a primary role in climate change (Marlon et al. 2022). 23% believe that there is a lot of disagreements among scientist about whether climate change is occurring (Marlon et al. 2022). The scientific community, however, overwhelmingly agrees that climate change is happening and that anthropogenic factors are a major cause. Likewise, although most people around the world hold favourable views of the preventative health benefits of childhood vaccines, pluralities of people in many countries –indeed, in some cases majorities-- see vaccines as involving medium or high levels of risks (PEW 2020). Many people also have doubts regarding the safety and efficacy of Covid-19 vaccines (Cascini et al. 2021, Norhayati, Yusof, and Azman 2022). On the other hand, the scientific community takes vaccines in general, and childhood vaccines in particular, to be one of the most safe and cost-effective public health interventions in the last century, with millions of lives saved (Whitney et al. 2014, Li et al. 2021).

There is a recognition that various and complex factors are likely to play a role in general differences in knowledge between publics and the scientific community, including educational attainment, familiarity with trusted sources of information, political affiliation, social identity, and religious beliefs (Horne and Kennedy 2019, Hornsey 2021, Lewandowsky 2021, Brown, Brown, and Kaiser 2021, Tremoliere and Djeriouat 2021, Goldenberg 2021). But recent research in the humanities and the social sciences has also called attention to another factor also likely responsible for what appears to be a lack of uptake of scientific knowledge: agnotological practices¹, that is, strategies aimed at producing or maintaining ignorance regarding scientific claims (Proctor 2008).

Various cases exemplify these strategies. Well-know is the tobacco industry's campaign against the health hazards of smoking. Using a variety of science-based mechanisms, such as emphasizing scientific uncertainty, funding friendly research, recruiting prominent scientists, or attacking unfavourable scientific research, the tobacco industry created misinformation and doubt about the negative health effects of smoking (McGarity and Wagner 2008; Michaels 2008; Oreskes and Conway 2010; Proctor 2011; Fernández Pinto, 2017). Similar strategies have also been employed by the oil industry and conservative think-tanks in their attempts to generate misinformation

¹ Although strictly speaking the term “agnotological” means the study of ignorance, many working on these topics use “agnotological practices” to mean “ignorance-producing practices.” I use it here in that sense.

regarding human responsibility for climate change (Dunlap and McCright 2010, Oreskes and Conway 2010, Mann 2021). The more recent discovery about the influence of the pharmaceutical industry in the opioid crisis constitutes another example of the role that ignorance-producing practices can have in creating inaccurate beliefs regarding the benefits and harms of particular products (Macy 2018, Marks 2020, Makhinson et al. 2021).

Importantly, and alarmingly, these cases show that science and its various institutions can be producers of misinformation and distortion. The authority of science can thus be used to create confusion and false beliefs regarding scientific claims, the degree of consensus, and the state of the evidence (McGarity and Wagner 2008, Michaels 2008, Oreskes and Conway 2010, Proctor 2011, Macy 2018). Furthermore, insofar as these agnotological practices employ aggressive and politically charged communications strategies, they can create a context in which scientists feel intimidated, slowing or impeding scientific progress (Biddle and Leuschner 2015).

But epistemic harms are not the only damages resulting from these strategic ploys. Indeed, of particular concern for many science studies scholars has been a social harm produced by agnotological strategies. Because scientific consensus is often thought important for legitimately grounding policy decisions (Jasanoff 2010), ignorance-producing practices can influence the public and policymakers' support for certain public policies (McGarity and Wagner 2008, Omer et al. 2009, McKee and Diethelm 2010, Oreskes and Conway 2010, Kearns, Glantz, and Schmidt 2015, Spithoff et al. 2020). Evidence exists, for instance, that many people are unwilling to back up policies and actions that would contribute to ameliorate climate change, such as regulation of CO₂ as a pollutant or setting strict CO₂ limits on existing coal-fired power plants (Marlon et al. 2022). Or consider the institutional support for the expansion of opioid treatment (Chidgey, McGinagle, and McNaul 2019, Spithoff et al. 2020).

