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Scientific Consensus-seeking

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Overview

A widely shared expectation of science is that it speaks authoritatively about how the physical world works and therefore about what the consequences of different human actions and policy interventions are likely to be in that world. Science, and therefore the scientist, is believed to offer public life something different – something more truthful and hence more authoritative – than offered by politicians, journalists, lawyers, priests or celebrities. Scientists 'reaching a consensus' and 'speaking with one voice' are integral to science's projection of epistemic authority. This is especially the case with the Intergovernmental Panel on Climate Change (IPCC), where its authority is perceived to rest on its communication of a scientific consensus. This chapter first summarises the nature of consensus-making in science in general, before examining the IPCC's consensus-seeking practices. It then evaluates some of the arguments for and against the pursuit of consensus by the IPCC and concludes by highlighting some future challenges for the IPCC with respect to its pursuit of consensus.

19.1 Introduction

The pursuit of consensus has been central to the mission, procedures and communication of the IPCC's knowledge assessments. This pursuit has been grounded in the belief that an intergovernmentally owned and transnational knowledge consensus about climate change is a prerequisite for effective policymaking. From its beginning, the IPCC has sought and delivered a consensus on what is deemed to be known scientifically about climate change. For example, in the foreword to the IPCC's very first assessment – the Working Group I (WGI) First Assessment Report (AR1) published in 1990 – the Co-Chair Sir John Houghton wrote 'peer review has helped *ensure a high degree of consensus*

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amongst authors and reviewers regarding the results presented' (IPCC, 1990a: p.v, emphasis added). This aspiration for authority-through-consensus has been evidenced in the rhetoric of IPCC communications. For example, in November 2007, just ahead of the publication of AR4's Synthesis Report, the IPCC promoted its consensus processes thus: '2500+ scientific expert reviewers; 800+ contributing authors; and 450+ lead authors; from 130+ countries; 6 years work; 4 volumes; 1 report. The core findings of the three volumes integrated in the most policy-relevant scientific document on climate change for the years to come'. The sheer weight of expertise compressed into 'one report' is offered by the IPCC, tacitly, as evidence of its epistemic authority.

This association between consensus and authority is used by social and political actors and commentators outside the IPCC, whether they be politicians, lobbyists, advocates or critics. The stronger the consensus, it is claimed by advocates, the greater the authority the IPCC has in public or policy debates. Critics on the other hand, seek to challenge the IPCC's consensus in order to weaken its public authority. Politicians also draw upon the language of consensus. For example, Kevin Rudd, the then Australian Prime Minister, announced in a speech on 6 November 2009, just before COP15 in Copenhagen:

> This is the conclusion of 4,000 scientists appointed by governments from virtually every country in the world . . . Attempts by politicians in this country and others to present what is an *overwhelming global scientific consensus* as little more than an unfolding debate . . . are nothing short of intellectually dishonest. They are a political attempt to subvert what is now a *longstanding scientific consensus* (emphases added).

The role of the IPCC's consensus in public debates and political negotiations about the goals and instruments of climate policy continues to provoke vigorous arguments. Some scientists are critical of consensus-seeking practices in the IPCC because of their ostensibly conservative outcomes. Oppenheimer et al. (2007), for example, argued that the IPCC's search for consensus with respect to future sea-level rise deflected attention from the full exploration of scientific uncertainties, to the detriment of robust policymaking. On the other hand, some political philosophers accuse consensus-driven knowledge assessments of subverting good scientific practice, by masking legitimate epistemic *dis*sensus (Beatty & Moore, 2010). These arguments about the legitimacy, outcomes and effects of the IPCC's consensus-seeking practices highlight long-standing debates in the history and philosophy of science about the nature of epistemic consensus (e.g. Fuller, 2002) and in science and technology studies (STS) about the legitimacy of knowledge consensus practices in science–policy interactions (e.g. Jasanoff, 2004). They also reflect debates in political science about the role and status of expert representation and deliberation in healthy democracies (e.g. Brown, 2009). These academic

debates about the nature and impact of consensus in regulatory scientific institutions and knowledge assessments are interesting in general terms. But they become crucially important for public policy with respect to specific concerns such as climate change.

