From social values to p-values: the social epistemology of the International Panel on Climate Change

Abstract: *In this paper I ask two questions prompted by the phenomenon of “politically patterned” climate change denial. First, can an individual’s political commitments provide her with good reasons not to defer to cognitive experts’ testimony? Building on work in philosophy of science on inductive risk, I argue they can. Second, can an individual’s political commitments provide her with good reasons not to defer to the International Panel on Climate Change’s testimony? I argue that they cannot (at least, in the way identified in the first part of the paper), because of the high epistemic standards which govern that body’s assertions. The conclusion discusses the theoretical and practical implications of my arguments.*

During the 2012 US Presidential election, John Long, a leader of the Florida Tea Party movement, expressed his support for his preferred candidate thus: “if Mitt Romney was an abortion supporter, if Mitt Romney favoured gay marriage, if he believed in global warming, I’d still be fine with him”.¹ Long’s remarks vividly illustrate two more general phenomena. First, his remarks exemplify a reluctance among the general public to believe in anthropogenic climate change. A recent survey found that only 67% of US citizens believed that there is “solid evidence that the world is warming”, and 42% that there is solid evidence that there is warming due to human activity.² Although a 2010 UK poll showed that 75% believed that “the Earth’s climate is changing and global warming taking place”, this was a

¹ Quoted in McGreal, C “Florida Republicans bet on Romney’s business sense” *The Guardian*, 25th October, 2012, <http://www.theguardian.com/world/2012/oct/25/florida-republicans-mitt-romney-business>

² Pew Research Center, “Climate Change: Key Data Points from Pew Research” June 2013, <http://www.pewresearch.org/key-data-points/climate-change-key-data-points-from-pew-research/> (accessed 4 Feb, 2014)

9% decrease since 2009, and only 26% believed it had been shown that change was “man-made”.³ Second, Mr Long’s remarks also exemplify how opinions about climate change are “politically patterned”, i.e. individuals’ prior political commitments are strongly predictive of their views on climate change.⁴ In the US poll, 44% of self-identified Republicans believed global warming was happening, compared to 87% of Democrats. A recent UK survey showed a strong correlation between individuals’ voting intentions and their willingness to see extreme weather events as related to climate change.⁵

The political patterning of opinions on climate change differs from other politically patterned commitments – for example, opposition to gay marriage – in that it apparently involves factual, rather than ethical, disagreement. In cases of factual disagreement, we typically think that discussants should defer to cognitive experts. Climate change denial conflicts with the scientific consensus. In 2007, the International Panel on Climate Change published a report co-authored by over 500 leading climate scientists and utilising over 2,000 expert reviewers summarising the scientific consensus on climate change.⁶ Its findings were stark: “warming of the climate system is unequivocal”, “most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations” and “more extensive adaptation than is currently occurring is required to reduce vulnerability”.

³ BBC, “BBC Climate Change Poll” February, 2012, at http://news.bbc.co.uk/nol/shared/bsp/hi/pdfs/05_02_10climatechange.pdf (accessed 10 Aug, 2013)

⁴ Kahan, D *et al* “Cultural cognition of scientific consensus” *Journal of Risk Research*, 14 (2011) pp. 147-74, p.157-167

⁵ YouGov “No public consensus on extreme weather links to climate change”, 2013, available at <http://www.yougov.polis.cam.ac.uk/?p=4351> (accessed 10 Aug, 2013)

⁶ International Panel on Climate Change, *Fourth Assessment Synthesis Report of the International Panel on Climate Change* (Geneva: IPCC, 2007).

In this paper, I consider two questions. In §1 I ask whether an individual's political commitments can provide her with good reasons not to defer to cognitive experts' testimony. Many, I think, assume not; even if John Long has good reasons to fail to defer to climate scientists, his political commitments cannot furnish him with such reasons. However, I use recent work in philosophy of science to show that political commitments might sometimes justify failures to defer. In §2 and §3 I ask whether an individual's political commitments can provide her with good reasons not to defer to the IPCC's testimony specifically. I suggest that they probably cannot (at least, in the manner identified in §1). Even if epistemic and political concerns interpenetrate, at least some expert testimony – such as that of the IPCC – stands above the political fray. In §4, I discuss broader implications of my arguments.

§1 Political commitments and expert testimony

Although there are philosophical concerns about aspects of climate science (most notably the use of climate models), climate scientists seem to count as cognitive experts with regard to the earth's climate.⁷ That is to say, in virtue of their training, skills, access to information and so on, they are far more likely than others to answer questions about that domain of knowledge correctly.⁸ Furthermore, despite significant disagreements within climate science, there are some claims they agree on (for example, that climate change is occurring, is anthropogenic and will have catastrophic effects).

⁷ See Lloyd, E "Confirmation and Robustness of Climate Models," *Philosophy of Science* 77 (2010): pp.971-984, and Parker, W "Predicting Weather and Climate: Uncertainty, Estimates & Probability", *Studies in History and Philosophy of Modern Physics* 41 (3) (2010):pp263-272

⁸ This definition of expertise follows that of Alvin Goldman in his "Experts: which ones should you trust?" in his *Pathways to Knowledge* (Oxford: Oxford University Press, 2004), p.146.