As this brief summary shows then, these types of agnotological practices can have negative epistemic and social impacts. A possible solution to this state of affairs then would be to eradicate these practices. In this paper I explore various challenges to such a proposal. First, I argue that finding criteria to reliably identify agnotological strategies in a way that permits the prevention of relevant harms is more difficult than it might appear. I focus on a criterion that many take as particularly apt for the task: bad faith motives and I show that it cannot do the work. I then consider an objection --that reliable criteria are unnecessary to successfully address the concerns raised by agnotological practices-- and I show that it fails. I conclude by exploring other ways of conceptualizing the problems attributed to this type of practices that are likely to be more fruitful. In particular, I challenge the assumption that misinformation resulting from ignorance-producing strategies is the main problem of concern.

Identifying Agnotological Practices

Epistemology and philosophy of science have traditionally been primarily concerned with knowledge and knowledge production and have neglected ignorance and how it can be promoted and maintained. Feminist and race theorist work has begun to correct this neglect (Mills 1997, Sullivan and Tuana 2007, Proctor and Schiebinger 2008, Fricker 2007, 2016, Townley 2011, Medina 2016). Agnotology scholars have called attention to the social construction of ignorance, the conscious and unconscious ways in which ignorance is produced, and the structural mechanisms that contribute to, or actively create ignorance (Proctor 2008).

Ignorance can be understood as a natural product, the starting point from which knowledge can be acquired. So conceptualized, ignorance is a void that science helps to fill (Proctor 2008). Ignorance is also the accidental result of the essential selectivity of knowledge production, that is, of who becomes a scientist, what lines of research are of interest to scientists, what gets funded, and so on (Proctor 2008). But ignorance can also be intentionally created and maintained with the purpose of promoting certain interests (Proctor 2008). Ignorance can be created as a strategic ploy at least in part precisely because ignorance is taken to be a state that can be solved only by conducting more scientific research. Examining how science can be co-opted to produce ignorance has been of particular relevance to science studies scholars (McGarity and Wagner 2008, Michaels 2008, Proctor and Schiebinger 2008, Oreskes and Conway 2010, Frickel et al. 2010, Proctor 2011, Kleinman and Suryanarayanan 2013, Elliott 2013, Nik-Khah 2014, Fernández Pinto 2019, Kourany and Carrier 2020).

Presumably, putting a stop to these agnotological practices would prevent or minimize the epistemic and social harms they ostensibly create (McGarity and Wagner 2008, Michaels 2008, Oreskes and Conway 2010, Proctor 2011, O'Connor and Weatherall 2019). Thwarting these ignorance-producing practices calls for some way to detect them. Arguably, whatever criterion is used to detect agnotological strategies must meet at least two related conditions. First, to avoid the possibility of incorrectly categorizing some research as suspect (i.e., a ploy to produce ignorance), identifying criteria should be reliable. Otherwise, we run the risk of impeding scientific and social progress by incorrectly considering some research as ignorance producing when it is not. Second, such criterion must be able to identify problematic research early enough to prevent or minimize the epistemic and social harms it can produce. That is, the criterion or criteria in question must allow us to predict—before significant harms have occurred—that some research might be ignorance-producing.² Unfortunately, this task is more challenging than it might appear. This is so for several reasons.

² Although after-the-fact analyses can be quite valuable, if what we want is to prevent or minimize relevant epistemic and social harms, then we need criteria that are applicable in a forward-looking way.

First, agnotological practices can take various forms. Much attention has been given to the ways in which the tobacco and oil industries, for instance, have used science to promote normatively inappropriate dissent (de Melo-Martín and Intemann 2018). The production of such dissent had as its main goal to undermine the scientific consensus --and with it, to cast doubt on particular policies that harm those industries' interests (McGarity and Wagner 2008, Michaels 2008, Oreskes and Conway 2010, Proctor 2011, Biddle and Leuschner 2015, O'Connor and Weatherall 2019). Multiple strategies have been used, from funding research friendlier to the industry's interests and recruiting reputable scientists to support favourable findings, to attacking scientific results that they saw as harmful to the companies' bottom line and disseminating studies that exaggerated uncertainty. In these cases, ignorance is created by using science to generate doubt regarding a scientific consensus, e.g., about the health harms of smoking or the contribution of fossil fuels to climate change.

