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Scientific Performance Assessments Through a Gender Lens: a Case Study on Evaluation and Selection Practices in Academia

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Abstract

The focus on *excellence* and *quality assurance* in the academy has spawned a significant increase in the use of bibliometric measures in performance assessments of individual researchers. This article investigates the organizational consequences of this development through a *gender lens*. Based on a qualitative case study of evaluation and selection practices at a Danish university, a number of potential gender biases related to the use of bibliometric performance measures are identified. By taking as default the research preferences, approaches and career paths of a succesful group of predominantly male scholars, evaluators using bibliometrics risk disadvantaging candidates diverging from the norm with implications for gender stratification. Despite these potential biases, bibliometric measures come to function as technologies supporting a managerial narrative of the gender-blind organization. They adhere to the prevailing ethos of the academic meritocracy by standardizing the criteria for organizational advancement and ensuring transparency and accountability in the selection process. While bibliometric tools in this sense may lead to the recruitment of scientists with a strong CV and track record, they may at the same time prevent many talented researchers diverging from the norm from being recognized and succeed as academics.

Keywords: gender and science, bibliometric indicators, research performance, research management, qualitative methods

Introduction

As observed by Simmel (1950: 412; originally written in 1903), the economic rationalization of modern society "has filled the days of so many with weighing, calculating with numerical determinations, with a reduction of qualitative values to quantitative ones". This development has obliterated many important qualitative differences, as certain social forms have become taken for granted as useful means for weighing and valuing elements of the social world, while diluting relationships and things that do not assimilate to these particular forms (Espeland and Stevens, 1998). Simmel's renowned sociological insight can be usefully extended to the recent decades' national and international New Public Management-driven reforms of higher education and

research (henceforth HER). These reforms have paved the way for new procedures for determining accountability and quality assessment directed at evaluating and controlling organizational performance.

Governments have been introducing market structures into the science systems for more than two decades. Institutional research budgets increasingly depend on performance-based funding; consequently, the competition between research organizations, groups and individuals is expanding rapidly (Gläser and Laudel, 2007: 109). At the global level, the OECD has played an important role in promoting the policy paradigm of the 'knowledge-based economy', while the World Bank's 2009 report on the "challenge of establishing world-class universities" has placed even further rhetorical emphasis on issues of 'high performance' and 'market-type competition' in the governance of HER institutions (Jessop, 2008: 26; Salmi, 2009). The question of global competitiveness also constitutes a key element in the EU policy discourses on research and development. This is seen in the Lisbon Strategy's (old and new) objective of making the EU the most competitive knowledge-based economy in the world (European Commission, 2000; 2005). Likewise, the more recent *Europe 2020* vision statement calls for *smart growth* by strengthening "research performance, promoting innovation and knowledge transfer throughout the union" (European Commission, 2010: 9).

The institutionalization of research evaluation constitutes a crucial component in this overall development (Whitley, 2007: 5), which has also spawned a significant expansion in the use of bibliometric indicators and metrics in the assessment of the performance of individual researchers (Weingart, 2005; Van den Brink et al., 2013).

Bibliometric indicators are advanced analytical tools used to assess scientific productivity, visibility and impact. Apart from their scholarly purposes, these tools are frequently employed by managers and politicians to organize competition among research institutions and boost the performance of individuals, groups, departments and faculties (Weingart, 2005; Addis and Brouns, 2004). As observed by Espeland and Sauder (2007: 2–3), the introduction of such standardized measures "can initiate sweeping changes in status systems, work relations, and the reproduction of inequality". Similarly, Weingart (2005: 127) argues that "not only the behaviour of individuals but that of organizations may be affected by bibliometric measures in ways that are clearly unintended". Thus, given their potentially profound organizational consequences, bibliometric indicators deserve further consideration.

This article investigates the constitutive effects related to the use of bibliometric indicators and metrics in the evaluation of research performance – through a *gender lens*. The *gender lens* enriches the study by focusing attention on the differential impact of practices of individual performance assessments on women and men. More specifically, this approach questions the taken-for-granted assumptions underpinning the existing organizational structures and practices and explores how some styles and forms of work become privileged in shaping the distribution of opportunities and rewards while others do not (Bailyn, 2011).

