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Going beyond science-policy interaction? An analysis of views among intergovernmental panel on climate change actors

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ABSTRACT

Scholarly literature on science-policy interaction is typically divided between advocating that science and policy need to be brought closer together or separated. In a recent article in this journal, Sundqvist and colleagues [Sundqvist et al. (2018) *Oneworld or two? Science-policy interactions in the climate field*, *Critical Policy Studies*, 12:4, 448–468] proposed a typology that structures this debate. We use their typology to conduct a text analysis on empirical material from the Intergovernmental Panel on Climate Change's (IPCC) internal consultation on its future. We find that science-policy practitioners are not as divided as the scholarly debate. Moreover, while the typology is a powerful tool in unearthing differences in opinion regarding science-policy interaction, it comes at the price of reductionism. We suggest that a continuum, instead of separate boxes, helps visualize the large spectrum of ideas. However, regardless of type of typology, it is important that the discussion goes beyond the relationship between science and policy, and beyond an unconstructive battle between extremes. It is neither possible nor normatively desirable to demarcate 'science', 'policy' and other actors. Whilst this discussion is of central importance to the IPCC, greater focus should be put on its relationship with society.


KEYWORDS

Science-policy interaction; climate regime; expertise; IPCC; policy-relevant knowledge

1. Introduction

International climate policy and climate science have developed side by side and are arguably more firmly coupled than ever before, not least through the decision by the Intergovernmental Panel on Climate Change (IPCC) to synchronize its assessment reports with the global stocktaking of the United Nations Framework Convention on Climate Change (UNFCCC) (IPCC 2016). International expert panels such as the IPCC are often seen as representing the beacon of reason and sound scientific justification. However, the role of science as an advisor to policy is contested (Geden 2018; Mahony and Hulme 2018; Wellstead, Howlett, and Rayner 2017), a discussion that can be linked to scholarly debate over the role that scientists can and should have in society (Bremer 2017; Moore 2016; Spruijt et al. 2014). Recently, this discussion has been given renewed

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attention through so-called post-truth politics. Post-truth politics – politics based on what feels right, rather than facts – are fed by a growing distrust in expertise and a change in how information is disseminated to the general public (Brulle 2019; Lewandowsky, Ecker, and Cook 2017), provoking counter-movements like the ‘March for science’ (Motta 2018). To say that scientific advice finds itself in a paradox – torn between its quest to provide value-free information to policy and allegations of doing exactly the opposite – might not be an understatement.

The debate for and against science as advisor to policy, or indeed the discussion about a post-truth era, is, however, not a new one (Kelly and Linsey 2018). In its simplest terms, the argument is that policy matters are too complex for policy to handle on its own and expertise is needed (e.g. Haas 1992). As science and policy are drawn closer together, the line between them is inevitably blurred, which some see as problematic (e.g. Boehmer-Christiansen 1994; Stressheim and Kettunen 2014). Another common concern about science as advisor to policy is that it risks undermining the democratic ground of the decision-making process (Forsyth 2011; Jasanoff 2010). In the case of climate change, this debate has often revolved around the role the IPCC has played (e.g. Berg and Lidskog 2018b; Haas and Stevens 2011; Lidskog and Sundqvist 2015).

In a recent article published in this journal, Sundqvist et al. develop a typology of science-policy interaction to be used, as they say, to bring about ‘more nuanced descriptions and prescriptions’ (2018, 449) of science-policy interaction in the field of climate change. Sundqvist and colleagues find that the view on the ideal relationship between science and policy in the scholarly debate is often built on normative ideas, often opposing and, as they say, ‘confusing’ (2018, 451). Their aim is to make sense of the debate and to provide better tools for future analyses. The authors find that the view differs greatly between scholars and argue that this discussion would have much to win by acknowledging that we need both ‘separation’ and ‘integration’ and to accept an ‘aporetic situation, one that is constantly in doubt and never finally resolved’ (2018, 450). While they use the climate regime as a case through which they discuss their proposed typology, they base their typology on a review of the literature and indicate that ‘an empirically based explanation of the spectrum of different positions that exist [...] in science-policy practice’ remains for the future (Sundqvist et al. 2018, 449).

In this article, we employ Sundqvist et al.’s typology on one case of science-policy practice – that of the IPCC-led consultation on its future launched in 2013 and finalized in 2015. More specifically, we use survey material from IPCC authors, governments, and other stakeholders in which they reflect upon the future of the IPCC. Being an intergovernmental body with a clear scientific and political side, the material gives insight into how the actors that are closely involved with the work of the IPCC view the relationship between science and policy.