But industry has also used science to promote ignorance not by creating normatively inappropriate dissent but by producing a scientific consensus.³ Consider, for instance, the successful attempts by the sugar industry to produce ignorance in this way. Documents show that in the 1960s and 1970s the sugar industry sponsored a research program that promoted fat and cholesterol as the main culprits in coronary heart disease, thus effectively concealing the role of sucrose (Kearns, Schmidt, and Glantz 2016).⁴ Similarly, evidence shows that the pharmaceutical industry also contributed to a scientific consensus that minimized the risks of prescription opioid addiction and overstated the benefits of these drugs (Makhinson et al. 2021, Spithoff et al. 2020, Chidgey, McGinagle, and McNaull 2019, deshazo et al. 2018, Macy 2018). In the 1990s, reasonable concerns about undertreatment of pain in many patients, led the influential American Pain Society in 1996 to propose that pain should be treated as a "fifth vital sign." Other medical societies, as well as healthcare organizations such as Veterans Affairs, and regulatory organizations such as the Joint Commission supported the "pain is the fifth vital sign" campaign (Chidgey, McGinagle, and McNaull 2019). At the same time, the pharmaceutical industry began a widespread, aggressive marketing campaign to promote long-term use of opioids to treat noncancer pain. The campaign minimized the risks of addiction and exaggerated the benefits of opioids in the treatment of pain (Makhinson et al. 2021, Spithoff et al. 2020, Chidgey, McGinagle, and McNaull 2019, deshazo et al. 2018, Macy 2018). Additionally, drug manufacturers funded publications and physician presentations to encourage the expanded use of opioids for pain control. Evidence also shows that the industry influenced the content of clinical practice guidelines that helped to promote an expanded use of opioids (Spithoff et al. 2020). Here science is employed in the service of consensus formation.

Second, as agnotology scholars acknowledge, although in some cases, the research results produced or disseminated to create dissent or to promote consensus are

³ I do not mean to imply that these strategies, e.g., promoting dissent, producing a consensus, are always independent strategies.

⁴ Although see (Johns and Oppenheimer 2018) for a challenge to these claims.

false or misleading, scientific evidence need not always be unsound in order to create ignorance. For example, the research funded by the sugar industry that showed that fats were involved in coronary disease, arguably provided epistemically sound results, even when it also worked to impede or limit research on the harms of sugar products (Kearns, Schmidt, and Glantz 2016). Hence, the epistemic quality of ignorance-producing research varies too.

Third, the types of harms that agnotological practices can produce are also quite diverse. Clearly, insofar as these practices produce misinformation, they can lead people to have false beliefs about particular scientific claims, the strength of the evidence, the degree of consensus, etc. Hence, agnotological strategies create epistemic harms. When ignorance-producing research is promoted aggressively, it can also create other epistemic harms. It can intimidate scientists conducting research in relevant areas, leading them to abandon research that create confrontation, or to defend their hypotheses less forcefully than they otherwise believe is appropriate (Biddle and Leuschner 2015). Moreover, insofar as inaccurate or false beliefs resulting from ignorance-producing research serve as guide to peoples' actions, agnotological practices can result in harms to people's health (Humphreys et al. 2022, Chigwedere et al. 2008). To the extent that such beliefs steer people to oppose policies that could minimize some harms, e.g., regulations on smoking, restrictions on CO₂, or lead them to support policies that contribute to harms, these practices can have further detrimental effects on people's wellbeing as well as that of the planet and other creatures (Proctor 2011, Michaels 2008, McGarity and Wagner 2008, Oreskes and Conway 2010, Chigwedere et al. 2008, Kearns, Glantz, and Schmidt 2015, Humphreys et al. 2022, Spithoff et al. 2020). Agnotological practices could also contribute to furthering injustices. For instance, some have argued that dissent on the existence of gender bias in society in general and academia in particular, contributes to the exacerbation of such biases and the injustices they promote (Leuschner and Fernandez Pinto 2021).

Despite these challenges, one might argue that it is possible to offer criteria that can reliably identify ignorance-producing research in a way that permits the prevention of relevant harms. Several of these criteria have been considered and found wanting.⁵ For instance, some have proposed that suspect research could be identified by determining whether such research has followed traditional norms of engagement for fruitful discussions about competing scientific views, such as maintaining shared standards, engaging in uptake of criticism, and having appropriate expertise (Longino 1990; Longino, 2002, Solomon, 2001, Kitcher, 2011, Borgerson, 2011; Harker, 2015, Cook et al., 2016). However, what these various norms actually involve is not straightforward. Under some reasonable interpretations the use of these norms to determine whether some research is ignorance producing is likely to identify as suspect research that is actually epistemically valuable. Under other interpretations, however, these norms fail to

⁵ For an detailed discussion of various criteria that have been proposed to reliably identify agnotological practices that attempt to undermine scientific dissent and a challenge to those criteria see (de Melo-Martín and Intemann 2018, chs.3-5).