I raise three main questions: (a) how is scientific performance assessed in the recruitment and promotion of academic researchers? (b) How do quantitative metrics and indicators influence this process? (c) What are the potential gender consequences related to the use quantitative metrics and indicators in this process? The article draws on findings from a qualitative case study on evaluation and selection processes in the recruitment of senior research staff at a Danish university. This case study was based on qualitative interviews with 24 department heads and a document analysis of 44 assessment reports from appointments for associate professorships.

Scholars have already raised concerns about the gender effects of the proliferation of individual performance measures in university settings (more on this below). However, no studies have elucidated the gendered implications of how such measures are put into practice in the day-to-day activities of managers and research evaluators. The key contribution thus lies in the attempt to make visible the practice level of scientific performance assessments and its potential implications for gender stratification. Since academic recruitment practices are often treated with a high degree of

confidentiality and sensitivity (Van Den Brink, 2010), the study also provides unique opportunity to gain new insights into an otherwise closed realm of evaluation and selection.

The article proceeds as First, I briefly describe the existing literature on gender consequences of the emerging evaluation regime and reflect on the relevance of the study. Second, I outline the selected theoretical perspectives and empirical insights, which may aid in the analysis. Third, I touch upon methodology and present the empirical scope. Fourth, I present the analysis, and fifth I discuss the main findings and conclude..

Gender and new regimes of evaluation

Numerous authors have already pointed out the potential downsides to the emerging performance management regime in HER, which have been argued to narrow the approaches that researchers employ and the span of areas in which they engage (Guena and Martin, 2003; Rafols et al., 2011). Whitley (2007: 10), for instance, observes that when "evaluations become more important for both researchers and employers, the costs of pursuing deviant strategies increase, and pressures to demonstrate how one's work contributes to dominant disciplinary goals will grow". According to him, this pressure is strongest for researchers in temporary positions "who need to show the merits for their research as assessed by current disciplinary priorities and standards in order to gain employment" (Whitley, 2007: 10). Morley (2003, IX) raises a more fundamental concern, asking: "if quality assurance is about standards and conformance, what place is there for difference and diversity?" In her view, the growing emphasis on quantitative assessments of scholarly output intensifies organizational demands for *prescriptive performance* within established regimes of logic and reinforces gendered power relations in academia (Morley, 2003: 48).

A specific strand of literature focuses on the gender consequences of this development. As observed by Thomas and Davies (2003), the integration of seemingly gender-neutral quantitative performance metrics into managerial practices can be viewed as instrumental in identifying and challenging the subtle processes of discrimination and nepotism in academia. Scholars have, for instance, suggested that NPM-driven managerial approaches strengthening the transparency and accountability of academic organizations may allow research active women to display their merits and claim their right to promotion (see, e.g. Morley, 2005; Luke, 1997). As noted by Thomas and Davies (2003), however, these approaches may simultaneously intensify employee workloads and promote a competitive and individualistic research culture, creating stronger tensions between the responsibilities of work and family life and leading to 'chilly climates' for researchers with a preference for more supportive and collegial working styles. Knights and Richards (2003) add another perspective to the discussion by arguing that the success criteria for the existing NPM-driven audit regime are slanted in favour of male career patterns. In line with the pioneer work of feminist organizational scholar Joan Acker (1990), the main argument underpinning these concerns is that transparent and standardized evaluation and appointment criteria, when taking as default the organizational behavior of dominant groups, will not necessarily counter gender inequality.

Despite a growing scholarly interest in investigating the stratifying outcomes of scientific performance assessments, there is little research on how such measures are put into practice in the day-to-day activities of research institutions. As pointed out by Van den Brink et al. (2013: 181), the existing research on indicators of scientific performance "rarely pays attention to the implementation process, power processes and context". The authors try to fill this gap by employing a 'practice perspective' aiming to describe the use of such measures in the managerial activities of promotion and selection. Very similar to this approach, the study at hand takes a step towards a more in-depth understanding of how the resources and ideas introduced by bibliometric indicators influence the evaluative practices of department heads and evaluators, thus entailing potential gender consequences. By 'gender consequences', I refer here to the unequal career outcomes for male and female academics.

As returned to below, the article's main argument is that whereas bibliometric measures cannot not *per se* be considered discriminative in their features, they are at risk of reinforcing an evaluative culture that disadvantages scholars diverging from the norm, i.e. the research behaviour and career paths of a successful group of predominantly male academics. One should of course not underestimate the heterogeneity of gender roles at play in academic organizations. However, despite the many different ways of being a man and woman in academia, such measures may indirectly be gendered in their stratifying outcomes. Indeed, other factors such as class, sexuality and ethnicity may also operate to influence academics' conformity to, or deviance from, the prevailing image of the ideal career path or track record. Gender, in other words, merely represents one of several intersecting social categories influencing the career outcomes of academics. Consequently, whereas this study limits its focus to gendered aspects of scientific performance measures, an underlying objective will be to employ the gender lens to raise broader questions about the potentially stratifying outcomes of how academic work is evaluated.