One important function of experts is to offer factual testimony, by which I mean sincere assertions of factual claims, to non-experts.⁹ When non-experts hear testimony, they must decide whether to defer to that testimony, which I will interpret as “accepting” the claims made by testifiers in the sense of using (or becoming willing to use) those claims as premises in practical reasoning. To clarify the issues at stake, I will focus on cases where non-experts can reliably identify which climate scientists are true cognitive experts.¹⁰ I presume that, *prima facie*, when non-experts recognise that a testifier is sincere and a true expert, they should defer to her testimony. There are many ways to justify this claim.¹¹ However, my interest is not in reasons to defer, but reasons not to defer. Specifically, I am interested in whether an individual’s *ex-ante* political commitments, i.e. her normative views on the relative importance of political values and on which policies would promote those values, can provide her with good reason to fail to defer to expert testimony.

Climate change provides an interesting case for investigating this broader question. Climate change raises difficult questions in political philosophy.¹² However, there seems to be public consensus that if climate change is happening, then something ought to be done. In support of this claim, note how little public debate focuses on whether we should respond to climate change if it is happening but on whether it is happening, where it seems assumed that if so, some action is demanded. I also suggest that most people recognise that effective steps

⁹ It is controversial whether testimony involves assertion, as opposed to “communication” (see, for example, Lackey, J *Learning from words* (Oxford: Oxford University Press, 2008) Chap.4). However, for current purposes, this distinction is unimportant.

¹⁰ For why this is not a heroic assumption, see pp.149-152 of Anderson, E “Democracy, Public Policy, and Lay Assessments of Scientific Testimony” *Episteme* 8(02), 2011, pp144-164.

¹¹ For this debate, see Lackey, J “Introduction” in Lackey, J and Sosa, E (eds) *The epistemology of testimony* (Oxford: Oxford University Press, 2006)

¹² See Gardiner, S *A perfect moral storm* (Oxford: Oxford University Press, 2012) for an excellent account of these problems.

against climate change will require major changes to the political and economic order.¹³

Therefore, for many, deferring to climate scientists' testimony would require significantly revising their political commitments. However, it seems that *direct* appeal to political considerations – “accepting climate change is happening would seem to clash with my support of capitalism, therefore I don't believe those experts”, for example – cannot provide individuals with good reason to fail to defer to expert testimony. Are there, then, any other, more indirect ways in which political commitments might justify failures to defer to acknowledged experts?

To address this issue, I will take a detour into philosophy of science. Clearly, non-epistemic political and ethical values should play a role in scientific research, most notably in topic choice and in setting restrictions on experimentation.¹⁴ However, many hold that science should be “value free” in the sense that “the justification of scientific findings should not be based on non-epistemic (e.g. political or moral) grounds”.¹⁵ Recently, some philosophers, most notably Heather Douglas, have resuscitated an objection, first proposed by Richard Rudner, to this value free ideal.¹⁶ For current purposes this “argument from inductive risk” can be summarised as follows:

1. Scientists accept or reject hypotheses.

¹³ The only work I know which accepts that global warming is happening, but denies that serious policies of abatement should be pursued is Bjorn Lomborg's *The Skeptical Environmentalist* (Cambridge: Cambridge University Press, 2001), and even he disputes some scientific results, see Chap.24, esp.317-324).

¹⁴ See Kitcher, P (2001) *Science, Truth and Democracy* (Oxford: Oxford University Press, 2001), Chaps. 8 and 9.

¹⁵ Betz, G (2013) “In defence of the value free ideal” *European Journal for Philosophy of Science* 3:207–220, p.207.

¹⁶ See Rudner, R “The scientist qua scientist makes value judgements” *Philosophy of Science*, 20(1) (1953), pp. 1–6; Douglas, H *Science, policy and the value free ideal* Pittsburgh: University of Pittsburgh Press, 2009). See also Betz, *op.cit.*

2. Typically, these hypotheses are not deductively entailed by the available evidence.
3. As such, scientists face “problems of inductive risk”: they risk accepting hypotheses which are, in fact, false (“false positives”) or rejecting hypotheses which are, in fact, true (“false negatives”).
4. There is no (responsible) way to set the trade off between false positives and false negatives other than by appeal to the non-epistemic costs associated with acting on different types of error.
5. Therefore, scientists must appeal to ethical values in scientific inference.

To illustrate, consider Rudner’s own example. Imagine a scientist is investigating the hypothesis that a toxic ingredient is not present in lethal quantities. A second scientist is investigating the hypothesis that a certain lot of belt buckles is not defective. Rudner suggests that the first scientist would properly require a higher degree of confirmation before accepting her hypothesis than would the second for accepting hers, given that “the consequences of making a mistake [in the first case] are exceedingly grave by our moral standards”, whereas the same is (presumably) not true in the second case.¹⁷

I doubt that the argument from inductive risk overthrows the value free ideal, for reasons §4 discusses. However, we do not have to buy the argument entirely to see that it raises important problems. Many versions of the argument treat scientists’ acceptance of hypotheses as equivalent to asserting some theoretical claim. If so, we can set out the following (highly abstract) picture of scientific inquiry. Scientists must often decide whether or not to assert claims which go beyond the available evidence. As such, they face a problem: they run risks of asserting false claims and of failing to assert true claims. They need (or can be seen as

¹⁷ Rudner, *op.cit*, p.2

employing) an “epistemic standard for assertion”: i.e. a principle which tells them how much evidential support some claim must enjoy before it is properly assertable.¹⁸ The higher their standard, i.e. the more evidence they require for making some claim, then the less likely that they will assert a falsehood, but the more likely that they will fail to say something true. This gives rise to two questions, one descriptive – which standards do scientists employ? – and one normative: which standards ought they to employ?