pinpoint some of the very cases of research that some consider paradigmatic cases of ignorance-producing research, such as research undermining climate change claims and research on GMO risks (de Melo-Martín and Intemann, 2018, ch.4). Likewise, the inductive risk account (Biddle and Leuschner 2015) also fails to offer reliable criteria for ignorance-producing research. This is so because this account relies on shared standards in science, which, as mentioned above, does not work as a reliable criterion. Moreover, because of reasonable ambiguities present in judgments about inductive risks, this account also turns out to present serious problems in practice (de Melo-Martín and Intemann, 2018, ch. 5).

Let me now address in more detail another criterion often used, implicitly or explicitly, to identify ignorance-producing research: the presence of bad faith motives. Despite the recognized problems with this criterion, it deserves attention for several reasons. First, it seems to attend precisely to what is really wrong —epistemically and ethically—with ignorance-producing research: bad faith motives. It seems intuitively correct that research motivated exclusively by non-epistemic aims, or by motives incompatible with the epistemic goals of science, such as confusing the public or deceiving the scientific community and policy makers will be unlikely to promote scientific progress. Second, the cases that have occupied the attention of agnotology scholars, e.g., tobacco, climate change, some pharmaceutical research, are characterised as involving bad motives. What all of these cases seem to have in common is the fact that science is used not to help advance scientific knowledge, but rather as a ploy to obtain some other objectionable goal: to confuse the public, stall policies, promote particular ideological views, or safeguard profits (Michaels 2008, McGarity and Wagner 2008; Harker 2015, Oreskes and Conway 2010; Proctor 2011; Biddle and Leuschner 2015; Fernández Pinto, 2017).⁶ Third, the description of ignorance-producing research as a strategic ploy, itself betrays the relevance of motivations for this type of research. Fourth, that this criterion deserves attention is further evinced by the discussion on scientific and other types of misinformation. The literature on misinformation and related terms, i.e., disinformation, malinformation, makes intentions crucial to their identification. In particular, disinformation and malinformation are defined as the *intentional* sharing of false or distorted information to harm, mislead the public, advance political goals, and the like (Wardle & Derakhshan, 2017; Bennett & Livingston, 2020; Posetti & Bontcheva 2020; Gradon et al. 2021; Greene & Murphy, 2021; Lewandowsky, 2021; León et al 2022).

In spite of its continuous prominence, and as intuitive as the use of bad faith motives as a criterion to identify ignorance-producing research might be, it is not obvious why motives or intentions – both appropriate and inappropriate – are relevant to the

⁶ I do not mean to suggest that all of these authors have taken the research mentioned to be suspect only on grounds of bad faith motives. In fact, several of them have proposed other criteria in part because they recognize the problems that bad faith motives have as a criterion to reliably identify ignorance-producing research. I am simply calling attention to the intuitiveness of motivation as grounds for considering some research problematic.

epistemic value of research (de Melo-Martín and Intemann 2018, ch. 3). People's motives are distinct from their actions and from the consequences that follow from those actions. Although some might intend to simply confuse the public or policy makers rather than to generate knowledge, that they intend such things does not entail that the research in question cannot contribute to scientific progress. Indeed, as mentioned earlier in the case of the sugar industry's actions, suspect research can produce sound claims even when bad motives underlie the production of the research in question. It is true that motives can be predictive of the consequences of one's actions. If one intends to produce unsound research one is likely to use inappropriate methodologies or can simply fabricate data. Still, the unsound research is the problem.⁷

Moreover, even if one were to agree that motives are relevant to the epistemic soundness of research, attention to motives is unhelpful in reliably identifying agnotological practices in a way that permits the prevention of relevant harms (de Melo-Martín and Intemann 2018, ch. 3). Determining someone's motivations is a difficult task. We do not have access to people's minds and those with bad motives have an interest in hiding them. Furthermore, it is not clear whose intentions must be considered when assessing research that attempts to inappropriately undermine or consolidate scientific consensus. Science is a social enterprise. Scores of researchers are often involved in producing research and their intentions may be varied. Additionally, independently of the intentions of scientists conducting the research, many others, scientists and non-scientists, can use scientific results in various ways. Relevant parties can thus have conflicting motives some of which will be consistent with the epistemic and social goals of science while others will not.