The aim of this article is thus two-fold. Theoretically, it aims to advance the discussion on science-policy interaction. Empirically, it investigates how key actors within the IPCC-process view the ideal distance between science and policy. We argue that while a typology like Sundqvist et al.’s is a powerful tool, employing it inevitably means going down the road of simplification. In brief, we find this simplification problematic in two ways. The first problem is technical. We find that as in practice the debate about the science-policy interface is not restricted to these two

spheres, analyzing empirical material using the typology is challenging. The second one is normative. It is problematic, we argue, to emphasize the extreme ends, instead of bringing forward the full spectrum of opinions. It is in the nuances we may find compromise, not the extremes, and solutions to problematic science-policy interaction may be best sought outside these two spheres. In [sections 4 and 5](#), we develop these arguments further. Before that, in [section 2](#) we provide a short presentation of the typology followed by a description of our material, then in [section 3](#), we present the results of our analysis.

2. Typology and empirical material

2.1. Typology

Sundqvist and colleagues (2018) present a typology that aspires to bring further clarity to the debate regarding science-policy interaction in the field of climate change. Having conducted a review of scholarly literature on climate science and policy, Sundqvist et al present their typology as consisting of four diagnoses, which describe and prescribe the relationship between science and policy:

- ‘Desirable one-world’. The relationship between science and policy is *described* as tightly coupled and this is also the *prescribed* ideal scenario;
- ‘Undesirable one-world’. The relationship between science and policy is *described* as tightly coupled but this is not the *prescribed* ideal scenario;
- ‘Undesirable two-worlds’. The relationship between science and policy is *described* as separated but this is not the *prescribed* ideal scenario;
- ‘Desirable two-worlds’. The relationship between science and policy is *described* as separated and this is also the *prescribed* ideal scenario.

It is of course unsurprising, that those who publish on such topics in the scholarly literature are generally dissatisfied with the status quo, and therefore the two ‘undesirable’ diagnoses receive the most attention in Sundqvist et al’s article. In the undesirable one-world, science and policy are too tightly coupled, which leads to the scientization of policy and the politicization of science embodied in scientific reductionism, consensus science, and/or the marginalization of voices. Solutions proposed for this are by nature diverse, but in general involve an increased plurality of voices contributing to both scientific and political discussions and policy options less dominated by science, or alternatively more independence for science. In turn, the main features of the undesirable two-worlds’ situation is that the gap between science and policy is seen as a problem, and that science and policy need to be brought closer together. Solutions proposed for this are thus better communication, closer cooperation, and adaptability to the changing needs of both policy makers and scientists.

Although the scholarly literature appears torn between these two diagnoses, in practice, Sundqvist et al observe, using the case of the relationship between the UNFCCC and the IPCC, science and policy are sometimes integrated, sometimes separated. Against this backdrop, we ask whether practitioners in the same field are as torn as Sundqvist et al found the scholars to be, or if their views are more in line with

the institutional structure. In the analysis that follows, we build on the paper by Sundqvist et al by studying how the actors most closely involved with the IPCC-process understand the relationship between science and policy, using the typology as a tool to structure the material. While Sundqvist and colleagues' typology is the result of structuring the scholarly literature, this literature is in turn built on observations. Consequently, we argue, it cannot be understood in isolation. Sundqvist et al used insights about the institutional arrangements within the field to discuss their results, we complement this by looking in detail at one specific case of science-policy interaction. Applying the typology to empirical material is therefore more of a conversation with the scholarly literature, than a test of Sundqvist et al's model. That said, the application of the typology nevertheless revealed some of its strengths and weaknesses, which are further discussed in [section 4](#).

2.2. Empirical material

The IPCC has reviewed its rules and procedure after every assessment. The last consultation started after the completion of the Fifth Assessment Report (AR5). Letters were sent out to governments, IPCC authors, contributing authors and reviewer editors, observer organizations, the Technical Support Units (TSU) to the IPCC Working Groups (WG) and the IPCC Secretariat, asking them to send in their views on the future of the IPCC (hereafter 'the respondents' and 'the submissions'). We generally treat all respondents as 'practitioners', as they have in common that they are all engaged in the work of the IPCC, in one way or another. Even though in theory it may be possible to draw straight lines between these groups, in practice, we argue, it is not. For instance, IPCC-authors sometimes act as government representatives at the UNFCCC, and government representatives covering 'science' issues at the UNFCCC are often trained scientists¹. This is not to say that differences between these groups cannot be found, indeed in a few places below we draw attention to such differences, but that differences should be treated with caution. This is also in line with much of the literature in the field regarding the co-production of science and policy in the context of the IPCC (e.g. Beck 2011; Beck and Mahony 2018; Livingston, Lövbrand, and Olsson 2018), and Sundqvist et al. (2018) observation that the processes of integration and separation between science and policy are both at work in the relationship between the UNFCCC and the IPCC.