This chapter first summarises the nature of consensus-making in science in general, before examining the IPCC's consensus-seeking practices. It then evaluates some of the arguments for and against the pursuit of consensus by the IPCC and examines whether such consensus is epistemically appropriate and politically desirable. It concludes by highlighting some future challenges for the IPCC with respect to its pursuit of consensus.

19.2 The Nature of Scientific Consensus

Making and defending a scientific consensus can be understood to fulfil a number of different functions. For example, a consensus can validate specialist knowledge about some physical phenomenon and hence act as a 'truth claim'. Establishing such a consensus can bring a new epistemic community into being or else consolidate the perceived authority of an existing epistemic community (Haas, 1992). A consensus can also offer a pragmatic way of bringing authoritative knowledge into public circulation when important policy decisions loom. Oreskes (2019) argues that consensus-making – 'scientists speaking with one voice' – is central to the practice of science. On the other hand, none of these functions of consensus-making in science stands unchallenged; there has long been a strand of philosophy that interrogates the nature of consensus in science. Thus Rescher (1993) argues against the desirability of consensus, claiming that cognitive pluralism in science is inescapable, while Miller (2013) points out that the lack of social diversity in an epistemic community undermines its claim to forge a legitimate consensus. In a similar vein, Stirling (2010) argues that democratic decision-making is better served by epistemic pluralism – 'keeping things open' – than by seeking a knowledge consensus.

The slippery and contested nature of a knowledge consensus prompts STS scholars such as Harry Collins to claim 'we don't really know what scientific consensus is' (quoted in Jomisko, 2013: 28). And it results in a proliferation of knowledge consensus typologies and the recognition of multiple practices of consensus-making. Scholars also talk about 'strong' and 'weak' consensuses. Gilbert (2002), for example, puts forward a non-summative account of group belief (i.e. consensus), which distinguishes between the group's collective belief in a claim and the range of beliefs of the individual members of the group. Similarly, Fuller (2002: 207–232) distinguishes between 'essential' (group belief arrived at through deliberation) and 'accidental' (convergence of autonomous

individual beliefs) consensus. And there seems no consensus about *how* a scientific consensus should best be arrived at. Guston (2006), for example, proposes the use of voting procedures in scientific assessments, whilst Verheggen et al. (2014) enumerate consensus in climate science through expert surveys.

When applied to matters of significant public policy concern – such as climate change – these questions about the nature and legitimacy of a knowledge consensus become important to answer. There may be a general recognition in philosophy of science that cognitive diversity is inevitable, that consensuses are unstable over time, and that what matters for the cultural authority of science is the legitimacy and integrity of *the process* of consensus-making (Beatty & Moore, 2010). But this theoretical understanding of consensus in science begs two important practical questions when it comes to pursuing and interpreting knowledge consensus in the IPCC: When is making a knowledge consensus *epistemically appropriate*? And when is it *politically desirable?*

In relation to the first question, Miller (2013) asks under what conditions might an epistemic consensus be deemed 'a mark of knowledge'. He suggests three conditions need to be satisfied:

- the *social calibration condition* – the use of common evidential standards and ontological schemes;
- the *apparent consilience of evidence condition* – different lines of evidence seem to converge;
- the *social diversity condition* – parties to a consensus should have diverse social profiles.

The case of the IPCC presents particularly challenging circumstances for these three conditions to be met. Social calibration and the consilience of evidence are more exacting conditions when dealing with a wide range of disciplinary epistemologies and traditions (Jasanoff, 2011b), such as the IPCC embraces. And the social diversity condition reveals the tension between parties to a consensus being selected on the basis of formal expertise versus national allegiance or other non-epistemic criteria (see **Chapter 7**).