One might argue that the difficulty in determining motivations is overstated, after all, the intentions in cases such as the ones discussed above, e.g., the tobacco, oil, and pharmaceutical industry, were obvious and well documented. This is true. However, notice that evidence regarding the clearly problematic motivations in these cases became public many years after the research had been conducted. More importantly for our case, they were known long after ignorance-producing research had already had considerable adverse epistemic and social impacts. Hence, though bad faith motives can be helpful in explaining why such research is appropriately characterized as ignorance-producing, it could not be used as a way to prevent the problems that the research created. Of course, learning about the bad faith motives of these industries has provided invaluable evidence that can minimize their continuous influence and help achieve at least some redress (Healton, Pack, and Galea 2019, Dyer 2022). But if our goal is to prevent the pernicious epistemic and social consequences agnotological practices presumably create, then what is needed is finding out about these motivations early enough.

Some contend that we can preventively determine research practices motivated by bad faith by attending to some of their features, such as the presence of financial

⁷ Of course, intentions are relevant to judgments about agents' moral culpability.

conflicts of interest, the focus on persuading policymakers or the public instead of the scientific community, or the emphasis on providing dissenting views without offering any real positive alternatives (Harker 2015). But none of these features are reliable indicators of the presence of bad faith motives (de Melo-Martín and Intemann 2018, ch. 3). As the increasing occurrence of conflicts of interest in science show, the mere existence of conflicts of interest need not result in biased or otherwise epistemically invalid research. Obviously, scientists with financial interests can be motivated by appropriate epistemic intentions. Likewise, there can be legitimate reasons for presenting research in public venues and targeting lay audiences for attention. For instance, groups whose epistemic authority is not acknowledged by the scientific community, often because such communities might lack the kind of expertise many researchers believe is required for a meaningful scientific debate, can try to get the attention of the scientific community by engaging the public (Epstein 1996). And of course, sometimes calling attention to limitations in evidence or questioning the methodologies used to support certain scientific claims is perfectly appropriate, even if a clearly developed alternative is not offered.

Why Reliable? How Reliable?

One might concede that finding criteria to reliably identify the types of ignorance-producing research discussed is indeed a difficult task.⁸ Nonetheless, one might contend that even if no criterion is as reliable as one might wish, a less than reliable criterion could still be useful to prevent the epistemic and social harms that these practices produce.

How important the reliability of a criterion should be depends, at least in part, on its use. If the goal is to simply be able to label some research as suspect so as to target it for a more rigorous scrutiny (Leuschner 2018), then a criterion such as the presence of bad faith motives could be perfectly useful even if unreliable in determining whether some research is legitimate or not.⁹ As others have argued, having some intuitive understanding of what constitutes ignorance-producing research might be sufficient to advance the discussion (Carrier, 2023). The scientific community could make a concerted effort to focus on dubious research in order to reveal questionable evidence, expose biases, and pinpoint questionable methodological practices. This scrutiny could help correct false beliefs about the strength of the evidence or the validity of the scientific claims and could mitigate public and policymakers' misperceptions. Limiting

⁸ It bears emphasizing that the challenges pointed out here are related to the criteria's ability to reliably identify suspect research. Hence, those challenges need not affect the usefulness of these criteria for other purposes. For example, consideration of bad faith motives may be important in pointing out epistemic vices; attention to the distribution of inductive risks can be helpful in promoting alternative research options that distribute risks more fairly, and so on.

⁹ This would also be the case for some of the other criteria that have been proposed. See de Melo-Martín and Intemann, 2018, ch. 6, for a detailed discussion of those criteria.

misperceptions could also address concerns about failures to support needed policies or to follow public health recommendations. Although at times the scientific community might direct excessive scrutiny to research that turns out to be epistemically or socially valuable, the consequences of an unreliable criterion to identify ignorance-producing research in such a case would not be particularly adverse. After all, scientific communities are in the business of carefully scrutinizing *all* research (de Melo-Martín and Intemann 2018, ch. 6).