Analytical reflections

Following West and Zimmerman (1987), this study conceives gender as something organizational actors 'do' rather than something they 'have'. Gender roles and categories are expressions of socially acquired behaviours and attributes produced and reproduced over time.

Clearly, this analytical approach challenges the idea of gender as a unitary conception structured around the male/female dichotomy. Recognizing the performative dimension of gender does, however, not necessarily imply that one should dismiss 'women' and 'men' as collective analytical categories. As Gunnarsson (2011: 32) rightly observes, it is possible to acknowledge abstract concepts "such as 'women' and 'men' as qualitatively different from lived reality [and] use them effectively without any expectation that they will correspond to this lived reality in any clear-cut sense". Indeed, such categories have been highlighted as instrumental to analysing the material and institutional conditions and structures forming and perpetuating gender inequalities (Fraser, 1995; Gunnarsson, 2011).

Feminist science studies have played an important part in teasing out the different forms of gender-based oppression at play in the academy. Pioneer studies in this tradition remind us how gendered norms and stereotypes operate to influence scientific approaches and interpretations (see e.g. Haraway, 1989). Further, unspoken notions about the ideal scientist and the scientific enterprise in general have been shown to clash with expectations about women and their roles in society (Schiebinger 1999: 69). The main argument underpinning this branch of scholarship is that seemingly impartial and objective scientific practices are shaped by implicitly gendered cultural assumptions privileging certain scientific perspectives and certain ways of being or becoming a scientist. Haraway's (1997) figuration of the scientist as a 'modest witness' constitutes an illustrative example in this regard:

> …the modest witness is the legitimate and authorized ventriloquist of the object world adding nothing from his mere opinions, from his biasing embodiment. And so he is endowed with the remarkable power to establish facts. He bears witness: he is objective; he guarantees the clarity and purity of objects (…) His narratives have a magical power – they lose all trace of their history as stories, (…) as contestable representations, or as constructed documents in their potent capacity to define the facts. (Haraway, 1997: 24)

What Haraway is proposing here is that the prevailing narrative of academic science as a 'culture of no culture' (Traweek, 1988: 1) and the scientist as a disembodied (male) truth-seeker, facilitates a detachment of scientific judgment from its socially situated vantage point. Scientists ascribing to this narrative, in other words, risk becoming blind to the cultural apparatus of historically sedimented and sometimes implicitly gendered ideas and assumptions influencing their judgments.

As advocated in this article, one could contend that this risk not only pertains to the construction of scientific facts but also to academic managers' and evaluators' quantitatively driven judgments

of scientific merits. What I am hinting at here is that the employment of seemingly objective measures in a biased system may operate to reinforce existing biases (Feller, 2003). If university managers, for instance, when recruiting senior research staff, fail to take into account the implicit structural and cultural obstacles encountering many women, the use of seemingly gender-neutral performance measures end up privileging traditional 'male' career patterns, since crucial factors such as career breaks, domestic responsibilities, research time and non-traditional publication behaviour are left out of the bibliometric equation. Wendy Espeland's work (Espeland and Stevens, 1998; Espeland and Sauder, 2007) with the concept of commensuration provides important insights into the social dynamics related to this particular problem.

Commensuration

According to Espeland and Stevens (1998: 314), commensuration can be viewed as a fundamental process in social life, "which transforms different qualities into a common metric". The sociological investigation of this process is important, because it "changes the terms of what can be talked about, how we value, and how we treat what we value" (Espeland and Stevens, 1998: 315).