Sections 2- 4 discuss these questions, but first note how the possibility that experts solve inductive risk problems creates a challenge for understanding expert testimony. We can construct an analogue of the problem of inductive risk for agents’ acceptance of claims. Imagine, for example, that Charlotte has excellent but not overwhelming evidence that it will rain later. She must decide whether or not to accept that claim; for example, she needs to decide whether to carry an umbrella to work. She needs (or can be seen as employing) an “epistemic standard for acceptance”; i.e. a principle telling her how much evidence is required before accepting that it will rain. Plausibly, epistemic standards for acceptance do and should vary with the expected practical costs of error. If the expected costs to Charlotte of falsely failing to accept it will rain, a false negative, are high (say, she is recovering from pneumonia), a lower standard seems appropriate than if those expected costs are low, but the expected costs of a false positive are high (she has too little space in her bag for an umbrella and her book).

Scientists’ assertions of claims which go beyond available evidence are (or can be seen as) governed by an epistemic standard; similarly, individuals’ acceptance of claims which go beyond available evidence are (or can be seen as) governed by an epistemic standard.

¹⁸ See my (ref omitted) for more on this terminology

Therefore, when a scientist asserts a claim, a non-scientist's decision whether to defer should turn on whether the epistemic standard which governs the scientist's assertion is as high as that which governs the non-scientist's acceptance. For example, imagine Tim hears a scientist say "belt buckles produced by this machine are flawless". Tim knows that the scientist employs a low epistemic standard for making this claim. For Tim, it is a matter of great practical import that his belt buckle is perfect. Even if the scientist is far more likely to be right about belt buckle manufacture than Tim, it seems reasonable for Tim not to defer to her testimony. There would be something bullying about insisting that even if Tim really wanted to avoid wearing a faulty buckle he should defer to the scientist, because she is more likely to be right than he is. Of course, these comments rely on unrealistic assumptions that scientists are limited to either asserting or not asserting claims, and audiences to either accepting or not accepting. I return to complexities in §2 below, but note that these complexities do not speak against the claim that if experts make outright assertions which audiences must accept or not, then the possibility of divergent epistemic standards might complicate our account of reasons to defer to expert testimony.

It is a small step from these remarks to an account of how political commitments might provide non-experts with good reasons to fail to defer to experts. Imagine, Andy, a climate expert, tells Barbara, a policymaker, "current property regimes cause environmental degradation". Barbara recognises Andy as an expert, has no reason to doubt Andy's sincerity, and no other true experts contradict Andy. *Prima facie*, Barbara should defer to Andy's testimony. Imagine, however, that Barbara reasons: "given my commitments to current property regimes, falsely accepting that they cause environmental degradation would be extremely costly; given my political commitments to future generations, falsely failing to accept that claim would be costly; however, my commitment to current property regimes is

stronger than that to future generations; therefore, I should adopt very high epistemic standards for accepting that claim; Andy's assertions are governed by lower epistemic standards". As a result, Barbara fails to defer to Andy.

There are many ways we could worry about the example. Many of these worries – Barbara could be wrong about Andy's standards, Barbara could be wrong on the relative value of property regimes and human lives – are irrelevant, however, to this section (although I return to them in §3). If asked *why* non-experts should defer to expert testimony, an obvious answer is that we each do (or should) want to ensure that we accept true claims. For non-experts, epistemic deference to sincere, true experts is one way to ensure this goal. However, unless experts are infallible, in deferring to their claims we run a risk of accepting false claims. A decision to defer is, then, at least partly, a decision regarding the relative costs of not accepting true claims *versus* accepting false claims. This decision must involve value considerations. That Barbara's political values are wrong or that she is deluding herself do not speak against the argument.

Note four further points. First, Barbara's political commitments function *indirectly* as a reason to fail to defer to Andy; she does not treat her commitments as evidence. Second, the example does not assume epistemic voluntarism. Barbara is not choosing what to believe. Third, Barbara is not guilty of epistemic arrogance, insofar as she is not disputing any of Andy's first-order factual claims. Finally, the conclusion I have reached *via* the argument from inductive risk seems consonant with recent trends in epistemology, where many have proposed an intimate relationship between practical interests and epistemic concepts such as

knowledge or reason for belief.¹⁹ Although I wish to avoid the quagmire of debate surrounding “belief” and “knowledge”, my results might well be reached by other routes.

Although a full analysis of the political patterning of views on climate change includes considerations not discussed above, my arguments can help us better understand actual debates. For example, Paul Edwards has documented how US political debate over climate change in the 1990s turned on distinguishing between “frontier” scientists, who were willing to rely on theoretical claims in making climate predictions, and “high proof” scientists, who rested their predictions on known to be accurate data.²⁰ Many influential Republican senators claimed that only high-proof claims, which tended to be more conservative than those of frontier scientists, should guide policy. These political debates can be reconstructed in my terms: Republican senators can be understood as arguing that even if frontier scientists are experts, they make assertions on the basis of epistemic standards which are too low for the high stakes context of adopting radical economic policies. As such, policymakers need not defer to their claims. Even if the relevant senators’ opposition to climate scientists’ claims was not truly motivated by such concerns, the arguments above still illuminate public debate.