However, labelling some research as suspect is unlikely to prevent many of the adverse epistemic and social consequences of these agnotological practices.¹⁰ If the scientific community calls attention to problematic research practices, this would in fact contribute to the dissemination of the questionable research. Although such dissemination could make clear to the public the problematic nature of the science, experience with climate change research shows that this might not accomplish the goal of limiting confusion and doubt in the public and policymakers. Indeed, criticism of climate change scepticism has often pointed out the ways in which the research falls short of meeting scientific standards, is plagued by conflicts of interest, and fails to respond to legitimate criticisms (Oreskes and Conway 2010, Michaels 2008, Proctor 2011, Washington and Cook, 2011; Mann 2012, Biddle and Leuschner 2015; Hansson, 2017; Lewandowsky et al 2018). And yet this—appropriate—scrutiny has failed to eliminate public misperception regarding the strength of the evidence or the degree of scientific consensus. It is not clear either that it has led more people to support certain energy policies. Similarly, targeting some research for rigorous scrutiny would necessitate that scientists use time and resources to engage the research. Thus, this strategy would not address the detrimental epistemic consequences that some agnotological practices have (Biddle and Leuschner 2015).¹¹

Another strategy to minimize some of the epistemic and social harms that suspect research produces would be to encourage the scientific community to ignore or not engage with suspect research (de Melo-Martín and Intemann 2018, ch. 6). At a minimum, this strategy could limit waste of scientists' time and resources by eliminating engagement with science that is unlikely to advance knowledge. Disregarding ignorance-producing research could also reduce attention from the media and the public, which could preclude doubt or confusion among the public and policymakers, thus minimizing both epistemic and social harms.

However, reliable criteria would arguably be more relevant in this case. Without them, scientists could fail to engage research or dissenting claims that can in fact

¹⁰ In fact, this would be the case even if the criterion in question were reliable (de Melo-Martín and Intemann, 2018, ch. 6). This is true also regarding the strategies discussed later.

¹¹ Note that it does not follow from the existence of these problems that scientific communities should give up on scrutinizing research, pointing out methodological problems, indicating biases, etc. There are many other good reasons why scientific communities should engage in these appropriate activities, such as avoiding error; correcting misconceptions; strengthening evidentiary claims, contributing to an informed citizenry, etc.

advance the epistemic and social goals of science. This is particularly troubling in a context where the scientific community is not particularly diverse and might be reluctant – or outright hostile-- to considering lines of inquiry that challenge accepted methodologies, shared background assumptions, or common norms guiding research practices (Epstein 1996, Wylie 2001, Schiebinger 2004, Whyte 2013, Harding 2015, Lacey 2020).

Furthermore, disregarding some suspect research would also be unhelpful in preventing the negative epistemic and social consequences of agnotological practices. Given that often those promoting agnotological practices have considerable resources, overlooking dubious research is unlikely to make the research disappear and would actually permit its unchallenged dissemination. If anything, this would only worsen the epistemic and social problems that we are aiming to address.

A third approach that could minimize at least some of the epistemic and social harms of concern would be to prohibit or severely restrict the conduct and dissemination of suspect research. Prohibition strategies could focus on severely restricting, or outright eliminating, funding for suspect research (Kitcher 1993, 2001, Kourany 2016, O'Connor and Weatherall 2019). If the research is not conducted, this would limit dissemination. Prohibition could also target the dissemination of suspect research. Academic journals and publishers and the media could simply ensure that such research is not published or receives media attention. This could prevent public confusion, lack of support for needed policies resulting from misinformation, and wasted resources.

However, if prohibition or significant restriction of some research is the goal, reliable criteria are surely needed. By using unreliable criteria, we run the risk of prohibiting research that is epistemically valid, and thus the risk of hindering scientific and social progress. As mentioned earlier, given the lack of diversity in science and considering the fact that scientific communities have a bias toward epistemological conservatism (Lee et al. 2013, Luukkonen 2012), using unreliable criteria to prohibit or severely restrict some research is likely to affect legitimate inquiry coming from marginalized groups and that challenges common methodologies, background assumptions, or research practices (Epstein 1996, Wylie 2001, Schiebinger 2004, Whyte 2013, Harding 2015, Lacey 2020). This strategy can then deter scientific progress and contribute to epistemic injustices (Fricker 2007).

But as the previous strategies, this one is likely to have limited –if any-- effect on addressing the epistemic and social problems of agnotological practices (de Melo-Martín and Intemann 2018, ch. 6). It presents obvious practical problems, e.g., private funding is commonly used in these cases, and it is not clear what mechanisms could be used to prevent dissemination of research results, at least in democratic societies.