The questions asked built upon the mandate of the task group that was set-up to work on the future of the IPCC. The respondents were asked four questions – regarding 1) the future products of the IPCC, 2) its modus operandi, 3) participation, and 4) other matters².

We analyzed the responses to the first three questions using the Sundqvist et al's typology. This material is freely accessible from the IPCC webpage³. All text was analyzed in NVIVO. As the survey dealt with the future of the IPCC, most respondents expressed a desire to see some form of change in the IPCC. A minority of respondents stated that the IPCC does not need to change. Although these actors most likely subscribe to one of the 'desirable diagnoses', it was often not possible to understand their view on the distance between science and policy, mostly due to short responses. We focused, therefore, on those actors who wanted change and had something to say about the relationship between science

and policy specifically. This means that, like Sundqvist et al, our analysis focused on the undesirable one-world diagnosis (prescribing two worlds/increased distance between science and policy) and the undesirable two-worlds diagnosis (prescribing one world/decreased distance between science and policy).

Although the relationship that IPCC participants and scholars who generate literature on the IPCC have to science-policy interactions are different, we posit that this is a discussion that needs to be had more explicitly. The three questions asked in the IPCC's consultation on its future and their respective responses, focusing on the products, procedures, and participation in IPCC assessment reports, reach to the core of the debates within the undesirable two-world and undesirable one-world diagnoses. Even though this may not mean that those responding to the consultation recognize or reflect on the distance between science and policy specifically, it cannot be denied that demands and requests from IPCC-actors have implications for the relationship between science and policy, and vice versa. As shall become apparent, the application of Sundqvist et al's typology to our material is not a perfect one. Moreover, our analysis reveals limitations both with the typology itself, but also potentially within the broader scholarly debate. We look at these and related questions in the remainder of this paper.

3. The distance between science and policy in the future IPCC

In the sections that follow, we present the results of our analysis of the IPCC-survey and application of the typology by Sundqvist et al. We provide examples from the material on how responses corresponding to the two perspectives look. More examples are collated in Supplementary Material 2.

The material was coded with respect to the three questions posed in the IPCC-future survey. This provided an overview of the dominant perspectives and overarching differences between actors. Next, the coded material was reread and further analyzed with respect not only to the typology of Sundqvist et al but also the broader science-policy literature. We separated what we thought were clear examples of subscribing to one diagnosis or another, and examples that were clearly saying something about science-policy interaction but not easily categorized. The latter were analyzed in more detail and further discussed in [section 4](#).

3.1. Question 1: what should be the future products of the IPCC?

The first question regarding the future products of the IPCC, due to an emphasis on communication was dominated by the 'undesirable two-worlds' perspective, which calls for a decreased distance between science and policy. This was reflected in the responses from both authors and governments.

A key feature of the undesirable two-worlds diagnosis is that science and policy are considered to be too far apart and that their relationship could be improved through aims to bridge the two. In the submissions we found numerous references which stress the need for IPCC products to be better communicated to policy. For instance, one government stressed that:

An essential aim of the IPCC assessment cycle is that the SPMs [Summary for Policy Makers] are actually widely read and understood by policymakers. To successfully meet this goal the author groups may benefit from enhancement of the assistance of professional science writers to help crafting the text to the intended readership (IPCC 2013, 142, Sweden).

An assumption here was that the IPCC does not manage to completely reach its target audience through the form and structure of its products. In particular the large and complex nature of its reports were emphasized by several respondents. One way that it was suggested that this should be remedied was through considering the timing of assessment reports. For example, one country stressed that:

If the cycle is longer than 5 years, then the public community might lose interest [...] due to the current trends of climate negotiations, we feel that it is crucial to keep this 5 year cycle for the informed decision making by the governments (IPCC 2013, 101, Maldives).

Some respondents even suggested the need for 'more frequent and smaller assessments' (IPCC 2014, 5, author AR5 WG2), or that 'shorter, more focused reports might be more useful for specific regions or sectors' (IPCC 2014, 7, author AR5 WG2). In addition to better communication of the reports, the emphasis here was on providing a more explicit link between policy and science, in particular recognizing the 'demands from countries' whereby

[f]ocus should be placed on 'fast track' products, such as methodological and technical guidance, expert meetings and task forces, with a view to provide countries with the necessary inputs and tools for gathering data and further developing and implementing their policies and actions to fight climate change (IPCC 2013, 122, Brazil).

Here the definition of a usable IPCC product is one that is developed in response to specific policy demands, but also well communicated, thus tightening the linkages between science and policy.