Furthermore, concerns about epistemic standards are not limited to opponents of environmental protection. Proponents of radical environmental policies often appeal to the precautionary principle. One way of reading this principle is as demanding that we take action to prevent environmental degradation even when there is lack of scientific certainty

¹⁹ Fantl, J and McGrath, M “Pragmatic encroachment: it’s not just about knowledge” *Episteme* 9(01), 2012, argues that practical interests may determine not only what counts as knowledge, but as a reason for belief.

²⁰ Edwards, P “Global climate science, uncertainty and politics” *Science as culture* 8, 4 (1999): 437-472, at pp.455-458.

that degradation will occur.²¹ Proponents of precautionary policy making can be understood as suggesting that whatever epistemic standards have to be met for claims to count as scientifically certain, those standards are often higher than those which should guide policy making. Of course, environmentalists typically argue that certain claims which experts do not assert should be taken seriously, rather than justifying failures to defer, but the concepts above help us to understand their concerns.

The arguments of this section suggest some more general lessons for social epistemology. However, I will remain focused on the climate change debate, and turn to broader issues in §4 below. So far, I have assumed that true experts testify that climate change is happening and is anthropogenic. My source for this assumption has been the International Panel on Climate Change (IPCC). However, as well as treating the IPCC's reports as evidence for what climate scientists testify, we might treat the IPCC as a testifier. So, even granting the argument outlined in this section, which suggests that politically motivated climate change denial is not as straightforwardly epistemically irrational as it might seem, we can ask: can an individual's political commitments provide her with good reasons to fail to defer to the IPCC's testimony specifically?

In the rest of this paper, I will argue that they cannot do so in the manner outlined in this section. It is important to stress that this conclusion is limited. There are multiple ways other than *via* a concern about epistemic standards in which individuals' political commitments might shape their deference to expert testimony. For example, individuals' political commitments might lead them to seek out news sources which misrepresent the scientific debate or might make them hyper-vigilant about perceived bias in climate scientists' work,

²¹ See John, S "In defence of bad science and irrational policies: an alternative account of the precautionary principle" *Ethical Theory and Moral Practice* 13(1), 2010, 3-18, at p.10.

and, hence, doubt their sincerity. It is open to debate whether such cases count as ones where individuals' political commitments provide them with good reasons to fail to defer. However, delving into these issues would take us far from the topic of inductive risk. In turn, I suggest that concerns about divergent epistemic standards are one of the clearest ways in which political commitments might indirectly provide non-experts with reasons to fail to defer to true experts. Therefore, even if the following arguments do not conclusively show that the answer to my question is negative, they do undermine one of the most powerful ways in which we might have argued for a positive.

§2 Does the IPCC run inductive risks?

In this section, I will first justify treating the IPCC as a kind of testifier, before outlining Gregor Betz's recent claim that the IPCC provides a model of value free science, which seems to imply that its testimony avoids the problems outlined above. Unfortunately, the rest of the section shows that the IPCC does not avoid these challenges. These arguments are useful, however, for laying the groundwork for §3, where I set out better reasons for thinking that the IPCC's testimony is above the political fray.

In 1998, the United Nations Environment Programme and the World Meteorological Association set up the "International Panel on Climate Change", an independent body, with a remit:

“to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific

basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation”.²²

The IPCC’s most important outputs are its five-yearly Assessment Reports, the most recent published in 2013, which aim to provide a comprehensive overview of current scientific consensus on climate change. The construction of these reports is extremely complex, but two features should be stressed. First, IPCC reports do not involve primary data collection and research, but are based on existing literature. Second, the synthesis of this vast amount of literature is undertaken as a massive collaborative effort, involving multiple authors and reviewers from across the world. A key feature of the IPCC’s protocols is that a strong focus is placed on ensuring consensus between all contributors.²³

In §1 of this paper, I ignored several problems, unrelated to inductive risk, which non-experts have in assessing expert testimony on climate change. There are very many self-described experts on climate change who give different testimony. Although many of these putative experts lack the credentials by which non-experts might discern true experts, this is by no means true of all. Furthermore, although the vast majority of experts agree that climate change is occurring, it may be difficult for non-experts to assess the epistemic value of such concurrence.²⁴ To complicate matters again, expertise relevant to politically relevant questions about climate change is distributed across scientific disciplines, such that even if

²² See IPCC “Organization”

<http://www.ipcc.ch/organization/organization.shtml#.Ugzv9W1Jp-w> (accessed 10th Aug, 2013)

²³ IPCC, “Principles and procedures”

http://www.ipcc.ch/organization/organization_procedures.shtml#.UgpQg21Jp-w (accessed 13 August, 2013)

²⁴ See Goldman, *op.cit* (pp150-159) for concerns about the value of expert agreement; although Coady, D “When experts disagree” *Episteme* 3(1-2), 2006, pp. 68-79, argues that such concerns are misplaced, including in the climate change debate (p.76).

non-experts can identify true experts with regard to some aspect of climate change, it does not follow that they have identified reliable testifiers on all aspects.