In summary, it seems then that reliably identifying suspect research in a way that helps prevent relevant harms is not an easy task. Giving up on reliability and simply using criteria that are more likely than not to identify agnotological practices correctly, presents its own challenges. Using unreliable criteria runs the risk of constraining epistemically valid and socially important research. Furthermore, even if we were to

believe that such risks are overstated (Jadreskic, Hopf, and Schoenwitz 2020), the strategies that could be used to prevent the harms that ignorance-producing research can create, e.g., increased scrutiny, disregard, or prohibition, are in fact either unworkable or otherwise unable to address the problems of concern. Indeed, at least in some cases, such strategies are likely to worsen such problems.

Reconceptualizing the Harms of Agnotological Practices

How should we go about addressing these problems then? It seems that giving up on scrutinizing problematic research is unlikely to be of help. But as mentioned earlier we need not do such thing. Scientists and humanities scholars should continue pointing out and challenging problematic research practices where they happen. Where history and experience points to the likelihood that some research might be suspect, e.g., research conducted by tobacco companies, it should be rigorously scrutinized. As mentioned earlier, the costs of scrutinizing scientific research even when it is epistemically sound are arguably not excessive.

What we should perhaps give up is trying to address the problems attributed to ignorance-producing research by focusing on what characterizes such research. If my arguments here are correct, this task is likely to fail. As we have seen, the criteria that have been proposed to identify ignorance-producing research cannot *reliably* distinguish legitimate from illegitimate research. Furthermore, agreement that some research is ignorance producing, e.g., tobacco and opioid risks, cannot happen early enough to prevent the significant epistemic and social harms that we want to avoid. These criteria might be very useful *explaining* why some research can be appropriately labelled as suspect. But arguably what we need are criteria that can warn us early enough to prevent or minimize the epistemic and social harms that we are interested in preventing or minimizing.

A proposed alternative strategy to addressing the problems that suspect research presumably produces is to focus on the need to nurture warranted trust in scientific institutions (de Melo-Martín and Intemann 2018, chs. 7-8, Goldenberg 2021, chs.5-6). The argument is that in a context where warranted trust is damaged, agnotological practices find fertile soil to generate negative epistemic and social effects. Facilitating warranted trust by tackling institutional and social factors that undermine it and promoting mechanisms that contribute to ensuring the trustworthiness of scientists can prove more successful strategies in combatting the effects of agnotological practices. Exploring how best to do this both empirically and normatively is certainly a way to move forward.

Both of these strategies, i.e., focusing on identifying and combating ignorance-producing research and attending to nurturing trust, presuppose that misinformation and

disinformation¹² constitute a considerable problem resulting from suspect research. Of course, this seems a reasonable assumption. The agnotological practices discussed here aim, after all, at promoting false beliefs, creating confusion, or hiding relevant data. However, the concern with misinformation regarding scientific claims is not, or not primarily, simply a concern about people's incorrect beliefs. The primary worry is that such misinformation guides people's support for or rejection of certain public policies.

I have several concerns regarding this assumption. One has to do with how to conceive of the phenomenon of misinformation. Research on misinformation – what factors make misinformation more (or less) likely to be believed; how it spreads; how common it is; how it can be combated-- has ballooned in the last few years (e.g., Lewandowsky et al. 2012, O'Connor and Weatherall 2019, Mercier 2020, Zimdars and McLeod 2020, Gradon et al. 2021). Nonetheless, conceptual and methodological problems, including definitional problems, faulty survey practices, and flawed inferences, plague much of this research (Habgood-Coote 2019, Clifford, Kim, and Sullivan 2019, Nyhan 2020, Rogers 2021, Cacciatore 2021). Clearly, this presents obstacles to ascertaining what or how much misinformation is being disseminated and consumed.¹³ Indeed, some evidence suggests that it might be significantly less than what is usually assumed given the amount of attention to this phenomenon (Guess, Nagler, and Tucker 2019, Guess, Nyhan, and Reifler 2020).

More difficult still, is to determine how misinformation is received, i.e., the effects it has on those who consume misinformation. That people engage in various ways with misinformation –a common metric used in studies of this phenomenon—does not tell us whether they believe it (Wagner and Boczkowski 2019, Mercier 2020). Even when people believe misinformation, it is yet a harder task to ascertain the role that misinformation has on people's behaviours. Studies about misinformation and its effects rarely allow for inferences of causation between exposure to misinformation and particular behaviours. At least some evidence suggests that people are more likely to attend to misinformation that is consistent with the beliefs they already hold (Guess et al. 2020) and that demographics and political ideology are stronger predictors of beliefs than misinformation consumption is (Guess, Nagler, and Tucker 2019, Drummond, Siegrist, and Arvai 2020). Likewise, evidence shows, that individual beliefs alone are poor predictors of behaviour given that people seem to be able to compartmentalize (Mercier 2020).