While some respondents advocated that science and policy should be brought closer together, there were also those who, in line with the undesirable one-world diagnosis believe that the connection has become too tight. Sundqvist et al emphasize that this closeness is not solely about the organizational closeness between the IPCC and the UNFCCC, but rather about interdependence in terms of ideas. One way in which this is apparent in the submissions is through an emphasis on the need to bring in more diverse voices – either through emphasizing the need for greater disciplinary diversity or through the incorporation of new sources, like gray literature. There is a general tendency for author respondents to highlight the former and governments the latter. The limited extent to which the IPCC reports truly integrate disciplines and cross-cutting themes was highlighted by one respondent who stated:

My impression of AR5 was that it was dominated by economics as a discipline, and IAMs [Integrated Assessment Models] as a tool. AR6 should return to the integration of SD [sustainable development] across all chapters, rather than dealing with it in a couple of chapters. The perspective of all disciplines should be balanced, not privileging economics (IPCC 2014, 98, author AR5 WG3).

In addition to the consideration of particular disciplinary perspectives, many respondents drew attention to the need for expertise from a broader set of sources. For instance as one country stated:

It is necessary to increase that of non-English literature, national assessment reports and other assessment products. [...] Sound rules on the citation of grey literature should be made to take documents like national climate change assessment reports and climate change bulletins into consideration in the IPCC assessment process (IPCC 2013, 39, China)

Another recognized that ‘organizations other than IPCC may be better positioned to respond to demands for rapid information on emerging scientific literature that has not yet undergone a full assessment.’ (IPCC 2013, 30, Canada). The problems with the nature of consensus science in the IPCC was also highlighted by some respondents, who saw that the politically charged settings in which the IPCC Summaries for Policy Makers were approved led to a diluting of the key messages of the report, saying that even though IPCC-authors want to provide policy with relevant information, facts and statistics ‘[...] if we may think those will be rejected at the final government review, we will lose incentive to provide the best information to policymakers’ (IPCC 2014, 101, author AR5 WG3). Overall, here, the lack of alternatives or plurality of voices within some products of the IPCC is seen as a problem, and suggestions are made on how to decouple science and policy through diversification.

3.2. Question 2: what would be the appropriate structure and modus operandi for the production of these IPCC products?

When responding to the question about structure and modus operandi, respondents were in general less concerned with the relationship between science and policy and many did not mention this at all. Among those who did, the undesirable two-worlds diagnosis was the most common.

The answer to this question was, naturally, often linked to the answer to the previous question about future products. For instance, one government proposed the introduction of fast-track products in response to the first question, and called for ‘[p]rocedures for the production of “fast track” assessments on very specific issues of interest to policymakers while keeping the high quality’ in response to the second question (IPCC 2013, 17, Belgium). Similarly, another government argued that the ‘IPCC working group structure and procedures should be adjusted to provide the expedite development of smaller and specific reports, as well as to be prepared to respond to countries’ requests for methodological work’ (IPCC 2013, 23, Brazil). These two examples are in line with the undesirable two-worlds diagnosis and its call for bringing science and policy closer together through better communication and closer cooperation.

Most respondents seemed satisfied overall with the existing structure and modus operandi, and did not suggest any major overhaul. Thus, with respect to the distance of science and policy, some also suggested that the current situation works. For instance, one author explained that

As a member of the SPM writing team for WG3, I participated in the plenary approval meeting in Berlin, and actually viewed that as improving the quality of the SPM: its existence forced the authors to present a balanced set of findings that was cognizant of the role that these findings would play in political processes, and where the findings were not supported by empirical results, or presented an interpretation of those results that was imbalanced, they were often removed’ (IPCC 2014, 52, author AR5 WG2&3).

Here, that science and policy are operating closely together is seen as something positive, suggesting a *desirable* one-world diagnosis. Other respondents described the relationship the same way – as a one-world situation, but were, however, less enthusiastic about their observations. Their responses instead reflected the *undesirable* one-world diagnosis. Here, the aim for consensus science is seen as problematic as it limits available policy options, and excludes more extreme findings. For instance, as stressed by one author:

IPCC should be concerned with spelling out the full range of author and community views, not just the consensus [...] Along with its consensus findings, publish a record of significant divergences of viewpoints among authors, if any, and identify those holding each view (IPCC 2014, 50, author AR5 WG2).

The same author also called for the process to be more transparent, opening it up to observers and the media and facilitating research on the IPCC. Similarly, one government suggested that

[t]he transparency of IPCC processes needs to be enhanced [...] We strongly suggest a consideration of measures to maintain public trust in the IPCC process and the integrity of the interaction between governments and scientists. This could be achieved for example through further opening of selected IPCC plenary meetings to accredited media' (IPCC 2013, 68, Germany).

The latter example here does not necessarily imply that science and policy really are too close together, but merely that that it may appear so to the public, hence the need to open up the process to show that this is not the case. Other responses more clearly indicated that the coupling between science and policy was perceived to be too close, for instance:

I think that the instructions authors receive from the IPCC plenary are too prescriptive. Not only were the subheadings in our chapter and their ordering dictated prior to our work starting but also a sentence or two of indicated content. The experts should be given a freer hand to explain the science in the best way possible (IPCC 2014, 76, author AR5 WG3).