One way of understanding the IPCC is as helping non-experts to navigate this testimonial morass. Non-experts can assume that the IPCC is a kind of super-expert which has done the hard work of distinguishing between true and false experts in multiple domains and then combining these domain-specific pieces of testimony. This view faces two challenges. First, it might be objected that only human agents, and not corporate bodies, such as the IPCC, can count as testifiers. However, modern scientific research is often highly collaborative, such that it seems impossible to treat academic papers as the testimony of any individual, or set of individuals, but we must see them as the testimony of the research group. Therefore, any theory of testimony should allow that corporate bodies can count as testifiers, on pain of being irrelevant to a key example of testimony, scientific publication.²⁵ Second, it might be objected that, strictly, the IPCC does not make claims about climate change, but, rather, about what others say about climate change. If so, there is an important difference between deferring to scientists – one accepts claims about the world – and deferring to the IPCC – one accepts claims about what scientists say about the world. However, the IPCC does not provide an opinion poll of scientists' beliefs, but its work involves taking many different reports, piecing them together, then forming an overall opinion. Much "expert testimony" about the world takes a similar form (consider, for example, the spymaster who receives many reports and threads them into a narrative). Therefore, it is reasonable to treat the IPCC as giving testimony about the world.

²⁵ Although see Kukla, R "Author TBD": Radical Collaboration in Contemporary Biomedical Research" *Philosophy of Science* 79(5), 2012, pp845-858 for skepticism on this score (pp850-851).

Can this super-expert's testimony be such that individuals' political commitments cannot provide them with good reason not to defer, at least *via* a concern about divergent standards? To address this issue, consider a possible worry about the picture of testimony outlined in §1. I assumed that scientists must either assert or not assert some claim, and that non-experts must decide whether or not to accept asserted claims outright. However, we might think that rather than assert claims outright, scientists could, instead, assert how likely claims are. In such a scenario, non-experts, rather than accept claims outright, could guide their action in accordance with their degree of certainty. Or, if non-experts must simply accept or not accept some claim, the choice of how to balance inductive risk would be up to them.

Such concerns are found in the debate over value free science. The conclusion that scientists must appeal to non-epistemic values in scientific research rests on the assumption that scientists accept or reject hypotheses. Richard Jeffrey claimed that this premise was incorrect.²⁶ Rather, Jeffrey argued, all that scientists do (or, at least, ought to do) is to report the degree of evidential support hypotheses enjoy relative to available evidence. Such claims do not go beyond the available evidence, and so do not face risks of false positives or false negatives. Therefore, scientists do not need to appeal to non-epistemic values. Of course, Jeffrey acknowledged, other *users* of science might face problems of how well supported some proposition should be before they act on it, but that is not scientists' problem. In a recent paper, Gregor Betz has argued for a modified version of Jeffrey's response, claiming that scientists can and should report the evidential status of hypotheses where this might involve giving a precise quantitative measure (as Jeffrey proposes) or could be a qualitative report.²⁷

²⁶ Jeffrey, R "Valuation and acceptance of scientific hypotheses. *Philosophy of Science*, 23(3), 1956, pp.237–246.

²⁷ Betz, *op.cit.*

If scientists do limit themselves to reporting what Betz calls “hedged hypothesis”, then it seems that the worries raised in §1 may require reconsideration. Interestingly for our purposes, Betz treats the IPCC’s work as a model for how scientists might avoid inductive risk problems. A distinctive feature of the IPCC’s synthesis reports is that they only make one claim outright: that climate change is happening. All other claims are given various epistemic qualifiers: for example, that it is “almost certain” that such changes are anthropogenic; that it is “very likely” that such changes will have significant impacts. Indeed, the IPCC’s “Summary Report” contains a table “translating” these qualitative terms into quantitative measures of uncertainty.²⁸

Consider, again, Adam, the expert climate scientist, and Barbara, the policymaker. Adam does not tell Barbara “current property regimes cause environmental degradation”, but “given the available evidence, it is extremely likely that liberal property regimes cause environmental degradation”. Can Barbara’s political commitments provide her with good reasons to fail to defer to this testimony? Not, apparently, in the manner discussed in §1. The problem in §1 arose from a worry about the risks involved in accepting claims which go beyond the available evidence. In this case, Adam’s testimony does not go beyond the evidence, but states a logical relation between available evidence and a hypothesis. Barbara might have epistemic reasons to doubt Adam’s ability to calculate probabilities or the quality of his evidence. She might have political reasons not to act on his claim. What it seems she cannot have are political reasons, related to divergent epistemic standards, to refuse to accept his claim. Therefore, it seems that worries about a mismatch between standards for assertion and acceptance cannot provide reasons to fail to defer to the IPCC.

²⁸ IPCC, *Climate change 2007: Synthesis Report* (Geneva: IPCC, 2007), p.5.