With respect to the second question – when is a consensus politically desirable – a range of factors come into play. These can broadly be captured by the idea of civic epistemology (see **Chapter 23**), which challenges the universal legitimacy and efficacy of a knowledge consensus generated by a transnational body such as the IPCC. *How* a knowledge consensus is made, and whether these processes are perceived as credible and legitimate within any given polity, will then determine how – and how effectively – consensus claims are used in public discourse and policy advocacy. What is politically effective in Germany, for example, may be

very different from what is effective in the United States. Policy traps lurk if a singular transnational knowledge consensus is used to guide or justify the design of policy instruments to be applied across different political cultures of risk management (Rothstein et al., 2012).

19.3 Consensus Practices in the IPCC

Little systematic theoretical or empirical attention has been given to exactly *how* knowledge consensus within the IPCC is constructed or how these processes have evolved historically. Where such consideration *has* been given to the nature of the IPCC's consensus, it has often been poorly grounded in empirical evidence (e.g. exchanges with regard to the early IPCC consensus; see Boehmer-Christiansen, 1996; Shackley, 1997), or else been approached using insights from limited disciplinary perspectives. For example, Elzinga (1996) reflected from an STS perspective on the shaping of the IPCC's 'worldwide consensus' and Goeminne (2013), likewise, using STS and political science. Conversely, Curry and Webster (2013) examined the IPCC's consensus in terms of scientific practice, but without drawing upon the insights of STS or philosophy of science. The clutch of studies which have sought to enumerate the strength of the 'climate consensus' (e.g. Oreskes, 2004; Verheggen et al., 2014) have done so with little engagement with political science (Pearce et al., 2017b).

IPCC reports generate different types of consensus statements. For example, in Summaries for Policymakers (SPMs) there is line-by-line agreement between government representatives and scientists, which is a different form of consensus than that which emerges within chapter teams. For SPMs, IPCC procedures allow for issuing formal 'minority reports', although this option is rarely utilised (Livingston et al., 2018). Central to the IPCC's consensus practices is how the final assessment products capture and represent uncertainty in scientific knowledge. The IPCC has evolved an elaborate series of guidelines for communicating uncertainty in its knowledge statements (see **Chapter 17**). Yet among observers and participants of the IPCC, there are ambiguities about whether consensus statements reflect 'a lowest common denominator consensus view of the vast majority of scientists' (Edwards & Schneider, 1997: 13), or whether the IPCC 'brings controversy within consensus, capturing the full range of expert opinion' (Edwards, 2010: xvii). Guidance issued ahead of AR6 asked chapter teams to seek the 'full range of views', but stopped short of saying exactly what this means or how this should be done. It is also important to recognise the distinction between consensus-as-product – offering the 'lowest common denominator' between varying expert opinions – and consensus-as-process – negotiating between different scientific interpretations of theory or evidence (see Box 19.1).

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Box 19.1
Controversies and IPCC consensus

The ambiguity about whether an IPCC consensus captures the 'lowest common denominator' about which all experts can agree or the 'full range of expert opinion' is present in a number of controversies. One example concerns the case of the IPCC's estimates of future sea-level rise in AR4 (O'Reilly et al., 2012). Hansen (2007) argued that these sea-level rise projections were troublingly conservative, because the need for consensus meant that emerging and still uncertain work about ice sheet dynamics was discounted by the relevant IPCC chapter team. Hansen painted the IPCC's consensus projections as a lowest common denominator, identifying 'scientific reticence' by experts in their avoidance of exploring more extreme possibilities. For Oppenheimer et al. (2007: 1506), the need for potentially consequential information in the 'tails' of probability distributions meant that the 'establishment of consensus by the IPCC is no longer as critical to governments as a full exploration of uncertainty'. This controversy about sea-level rise reflected uncertainties in different modelling strategies.