Here, policy is described as interfering with the scientific work. This is one side of the undesirable one-world situation, whereby politicization of science is at its extreme end.

3.3. Question 3: ways to ensure enhancement of the participation and contribution of developing countries

Regarding increased participation and contribution of developing countries, the undesirable one-world diagnosis dominated strongly. This comes as no surprise as one of the core features of the undesirable one-world diagnosis is increased plurality, and increased participation in most cases entails increased plurality (in terms of, for instance, voices heard and knowledge types). We did not find any clear examples of governments responding more in accordance with the undesirable two-worlds diagnosis, and among the authors' responses only indirect associations with this view. Recognizing that there is problematic reductionism within the IPCC process, but not being willing to do anything to change structural barriers, could perhaps be seen as supporting a system where typically a specific type of science (Westernized and/or

physical sciences) is dominant while other voices are excluded (cf. Corbera et al. 2015; Ho-Lem, Zerriffi, and Kandlikar 2011). Although this is not necessarily the same as bringing science and policy closer together, it is the opposite of increasing plurality and thus closer to the undesirable two-worlds diagnosis. One such example is an author who replied that if participation by developing countries is hindered by lack of resources, this is a problem that can be solved. However:

'Lack of expertise is more difficult. It is important that lead authors should be competent in their areas, and it therefore does not make sense to appoint Las [Lead Authors] from developing countries for the sake of balance of countries, however desirable that may be [...] It is possible that participation as nominated reviewers (a role I have proposed in D) would be more suitable.' (IPCC 2014, 21, author AR5 WG1).

The reference to the seemingly politically motivated desire to include more authors from developing countries in the assessment, and stress on the need for these experts to have the same kind of expertise as those from developed countries, does not take into consideration different definitions of expertise, or how to change the structure to deal with the underlying problems. In a similar vein, another author responded that:

'I've seen too many examples of developing country experts not being able to deliver as expected. Sometimes because they were assigned to the 'wrong' chapter because the chapter just 'needed' a non-OECD author, often due to language issues, and sometimes due to lack of motivation' (IPCC 2014, 31, author AR5 WG3).

In this case however, the author suggests that access to literature and language are barriers to the participation of developing country experts – structural problems that need addressing in order to properly involve developing country scientists in the IPCC-process. According to this author, open access and translation are two means that can be used to increase developing country participation.

There is no lack of similar suggestions, which point to the undesirable one-world diagnosis, in the material. The main underlying theme here is that the solution to problematic reductionism is to increase plurality. A common proposal of how to increase plurality was that literature in languages other than English be included in IPCC assessments (see e.g. IPCC 2013, 25, Brazil). Another common suggestion was that increased regional focus in the IPCC products will lead to increased participation by developing country experts, as a new type of knowledge will be required:

First, by adopting a regional focus one would inherently foster the engagement of regional scientists and hence necessarily the developing nation scientist. However, as has been seen in past reports, merely being on an author team does not necessarily lead to solid engagement [...] A possible approach within the adoption of a regional focus paradigm is to partner scientists within author teams, mixing across disciplines and experience to comprehensively address the regional multi-disciplinary issues.' (IPCC 2014, 27, author AR5 WG1&2).

This is another example of trying to deal with the underlying structural problems that hinder more diverse participation. Another, more direct, way of dealing with under-representation of developing country experts would be to introduce regulations, such as the following suggestion from one author:

I will go as far as to argue for some sort of duties for affirmative action inside the author teams, so all CLAs [Contributing Lead Authors] are nudged and instructed to protect developing country authors while making sure their views (even if not so mainstream) are as fundamental as any other (IPCC 2014, 74, author AR5 WG 2).

The one-sided nature of the responses to this question also highlights the challenge with determining what is really one- or two-world perspective in this question. Although most respondents suggested increasing participation in the IPCC's future work, this is not necessarily related to the distance between science and policy, as discussed below.

4. When the debate is no longer limited to science-policy interaction

Although it was possible to identify how the responses in our material corresponded to the one- and two-world diagnoses, on many occasions individual responses could not be classified as belonging to only one diagnosis. Many respondents were in favor of reducing the distance between science and policy when answering the question about IPCC products, but in favor of increased plurality – one of the ‘solutions’ associated with increasing the distance between science and policy – when responding to the question about participation. For instance, one government's response to the question about products was to call for ‘[...] reports on the emerging science or policy maker needs [...]’ (IPCC 2013, 153, Thailand), in line with the undesirable two-worlds diagnosis quest to ‘bridge the gap’ between science and policy. However, in response to the question about participation, they wanted increased plurality more in line with the undesirable one-world diagnosis, calling that the:

IPCC should set up regional committees to enhance involvement of developing countries and to access literatures in several languages other than English. Representatives of countries and regions of these committees can facilitate assessment of literatures and engagement of developing country scientists and experts at the same time’ (IPCC 2013, p. 154, Thailand).