In a 2007 article, Espeland and Sauder draws attention to how university rankings rest on commensuration. A fundamental premise underlying this research is the assumption that processes of commensuration in certain situations and contexts can become so deeply institutionalized and taken for granted that they contribute to forming the things and relationships they are developed to measure (Espeland and Stevens, 1998: 329). This is because organizational processes of commensuration inevitably produce various forms of *reactivity*[1] and change how people make sense of everyday situations (Espeland and Sauder, 2007: 10–11). A university ranking (or bibliometric performance indicator), for instance, can make it easier for organizational representatives to ignore qualitative characteristics and nuances that are not expressed in a particular metric. In addition, they can construct new relationships between objects and entities by transforming distinctive qualities into a common comparable metric. This leads to new hierarchical relationships between ranked universities or, as in the case of research performance metrics, allegedly objective comparisons between researchers with very different research propensities, career paths and publication behaviour. Further investigations of how such metrics are employed by research managers and evaluators (e.g. assessment committees) requires a clear conceptual understanding of their methodological applications and limitations. Drawing on Latour's and Woolgar's (1986) concept of *modalities*¸ Gläser and Laudel (2007) provide exactly that.

Amateur bibliometrics and modalities

Gläser and Laudel (2007: 117) use the term *amateur bibliometrics* to describe the "practice of producing bibliometric analyses of an evaluative character by actors with little or no professional background in the field and with little or no knowledge or regard for the modalities involved". Here, modalities refer to the 'modifying statements' employed by interested parties to weaken or make more solid the applicability of scientific findings. In this study, the concept is used to account for the qualifying statements that limit the methodological applications of bibliometric indicators to "specified conditions and ways of use" (Gläser & Laudel, 2007: 117). These modalities constitute a crucial element in the evaluative practices related to the assessment of scientific performance, because bibliometric indicators, like any other scientific method, rely on a set of "assumptions about applicability and proper procedure" (Gläser and Laudel, 2007: 117). Since most department heads and committee evaluators have only modest or no scholarly training in bibliometrics, a particular analytical focus on their regard for the modalities involved seems highly relevant. My own use of the modalities concept in the analysis of assessment reports and interviews with department heads, however, goes beyond the ideas introduced by Gläser and Laudel (2007). I place particular emphasis on the subtle gender dynamics embedded in, or emerging from, the evaluative use of bibliometrics, hence adding a new dimension to their approach. In addressing these modalities, I draw heavily on contributions from the bibliometric literature. Yet, before I turn

to discuss this strand of scholarship, it is important to account for field-specific and disciplinary variations in how research activities are structured and organized across academic fields and disciplines, which points to the relevance of sociologist Richard Whitley's (1984) work on *The Intellectual and Social Organization of the Sciences* (henceforth ISOS).

Task uncertainty and mutual dependence

In ISOS, Whitley (1984) develops two useful analytical dimensions for understanding the social organization of the sciences. These dimensions aid to the present study's analysis of how evaluative practices vary across disciplines and fields. According to Whitley (1984: 120), scientific fields vary in their "need to adhere to particular standards of competence and criteria of significance in order to reward important reputations for contributions". He labels this the dimension of *mutual dependence*. More specifically, this notion refers to the relative dependence of a field on knowledge produced in other fields in order to make significant scientific contributions in its own field, but also the extent to which scientists are expected to explicate how their contributions connect to the work of other scientists (Fry, 2004). Moreover, disciplinary fields differ in terms of level of *task uncertainty,* which relates to their compliance with widely accepted work procedures, standardized methods, problem definitions, theoretical goals and their ability to produce visible and replicable research results (Felt and Stöckelová, 2009; Whitley, 1984).

As several scholars note, the social sciences and humanities (henceforth SSH) are characterized by wider variations in paradigms, epistemic cultures, scientific communication practices and perceptions of excellence and quality than the natural and health sciences (henceforth NHS) (Felt and Stöckelová, 2009; Lamont, 2009; Moed et al. 2002). It is therefore also reasonable to contend that most SSH disciplines represent a lower degree of mutual dependence and a higher level of task uncertainty than what is the case in the NHS disciplines. These characteristics have the following bibliometric implications: First, the comprehensive variations in communication media within SSH limits the relevance of employing bibliometric measures, such as citation counts, journal impact factors and h-indices in these fields, since the existing bibliometric databases (e.g. Thomas Reuters' *Web of Science* [WOS]), lack systematic coverage of anthology articles, conference proceedings and monographs. Second, the themes and topics in the SSH literature are sometimes more locally anchored than is the case with the NHS literature, and scholars within these fields therefore also publish more frequently in non-English journals. This feature also speaks against the use of bibliometric measures, because WOS and SSCI have great limitations with respect to language and geographical coverage (Archambault and Gagné, 2004).