I will now argue that facts about the IPCC's work make this move too hasty: that is to say, even though the IPCC reports "hedged hypotheses", concerns over divergent epistemic standards might still justify non-experts' failure to defer to the IPCC. These concerns arise because even if the IPCC's assertions merely report evidential probabilities, these reports are conditional on the IPCC's body of evidence, i.e. the set of reports which it summarises and synthesises. If the content of this body of evidence is shaped by decisions which involved making significant tradeoffs between risks of false positives and false negatives, then the IPCC's reports still implicitly rely on some choice of epistemic standard(s). In turn, non-experts might object that these standards are lower than those which should govern their acceptance of claims, and, hence, refuse to defer to the IPCC's testimony. At least two features of the IPCC's body of evidence illustrate this possibility.²⁹

First, individual pieces of climate change research involve solving inductive risk problems. For example, imagine that an individual paper, considered by the IPCC, concludes with the claim that "it is very likely that climate change will raise mean temperatures". In coming to this conclusion, the researchers involved will, typically, have made a series of assumptions about such matters as the circulation of carbon in the atmosphere. In turn, they will have faced a problem of deciding when these assumptions are sufficiently well-warranted to be treated as a premise. Their results will not simply report evidential relations, but interpret evidence in line with other commitments which, strictly, go beyond the available evidence.

²⁹ Katie Steele ("The scientist *qua* policy advisor makes value judgments" *Philosophy of Science*, 79(05), 2012) suggests a further possibility of inductive risk in the IPCC's work, in the translation between subjective probability assignments and qualitative statements of uncertainty; I leave this to one side for this paper.

When the IPCC includes this paper in a synthesis, its claims will be sensitive to the original researchers' epistemic standards.³⁰

Biddle and Winsberg have provided a concrete example of this phenomenon. When scientists constructed early models predicting climate change's likely effects they typically faced a tradeoff between constructing models which accurately predicted mean surface temperature and models which accurately predicted precipitation patterns.³¹ Furthermore, given limited resources, the need to integrate different models, and so on, there was little opportunity to develop both kinds of models. Instead, a choice had to be made of which model to use for both purposes. It seems plausible to see such choices as a form of inductive risk problem, concerned with deciding which kinds of errors – in the prediction of surface temperature versus in the prediction of precipitation – are most important to avoid. If so, when the IPCC uses model-derived results as the basis for its own claims, those claims will implicitly reflect how the original researchers balanced these different risks.

As well as reflecting the standards used by research included within the body of evidence, the IPCC must also choose which research to include in this body of evidence in the first place. This can also be seen as an inductive risk problem. Authors of IPCC reports must decide whether it is preferable to make sure that all reports are included, however tentative, thereby reducing the risk of failing to include true reports in their body of evidence, or to include only those reports and studies which seem most likely to be true, thereby reducing the risk of including false reports. These decisions about inclusion and exclusion will, in turn, affect the

³⁰ See Wilholt, T (2013) "Epistemic trust in science" *British Journal for Philosophy of Science* 64: 233-253, p.239 for related issues.

³¹ Biddle, J., & Winsberg, E. "Value judgements and the estimation of uncertainty in climate modelling" in P.D. Magnus, & J. Busch (Eds.), *New waves in philosophy of science* (Basingstoke: Palgrave Macmillan, 2011), pp179-184.

probability assignments the IPCC makes. I will provide a case study of this phenomenon below, but as a simple example, consider the inclusion of anecdotal reports from fishing communities of depleted fish stocks. Such reports may be less reliable than reports from scientific studies. If so, including such reports runs a higher risk of “false positives”. However, not including such reports runs a higher risk of “false negatives”.

Although the IPCC’s claims do not *seem* to involve inductive leaps, those claims are shaped by various decisions – of which reports to include, of which claims to assume in those reports – which do involve trading off inductive risks. Therefore, if non-experts believe that the epistemic standards which governed these tradeoffs were lower than those appropriate for their acceptance of the claims, then their political commitments might provide them with good reason to fail to defer to the IPCC’s testimony. This claim requires supplementing by two clarifications. First, in arguing that the IPCC’s use of epistemic qualifiers does not avoid problems of divergent epistemic standards, I do not mean to imply that this policy is mistaken. Rather, for those who are not concerned about divergent epistemic standards, such a policy is extremely helpful. Second, when I claim that the IPCC’s work does not avoid worries about divergent standards, I do imply that *all* scientific work will face the same problem; maybe some scientists could meet Jeffrey’s ideal, but Betz is wrong to say that the IPCC does.

§3 Keeping up standards

Consider, one last time, the case of Andy, the acknowledged climatology expert, and Barbara, the policymaker. Andy asserts a qualified claim, but Barbara refuses to defer to this qualified claim on the grounds that it depends on Andy’s body of evidence, the content of

which is shaped by inappropriately low epistemic standards. For this – admittedly convoluted – concern to provide Barbara with good reason not to defer to Andy’s testimony, however, her political commitments must justify a higher epistemic standard than those which shape Andy’s body of evidence. In the rest of this section, I argue that such a condition is extremely unlikely to obtain when non-experts must decide whether to defer to the IPCC. As such, it is very unlikely – although not strictly impossible – that non-experts’ political commitments can provide them with good reasons to fail to defer to the IPCC, at least in the manner outlined in §1.

The issues discussed in this paper stem from the possibility that non-experts’ epistemic standards for acceptance are higher than those which govern experts’ assertions of claims. However, non-experts’ proper epistemic standards for acceptance are likely to have an upper limit; there is some degree of certainty at which they should concede a claim. Clearly, the higher the epistemic standards which govern experts’ assertions, then the less likely that non-experts will have good politically motivated reasons not to defer to them. Above, I argued that the IPCC’s claims depend on solutions to inductive risk problems: both in the reports it synthesises and in its decision of which reports to synthesise. Which epistemic standards govern the reports in the IPCC’s body of evidence?