Another government called for improved ‘user-friendliness of products’, which suggests bringing the IPCC products closer to policy, but also asks for ‘complete independence’ (IPCC 2013, 147, Switzerland) of scientific work, which implies keeping science and policy apart. Similarly, one author called for ‘Wiki style approaches to updating between Assessments’, suggesting a new means of enabling plurality in the process, but at the same time arguing that, ‘I would work more on figures that convey simple ideas, as in a presentation, particularly in the SPM’, here focusing on how the Summary for Policymakers could be made more user-friendly (IPCC 2014, 63, author AR5 WG3). These examples illustrate a pattern – proposing ways to make IPCC products more adaptable to policy – in line with the undesirable two-worlds diagnosis – and proposing bringing more diverse voices to the process – in line with the undesirable one-world diagnosis – is common within the material.

The first observation to make with regard to this tendency for respondents to stress the need for both better communication and increased plurality, is that they are not opposites, despite the two being presented as solutions on opposing sides of the typology. Sundqvist and colleagues find that the scholarly debate is split between supporting *either* separation *or* integration of science and policy. More specifically,

more and effective communication between science and policy is seen as a solution to the undesirable two-worlds diagnosis (cf. Peters 2016; Rose 2014), and increased plurality as a solution to the undesirable one-world diagnosis (cf. Hulme 2010; Kary, Newell, and Hayes 2018). However, in practice (the authors take recent developments of the UNFCCC and the IPCC as examples), climate science and policy operate based on separation *and* integration. The practitioners whose responses make up our material, reason more in line with Sundqvist et al's observation regarding how international climate governance is organized in practice, rather than seeing them as opposing as suggested by the classification of the scholarly literature. We see it as drawing attention to a key aspect of this discussion – that calls for better communication or increased plurality is a conversation that extends beyond the science-policy interface. For instance, as soon as communication is not restricted to that between science and policy, or what is considered to be 'science' and 'policy' are not clearly demarcated, the debate extends beyond the science-policy interface by involving additional actors. Hence, looking at the practice of science-policy interaction compared to theoretical understandings of the same, it becomes apparent that in practice it is neither possible, nor desirable to restrict the debate to one between and about science and policy exclusively. This is particularly apparent in the case of the IPCC, as it is an intergovernmental body that is made up of both a scientific and a political component, which overlap but serve different functions at different times (Beck 2011; Haas and Stevens 2011; Jasanoff 2010). In our material, we saw that these functions also extend into how the IPCC is perceived by those involved. Sometimes the IPCC was thought of as 'science', sometimes 'policy' and sometimes an interface. We also saw that calls for increased communication often involved actors in addition to science, policy and/or the IPCC. Similarly, calls for increased pluralism could mean the inclusion of more, and different, actors, thus again not keeping the relationship to one between science and policy exclusively (Lidskog and Sundqvist 2015; Berg and Lidskog 2018a; Ford et al. 2016).

The analytical challenge of trying to deal with communication/plurality brought forward an important point: the typology may be able to describe a science-policy relationship in theory, but when possible solutions are discussed in practice, another approach is necessary. Moreover, not only is the typology challenging to apply to our material for these exact reasons, it is also challenging to use it to summarize the scholarly literature.

We emphasize the word *summarize* here because there are parts of the literature that fit the typology well. This is true of the literature that corresponds to Sundqvist et al's 'undesirable two-worlds situation'; literature that discusses, for instance, how to bridge the gap between science and policy (e.g. Jäger 1998), and subsequently its mirror-literature in the 'undesirable one-world' perspective, namely that which prescribes more separation between science and policy (e.g. Price 1981). Ontologically however these two 'perspectives' have a lot in common in the sense that they believe that science and policy *can* be separated in the first place (see e.g. Pregernig 2014; Rich 1991). Consequently, they also have in common that any 'one-world' situation is undesirable – advocating for science and policy to be bridged does not mean to move from two worlds to one, but rather from a, in their view, dysfunctional to a functional two-worlds situation.

Our main point here however is that whilst we agree with Sundqvist et al that *part* of the scholarly literature on science-policy interaction is fairly polarized and can effectively be described by their typology, we argue, on the other hand, that an important part of the science-policy literature cannot. This literature is diverse, but overall a theme it often deals with is complexity. For the sake of argument, we call it the *critical literature*.

The critical literature does not believe that science and policy can be truly separated, as they are interrelated, or co-produced, despite having their own unique features (e.g. Lidskog and Sundqvist 2015; Berg and Lidskog 2018a)⁴.