Epistemic controversies in the IPCC about the value of human lives, the contribution of different countries to atmospheric greenhouse gas levels or links between climate change and violent conflict, cast the problem of consensus-seeking in a different light (see **Chapter 16**). Despite the apparent 'mechanical objectivity' of the scenarios and models that underpin the IPCC's knowledge claims, a growing emphasis has been placed on 'expert judgement' as the key process for generating consensual knowledge (Mach & Field, 2017). And in WGII and WGIII, disagreement can be observed over where exactly the boundary between 'facts' and 'values' lies. This leads to conflicts between authors and governments, the latter perceiving their interests to be threatened by overly subjective constructions of climate risks. On the one hand, this boundary work can be read as the naked defence by governments of their political–economic interests. Equally, it can be understood as an expression of different expectations of what constitutes 'scientific assessment', of where science ends and politics begins (see **Chapter 21**). In pursuing consensus, the IPCC's WGs are therefore not just engaged in resolving epistemic uncertainties. They are mediating between different ideals of what knowledge consensus means in practice.

19.4 Arguments in Favour of Consensus

The argument in favour of the IPCC seeking a scientific consensus on climate change is that by doing so it reflects what science supposedly is uniquely disposed to be good at – applying rules of reasoning and inference, which lead unambiguously and universally from evidence to conclusion. The same evidence presented to the same disciplined minds leads to precisely the same conclusion. In this view, a *lack* of consensus would undermine the authority of science. It might

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suggest that sufficient effort had not been made to reconcile conflicting views among experts, or else that personal or cultural biases and values had protruded into the reasoning process.

This is the position implicitly assumed by Sir John Houghton in the foreword to the AR1 WGI report cited earlier. His comments on IPCC's consensus were immediately preceded by the observation that: 'Although . . . there is a minority of opinions which *we have not been able to accommodate*, the peer review has helped ensure a high degree of consensus amongst authors and reviewers regarding the results presented. *Thus*, the Assessment is an authoritative statement of the views of the international scientific community at this time' (IPCC, 1990: p. v, emphasis added). The IPCC's assessment of knowledge is authoritative *because* it is a consensus. Paradoxically, this is also the view of many critics of the IPCC who assert that science properly conducted – through unbiased and structured reasoning processes – *should* lead to unanimous consent (Oreskes, 2019). On such a reckoning, simply pointing to the existence of a minority dissenting position that contradicts an IPCC consensual statement is sufficient to undermine the authority of the IPCC's consensus. The symbolic and political power that a scientific consensus affords the IPCC would thereby be undermined (Pearce et al., 2018). This view of consensus in science is one that offers a wide variety of protagonists a useful defence against cultural relativists.

19.5 Arguments against Consensus

The earlier defence of consensus reflects a very particular (purist) view of scientific knowledge, which scholars such as Bruno Latour (1993) have described as the 'modernist illusion of science'. Silberzhan et al.'s (2018) experiment, for example, shows that random groups of similarly qualified experts can reach quite different conclusions when presented with identical empirical evidence.

There are three main groups of arguments against the pursuit of a knowledge consensus by the IPCC. First, the requirement of consensus can be pernicious; in order to protect the authority of a group it encourages premature agreement among experts where there is none (Beatty & Moore, 2010). Some argue that the IPCC should more openly embrace the idea of expert elicitation, or even expert voting: 'A scientific body that does not partake in . . . a politics of transparent social choice – one that hides both its substantive disagreements and its disciplinary and sectoral interests beneath a cloak of consensus – is not a fully democratic one' (Guston, 2006: 401). For example, such an approach to capturing disagreement could usefully have been applied to the case of the sea-level rise controversy in AR4 (see Box 19.1). Expert elicitation makes disagreements explicit and better reflects the quasi-rationality of scientific deliberation.

Second, the presence of officially sanctioned credible minority views – thereby revealing the extent of expert dissensus – can enhance the authority of science in public and political life (Rescher, 1993). It would show that the deliberative procedures of the IPCC were fair and accommodating to the full range of accredited views. The implication of this argument is that the IPCC assessment process should not just *allow* minority reporting in its rules of procedure, but ensure that minority reporting is *actively facilitated*. 'Science would provide better value to politics if it articulated the broadest set of plausible interpretations, options and perspectives, imagined by the best experts, rather than forcing convergence to an allegedly unified voice' (Sarewitz, 2011: 7).