This challenge relates to the question posed in §1: how *do* scientists respond to problems of inductive risk? I suggest that, as a matter of fact, high epistemic standards serve as a regulative ideal for practising scientists. It is a constitutive norm of good scientific practice that scientists assert claims only when, given their evidence, those claims are extremely

unlikely to be false.³² Furthermore, I suggest that the social systems of science – institutions such as journal publication, peer review, credit allocation, and so on – are structured such that we can reasonably assume that scientists act in accordance with this norm. Obviously, proving both of these claims is difficult. Here I offer simply an illustrative example. Consider the use of statistical testing procedures across a wide range of sciences. When using statistical tests to decide whether to accept some hypothesis on the basis of evidence, scientists routinely assume that they should use very high “p” values.³³ Furthermore, research which does not report “highly statistically significant” results is unlikely to be published. Adoption of high “p” values ensures that scientists accept hypotheses only when, relative to the available evidence, it is extremely unlikely that those claims are false. This practice can be seen as the adoption of a high epistemic standard, one which minimises false positives, even at the cost of risking false negatives. To put it another way, the Republican senators were onto something: frontier science is problematic *qua* science.

Of course, even if scientists do adopt high standards, maybe they ought not to. My aim, however, is not to defend current scientific practice, but to make a point about the IPCC. If I am correct about the epistemic standards employed in scientific practice, then, as long as the IPCC limits itself to including only reports which count as good science in its body of evidence, then we can reasonably assume that the reports it synthesises meet high epistemic standards. This is precisely what the IPCC does. Its guidelines state that it aims to synthesise “peer-reviewed scientific, technical and socio-economic literature”, thereby excluding reports

³² For an account of how to conceptualise scientific norms, see pp.834-836 of Knuuttila, T, “Contradictions of Commercialization: Revealing the Norms of Science?” *Philosophy of Science*, 79(05), 2012, pp833-844.

³³ This phenomenon is often criticized. See Cranor, C *Regulating toxic substances* (Oxford: Oxford University Press, 1993), esp. Chap.1 and Ziliak, S and McCloskey, D *The cult of statistical significance* (Ann Arbor; University of Michigan Press, 2007), esp. “Introduction”.

not certified as meeting high scientific standards.³⁴ (Admittedly, the IPCC guidelines do allow inclusion of some “non-peer-reviewed literature, such as reports from governments and industry”, but stress that great caution must be taken in using such literature).

The IPCC’s decision to restrict itself to reports which have been certified as “good science” is not trivial, as the following example demonstrates.³⁵ The Fourth Assessment Report of the IPCC stated that it could not provide any estimate of short- or long-term ice-loss from the West Antarctic Ice Sheet (WAIS). Therefore, tables showing possible sea level rises in the Twenty-First Century did not include possible contributions from Greenland or Antarctica. This was a change from the Third Report which did include such projections. This difference arose from a change in scientific understanding: during the period of writing the Fourth Report, data emerged which contradicted the dynamical models previously used to understand the WAIS. This data did not, however, show that the WAIS was more stable than assumed, but that it was already melting. However, articles which developed this data and generated new predictions were published too late to be included within the Fourth Assessment Report. Although authors of the Fourth Report were well aware of these results, they chose not to include these projections in their body of evidence.

One might argue that even if new models of the WAIS had not yet undergone peer review – they lacked a certification of high quality – they should still have been considered, because, in this case, it was more important to include all potentially true reports rather than to ensure that all included reports were very likely to be true. Indeed, James Hansen has argued that the

³⁴ IPCC (2013b) “Principles and procedures” web-page at http://www.ipcc.ch/organization/organization_procedures.shtml#.UgpQg21Jp-w (accessed 13 August, 2013).

³⁵ My account of this case draws on O’Reilly, J, Oreskes, N and Oppenheimer, M (2012) “The rapid disintegration of consensus: the West Antarctic Ice Sheets and the International Panel on Climate Change” *Social Studies of Science* 2012 42: 709-731.

“scientific reticence” of the IPCC with reference to the WAIS was potentially dangerous.³⁶ I will return to Hansen’s concerns in §4, but note how the IPCC’s epistemic conservatism relates to non-experts’ deference to its testimony. Of course, some non-expert’s political commitments might be such that she adopts an extremely high epistemic standard for accepting any claims about climate change. Therefore, even if the IPCC’s work is shaped by high epistemic standards, it is conceivable that non-experts’ political commitments might still provide them with good reason to fail to defer to its testimony. However, given the high standards the IPCC employs, such cases are likely to be extremely rare. Therefore, although we cannot say that individuals’ political commitments could never provide them with reason to fail to defer to the IPCC’s testimony, it is very unlikely that they have such reasons.