Sundqvist et al write that, though a divergent group, scholars that identify too tight a coupling between science and policy often come back to the (problematic) effects of consensus science (and policy) associated with the IPCC, which leads to a ‘marginalization of alternatives’. This situation could potentially be addressed with more pluralism, but that goes beyond the relationship between science and policy. Moreover, problems associated with consensus science, marginalization of alternatives, and reductionism are also linked to how science is defined in the context of the IPCC – an issue that is not necessarily solved by altering the relationship between science and policy. The bottom line here is that the science-policy interface is but one issue these scholars focus on and one that does not have an easy solution. This is something that Sundqvist et al. (2018, 461) also acknowledge when they say that ‘not surprisingly, given the different diagnoses, scholars disagree on how to deal with the problems of a one-world situation and the perspective is in practice developed in various ways’. This nuanced description is, however, not reflected in the typology. The description of the opposing views as mirror images ‘what in one diagnosis is a problem becomes a solution for the other’ (Sundqvist et al. 2018, 463), suggests that scholars arguing against the undesirable one-world situation seek a two-worlds situation. However, identifying problematic dependency between science and policy does not automatically mean that one thinks independence is possible.

Sundqvist et al. (2018, 463) recommend that social scientists who analyze the science-policy interface acknowledge the different perspectives and that this in turn will ‘spur a more fruitful analysis on ways to improve the policy uptake of climate change science’. One way of making us aware of this is by using a typology. However, the very practice of using a typology to describe the polarization of the debate on science-policy interaction reinforces the problem. Even though the different diagnoses that Sundqvist et al present should be understood as ideal types, it is difficult to imagine the ‘whole spectrum’ of ideas on the relationship between science and policy – that the authors indeed call for – when they are presented in separate boxes. Moreover, as explained above, there is indeed a literature that does recognize the complexity of the process. Placing this very literature within a science-policy typology reduces it to less than it is. A typology, or indeed any model, is a powerful explanatory tool, but it comes at the cost of reductionism. More helpful in this case, we argue, is firstly, to think instead of ideas regarding the distance between science and policy on a continuum – from full separation to full integration, secondly, to use the critical literature to twist and turn and broaden the debate and, thirdly and related to this, to use the continuum only as a starting point for discussion. This discussion in turn needs to be open-ended regarding what can be done in situations of problematic science-policy interaction.

5. Trade-offs between reductionism and complexity

As is unsurprising, our application of the typology, and synthesis of it, reinforces the problem of reductionism further. Applying the typology to our material helped nonetheless to unearth ideas regarding science-policy interaction, and to illustrate that this discussion extends beyond the theoretical.

Our analysis shows that many IPCC-actors seem positive about both increased plurality and better communication. This could indicate that no friction regarding possible changes in the arrangement of science-policy interaction is to be expected. However, ideas around science-policy interaction are in essence ontological and epistemological questions, which take different forms when applied practically (cf. Löfmarck and Lidskog 2017; Berg and Lidskog 2018b). To illustrate this point, we return to the example of how the IPCC could maintain ‘complete independence’ and at the same time increase cooperation with stakeholders and produce reports based on policy requests, as suggested by one government (IPCC 2013, 147, Switzerland). These suggestions are an example of how, in Sundqvist et al’s terms, ‘organizations sometimes want to adhere to both [perspectives] without realizing the tension’ (2018, 463). If these tensions are revealed at an early stage, they can be discussed, analyzed and better understood. However, if these tensions are ignored, it will be more difficult to understand *why* disagreements emerge.

The above is of course just one such example. However, these diverging perspectives might become problematic if the IPCC one day wishes to make larger changes than those it already has (cf. Beck and Mahony 2017, 2018; Devès et al. 2017), and a future reiteration of the consultation that formed the focus of our analysis may wish to start by discussing this question. Indeed, the IPCC’s mandate – to be policy-relevant but not policy-prescriptive – fundamentally suggests an aporetic situation, and this clearly leads to confusion and tension (Geden 2018; Hulme 2016; Mahony and Hulme 2018). The IPCC has, since its inception, juggled the processes of separation and integration, for instance by separating the work of the IPCC into different phases, excluding governments from some, and by using different approaches in their front- and backstage activities (Jasanoff 1987, 1990; Lidskog and Sundqvist 2015). In practice, establishing a relationship that is close enough but not too close between science and policy appears almost impossible, and hanging on to a simplistic model of separation in its frontstage activity makes the climate regime an easy victim for climate skeptics (De Pryck and Gemenne 2017; see also Pearce, Mahony, and Raman 2018).