Giving these concerns, we should at least be cautious about how much of a problem misinformation in general and scientific misinformation in particular is when it comes to people's beliefs and particularly to their behaviours. At a minimum, more conceptual and methodological clarity is desirable. Correctly understanding the problem

¹² In what follows, I refer simply to misinformation as my concern is with the creation and dissemination of false or inaccurate claims regardless of the motivations.

¹³ Of course, these problems are compounded when determinations of bad faith motives are also at stake.

is needed to ensure that the solutions proposed are successful. Philosophers of science can contribute to these conceptual and methodological clarifications. This offers an additional opportunity to move forward.

A further concern is that the focus on misinformation conceals the necessary role that social, political, and ethical values play in people's behaviours and their acceptance or rejection of science-based public policies. Although it is plausible that at least in some cases misinformation regarding scientific claims leads people to resist some policies or recommendations that they would not otherwise resist, much of what is attributed to the effects of agnotological practices is actually the result of disagreements about values. To insist that people's opposition to policies to reduce climate change, for example, is the result of scientific misinformation is to incorrectly presuppose that scientific evidence alone is relevant to policy decisions. Of course, no one would defend this assumption explicitly. However, it is difficult to make sense of much of the debate on the adverse effects of agnotological practices on public policy without this assumption.

This presupposition is, of course, false. One might agree with the fact that climate change is occurring, that humans are primarily responsible for it, and that it is a serious threat to the planet, and still oppose mitigation policies on a variety of grounds, including lack of concern about future generations, reservations about the economic effects of such policies, beliefs in humans' ability for innovation, responsibility attributions, lack of trust on institutions to bring about change, or worries about fairness (Drews and Van den Bergh 2016, Faure et al. 2022, Armesto 2021, Jagers et al. 2021, Kalch et al. 2021, Bergquist et al. 2022). Indeed, some recent evidence regarding people's attitudes about climate change show that majorities of citizens all over the world feel somewhat or very concerned about the harm they would personally face from climate change and consider climate change a serious threat (Statista 2021, Pew 2022). For example, 77% of Germans consider climate change a global emergency. Yet only 44% of them fully agree with the statement 'each person is personally responsible and should behave in a climate-friendly way' (Statista 2021). Similarly, in the USA, the majority of people say they see the effects of climate change in their own communities, believe that the federal government is not doing enough to reduce the impacts of climate change, and favour the U.S. taking steps to become carbon neutral by 2050 (Pew 2022). But they also say that the U.S. should use a mix of renewable and fossil fuel energy sources rather than phasing out the use of oil, coal, and natural gas completely (Pew 2022). Believing the science does not lead to agreeing with what to do about it.

In obscuring the role of values in policy-making acceptance, the focus on scientific misinformation prevents engagement with relevant stakeholders about the values they hold (de Melo-Martín and Intemann 2018, chs. 9-10, Goldenberg 2021, ch. 4). Moreover, eclipsing the role of values in policy disagreements makes their evaluation difficult. Insofar as the values at stake are problematic, and thus difficult to defend publicly, failure to attend to values will leave them not just concealed, but unchallenged. Of course, value disagreements are not easy to address, but if such disagreements – rather than scientific misinformation—are primarily responsible for people's policy positions, then attending to them is crucial. Philosophers of science and science studies

scholars can thus move this debate forward by contributing to the discussion on the relationships between policy, values, and science and by generating the kind of empirical evidence that would be relevant to address stakeholder concerns. A further advantage of engaging with issues of values instead of simply attending to the role of misinformation is that it removes the strong incentive that those promoting ignorance-producing research have to attack scientific claims and promote misinformation.

As mentioned though, this does not mean that we should give up on challenging suspect research, promoting scientific literacy, and reducing misinformation where it happens. It bears repeating, that there are strong reasons why these are appropriate goals: our interest in avoiding error, valuing an informed citizenry, the desire to nurture democratic institutions. We might do well however in adjusting our attention from one primarily focused on characterizing ignorance-producing research, to one interested in promoting trustworthy institutions, clarifying the relationships between policy and science, and finding ways to tackle value disagreements in policy acceptance.

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