§4 Implications and conclusions

In conclusion, I shall clarify my arguments and note their more general implications. §3 argued that, regardless of their political commitments, non-experts should defer to the IPCC’s testimony because the IPCC relies on the high epistemic standards which characterise scientific research. This might seem to contradict the arguments of §1, where I said that agents’ political commitments could provide them with good reasons to fail to defer to expert testimony. In §1, however, I assumed that being an expert with regard to some domain is a matter of being more likely to answer questions about that domain correctly than others. If so, then non-experts might always question whether they should defer to experts, because being more likely to get the right answer need not be likely enough for non-experts’ purposes. In §3, however, I suggested that a particular kind of expert – the professional scientist – is likely enough to answer correctly, for all practical purposes, because the social structures of science

³⁶ Hansen, J (2007) “Scientific reticence and sea level rise” *Environmental Research Letters* 2(2) (April-June 2007), pp1-7, at 3-5.

systematically ensure that these experts' assertions are governed by high epistemic standards. Therefore, while §1's conclusions still hold true as an account of deference to expertise, they may not apply to scientific testimony specifically. Although the IPCC example helps make this difference clear, the result does not, of course, require that body's existence.³⁷

This clarification raises two important issues: one theoretical, one practical. Philip Nickel has argued that non-experts' "entitlement" to rely on scientists' testimony is "norm-based", rather than "assurance-based".³⁸ Roughly, I am entitled to rely on a scientist's words because I know that her assertions are governed by public norms, "firmly established standards of evidence and truth that govern testimony in the context" rather than because she offers a "personal guarantee or invitation to trust".³⁹ The arguments above exemplify the importance of this institutional aspect of our reliance on scientific testimony. Our reasons to defer to scientific experts are not grounded on a judgment that they are more epistemically competent than we are plus a judgment of sincerity, but also on a specific feature of the social institutions which govern scientific assertion. Any account of deference to expert testimony must take account of this fact.

This theoretical point relates to a more practical point. In §3, I suggested that it is extremely unlikely that claims which meet high epistemic standards will not be well-enough established for practical acceptance. Of course, we could imagine someone who says "the climate scientists are correct, relative to norms of good science, to say that climate science is happening, but I want even more evidence". In practice, however, no-one seems to make

³⁷ Goldman himself already defines expertise non-comparatively: "being an expert is not simply a matter of veritistic superiority to the rest of the community. Some non-comparative threshold of veritistic attainment must be reached" (*op.cit.*, p.147). Unfortunately, he does not say more; this paper shows why this topic is important.

³⁸ Nickel, P "Norms of assertion, testimony and privacy" *Episteme* 10(02) (2013), 207-217.

³⁹ Nickel, *op.cit.*, p215

such arguments. Those who wish to justify failure to defer to climate scientists seem more likely to argue that climate scientists are bad scientists than that even good science might not be good enough. For example, they point to e-mails taken from the Climate Research Unit at the University of East Anglia which, they claim, show that climate scientists fudge data, thereby failing to meet the norms of good science.⁴⁰ If reasons to defer to testimony do have an institutional dimension, then we can understand why such attacks are so powerful. However, these considerations point to a strength of the IPCC's work. Even if individual (groups of) climate scientists might fail to live up to scientific norms, the IPCC's work involves scrutiny of each piece of research by a very large number of different scientists. Therefore, to doubt the IPCC lives up to the norms of science requires showing more than that there are bad apples, but that the entire community of climate scientists is institutionally corrupt. This seems unlikely. Those who are sincerely worried about the epistemic risks involved in deferring to individual scientists should be less concerned about the IPCC.

My final comments concern the relationships between my arguments and value free science. At a theoretical level, the considerations in §3 challenge arguments that scientists who face problems of inductive risk must appeal to non-epistemic values. Rather, maintaining fixed, high epistemic standards can be justified because this ensures that scientists' claims can serve as a fixed point in political debate.⁴¹ I develop these comments elsewhere but note their

⁴⁰ See, for example, Delingploe, J *Watermelons: How Environmentalists are Killing the Planet, Destroying the Economy and Stealing your Children's Future* (London: Biteback, 2012), Chap.2

⁴¹ My arguments might also have implications for epistemic contextualism. Henderson has argued that, even if we are contextualists about knowledge, we should maintain high standards for ascribing knowledge to “*general-purpose source communities* – communities of inquirers having a social role of producing information of such a high epistemic quality that a somewhat indeterminate range of groups might freely draw on their results without hesitation” (Henderson, D “Gate-keeping contextualism” *Episteme* 8(01), 2011, 83-98, p87). One way of understanding my claims is that because climate scientists are “general purpose

practical relevance.⁴² There are many very different causes of the political patterning of opinions about climate change. Plausibly, many of these causes are not amenable to rational debate. Furthermore, even when a climate change “sceptic” raises concerns which can be understood in my terms, these arguments are more likely public rationalisations of, rather than motivations for, failures to defer to climate scientists. Therefore, the arguments of this paper may not provide a useful tool for improving public debate. However, this does not mean that they do not have practical implications. Consider, again, the example of the WAIS. It might seem that, given the vast potential costs associated with not estimating the likely rate of WAIS collapse, the IPCC should have been less reticent about using non-peer-reviewed results. However, such thoughts should be resisted. Although a body which was laxer in its epistemic standards than the IPCC might be less likely to fail to report important phenomena, it would also be one whose claims could reasonably be rejected on political grounds. Although dangerous, the IPCC’s reticence is justifiable.

source communities”, they should only count as knowing claims when those claims are very likely to be true.

⁴² Reference omitted