A third group of arguments against the necessity of scientific consensus works by analogy. Majority rule works very effectively in maintaining order in social institutions, such as parliaments and the courts that involve voting MPs and juries. Consensus is not required for a legal ruling or judgement to carry authority in wider public settings. And whatever differences between the nature of scientific enquiry and political (or jury) debate might be insisted on, it must be recognised that scientific assessments such as the IPCC are established explicitly as social (i.e. deliberative) institutions. They scrutinise and evaluate evidence, much like a judicial process (Shapin, 2010). There are many other dimensions beyond just 'unanimity of view' if institutions are to become trusted and authoritative amongst members of a polity – for example, fair and agreed procedure, respect for dissent, and acceptance of outcomes.

Even if one accepts that a scientific consensus is desirable, in many fields of climate change consensus is elusive. Agreement – i.e., 'high confidence' – exists within some specific research communities, for example among detection and attribution studies leading to affirm the reality of human influence on the climate system. But in other fields relevant to climate change impacts and policy such a consensus does not hold. For example, there is 'low confidence' in the magnitude of the contribution of permafrost thawing to carbon cycle feedbacks, on whether – and with what speed – Antarctic ice sheets might contribute substantially to sea-level rise and on whether Arctic sea-ice thawing causes increases in mid-latitude climate variability (IPCC, 2021a).

19.6 Achievements and Challenges

Over its 34-year history the IPCC has brought a substantial degree of 'epistemic order' to scientific knowledge about climate change. The founding chairman of the IPCC – Bert Bolin – sought to bring order out of what he perceived in 1988 to be 'chaos' in the public perception of climate science (Bolin, 2007: 49). Reflecting this desire, the IPCC has managed to organise the scientific community to increasingly approximate a univocal stance on climate change knowledge. As a

social accomplishment, this was already recognised nearly 25 years ago by van der Sluijs et al. (1998) in their analysis of the IPCC's consensus statement about the climate sensitivity; this consensus estimate – a range of 1.5–4.5 °C – 'anchored' the scientific terms of the policy debate.

However, the IPCC's search for consensus across all areas of relevant scientific and social scientific knowledge has not always been easy and there are new challenges ahead. As the IPCC seeks to respond to changing political and public expectations about its role, how it establishes and communicates a knowledge consensus on climate change will come under ever closer scrutiny. As future assessments engage more directly with policy solutions to climate change – and as the IPCC furthers its enlistment of more diverse forms of knowledge and expertise – informal modes of consensus-making relying on unstructured deliberation will be found wanting. For example, future engagement by the IPCC with more explicitly value-based forms of knowledge (see **Chapter 13**) will question whether consensual statements are epistemically, or even ontologically, appropriate or politically desirable. These tensions have already surfaced in previous ARs and will require more direct handling in the future. Formal procedures such as voting, expert elicitation and minority reporting – far from weakening the authority of the IPCC – may in fact be the only way in which the IPCC can remain authoritative and relevant for policy.

Three Key Readings

O'Reilly, J., Oreskes, N. and Oppenheimer, M. (2012). The rapid disintegration of projections: the West Antarctic Ice Sheet and the IPCC. *Social Studies of Science*, 42(5): 709–731. http://doi.org/10.1177/0306312712448130

This article offers a very good case study of how the IPCC handled disagreement among experts about the contribution of ice-sheet dynamics to future sea level, and hence the practical difficulties of reaching consensus.

Pearce, W., Grundmann, R., Hulme, M., Raman, S., Kershaw, E. H. and Tsouvalis, J. (2017a). Beyond counting climate consensus. *Environmental Communication*, 11(6): 723–730. http://doi.org/10.1080/17524032.2017.1333965

Using the case of climate change, this review article explains the political uses and limits of scientific consensus, in particular when that consensus is arrived at through non-deliberative techniques.

van der Sluijs, J., van Eijndhoven, J., Shackley, S. and Wynne, B. (1998). Anchoring devices in science for policy: the case of consensus around the climate sensitivity. *Social Studies of Science*, 28(2): 291–323. http://doi.org/10.1177/030631298028002004

This was one of the first published studies that explored how and why consensus in climate science emerged through the IPCC's knowledge assessment practices; it takes the seminal case of 'the climate sensitivity'.