Finally, Sundqvist et al highlight that ‘there is insufficient communication and cross-fertilization between proponents of the various diagnoses. More interaction between them would help both understanding and practice in the science-policy interface on an appropriate case-by-case basis’ (2018, 463). Our analysis of the IPCC survey made it clear that in addition to this, more communication between practitioners and scholars is also needed, and that in turn this debate should not be reduced to one about, and between, science and policy. Finding a way that the scholarly literature and practitioners involved in scientific assessment processes, like the IPCC, can talk to each other through engaging practically in the process could be a first step (Berg and Lidskog 2018a). Making more of an effort to reach out to and engage broader society is another (while still a work in progress, here the IPCC could arguably learn from its younger sibling IPBES⁵ (Beck et al. 2014; Löfmarck

and Lidskog 2017)). Taking institutional arrangements, traditions, and cultures into consideration will not be an easy venture and will require much more thought and consideration than is possible in this paper. However, if there is one overarching lesson that can be learned from our analysis, then it is that the relationship between science and policy can be broken down to more manageable pieces. Perhaps we cannot all agree on whether science and policy can be separated or if they are co-produced, but we can, for instance, reflect on which actors have access to the IPCC-process, what literatures, scales, languages, and means of communication are considered, as well as how the processes of deliberation and consensus can be rethought (cf. e.g. Beck et al. 2014; Berg and Lidskog 2018b; Hulme 2018; Livingston, Lövbrand, and Olsson 2018; Pearce, Mahony, and Raman 2018; Pearce et al. 2017; Porter, Kuhn, and Nerlich 2018) – all issues that are currently being discussed in the scholarly literature.

6. Conclusions

In this paper, we presented an analysis of the submissions by Parties to the IPCC, IPCC experts, and other actors such as international NGOs, on the future of the IPCC. We used a typology of science-policy interaction that focuses on the distance between science and policy developed by Sundqvist et al. (2018) to discuss our material.

While Sundqvist et al found the scholarly debate torn between advocating separation or integration between science and policy, the IPCC-actors in our empirical material often seemed to support both. Whilst a typology can be a powerful explanatory tool, and in this case helped us unearth diverging ideas in our material, applying it comes at the cost of reductionism. Indeed, our analysis makes it clear that discussions on the IPCC's evolution would be incomplete without looking at its relationship to other actors. We see this in calls for transparency and increased connection with society. More broadly, we see this in the changes the IPCC is arguably already engaging in, such as shifting leadership and a turn to a more solution-based approach (e.g. Haas 2017; Lee 2015), and in the debate about where the IPCC fits in society (e.g. Beck et al. 2014; Devès et al. 2017; Lidskog and Sundqvist 2015). Finally, we see it in the societal debate and a public that does not want to be left out from discussions held between 'experts' and policy-makers, perhaps most obviously with regard to the post-truth politics discourse. This discourse, which could have been about democratizing expertise and engaging the public, has become about undermining scientific knowledge, playing into the hands of climate change deniers and right-wing movements (see also Braun and Dodge 2018; Brulle 2019). Therefore, we argue, it is even more crucial not to make climate change an issue that is primarily discussed between science and policy at the international level without transparency or accessibility (cf. Pearce et al. 2017; Grundmann et al. 2017). While climate change is a scientific and technical issue, it is also about what world we want to live in. Acknowledging the subjectivity of the issue does not mean that science has no role to play. On the contrary, given the high stakes and the complexity of the task, science, not least the social sciences, is crucial (cf. e.g. Berg and Lidskog 2018a, 2018b; Lövbrand et al. 2015), but this role cannot be executed from an ivory tower. Indeed, given its intergovernmental nature and recent solutions-turn, the points outlined above are debates that the IPCC could potentially help moderate.

In sum, we suggest that to understand science-policy interaction, particularly in the climate change context, a continuum ranging from complete separation to integration reduces the risk of overlooking important nuances compared to categorizing in separate boxes. However, regardless of the typology used, a typology should only be a starting-point for discussion, not least because questions that concern science-policy interaction extend beyond these two spheres. In theory, more complexity may seem counter-productive to action and a simple typology and straightforward answers a better way to go. However, our analysis suggests that reductionism highlights extreme positions and wipes out the nuances, overlaps and compromises needed to move forward – albeit incrementally – in practice, not just in theory.

Notes

1. One example of this is the UNFCCC Structured Expert Dialog <https://unfccc.int/topics/science/workstreams/periodic-review/the-structured-expert-dialog-the-2013-2015-review>.
2. See Supplementary Material 1 for full details of these questions, including guiding themes, and also a more detailed description of the process of the consultation.
3. <https://archive.ipcc.ch/organization/future.shtml>.
4. Here we can place Sundqvist and colleagues themselves as they argue that the processes of separation and integration in practice are not opposites. Indeed, they use the typology as a tool to show that the scholarly literature is torn, and to call for a more nuanced debate.
5. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

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