Modalities and gendered outcomes of scientific performance metrics

Journal rankings: Journal rankings and impact factors[2] have a number of frequently overlooked modalities (see e.g. Fleck, 2013). Especially, the use of such measures as proxies of publication quality imposes strong biases. Seglen (1997) illustrates how merely 15 per cent of a typical journal's scholarly papers receive more than 50 per cent of its overall citations. Publishing in a highly ranked journal does, in other words, not guarantee scholarly impact, because most of the citations accrued by top journals normally adhere to a limited number of papers (see also Christenson and Sigelman, 1985). It should be mentioned, however, that this bias in the assessment of research merits can be overcome by accounting for publication-based citation rates (article impact) (Moed et al., 2002; Weingart, 2005). As documented in the empirical analysis, this appears to be common practice at most NHS departments, whereas the situation in the social sciences is different, as citation counts are less prevalent.

Scholars focusing on the social sciences have already documented clear differences in the average impact factor scores and journal ratings of the publication outlets in which male and female academics publish their work (Brooks et al., 2014; Davenport and Snyder, 1995; Hunter and Leahey, 2010; McElhinny et al., 2003). In comparison, studies investigating gender differences in the performance of NHS researchers find no consider-

able variation concerning average journal impact factors (see e.g. Bordons et al., 2003; Mauleon and Bordons, 2006). These field-specific variations should be interpreted in view of strong differences in task uncertainty and mutual dependence across the NHS and SSH. As mentioned earlier, the SSH fields, despite many within-group differences, are characterised by wider variations and struggles between paradigms, epistemic cultures, scientific communication practices, regional and international research traditions and perceptions of excellence and quality than the NHS. And if women are overrepresented among the scholars engaged in 'non-mainstream' approaches and topics in the SSH, a reliance on journal rankings and impact factors may entail indirect biases in recruitment and selection processes.

Current research focusing on the social sciences provides some evidence supporting this assumption. Several studies point to noteworthy gender variations in methodologies and epistemological frameworks, with women gravitating towards constructivist styles and qualitative approaches and men towards positivist styles and quantitative approaches (see e.g. Breuning et al. 2005; Mallard et al. Plowman and Smith 2011). If SSH evaluators rely on journal rankings and impact factors as proxies of scientific merit, such gender variations may produce unequal career outcomes, since qualitative methods and constructivist epistemological styles are less prevalent in the most highly regarded social science journals (Bennett et al., 2003; Donovan, 2007; Macdonald and Kam, 2007; Svensson, 2006; Willmott, 2011).

A similar concern could be raised with respect to topic selection. Dolado et al. (2005) map variations in sub-field preferences among researchers in 50 internationally top-ranked economics departments and find women's representation to be highest in areas pertaining to lower-status journals such as Health, Education, Welfare, Labour and Demographic Economics and Economic History (Ritzberger, 2008). Similarly, Light (2013) carves out ten specialization clusters in the sociological literature, of which women are overrepresented in areas such as gender-race-sexualities, family-demography-youth, and medical-mental-health-aging, with a lower likelihood of being published in prestigious journals.

Citation counts: Although performance assessments based on citations rates per paper involve a number of methodological shortcomings,[3] this measure – from a gender perspective – appears to be the least problematic. The existing research on gender differences in citation rates provides inconclusive and ambiguous results, which may be due to strong institutional variations in citation patterns dependent on scientific discipline, geographic location and even gender composition in the field. While a number of studies have found a citation bias in favour of men (e.g. Aksnes et al., 2011; Maliniak et al., 2013; Lariviere et al,. 2013), most of the existing research finds women to be equally or in some cases even more cited than men (e.g. Long, 1992) (for a literature review, see Nielsen, 2016a). A recent study compared the research impact of 3,923 female and male researchers at Aarhus University; and in line with most of the existing literature found only trivial differences in the field normalized citation rates and relative shares of men and women contributing to the top 10% most cited articles internationally (Nielsen, 2016a). Matters, however, look quite different if we turn to the *h*-index.

H-index: Basically, the *h*-index (Hirsch, 2005) is a proxy for research performance developed to capture both publication rates and citation impact in a common metric. This metric combines the number of articles published by a researcher with the number of citations received by these papers and provides an estimate of the highest number of papers that have each received the same number of citations. This means that a researcher with an *h*-number of 6 has published six papers, of which each paper has received at least six citations (García-Pérez, 2009).

A number of modalities must be taken into account when using the *h-index* to assess research merits. First, the *h-index* is slanted in favour of researchers who publish in sub-fields with high citation frequencies[4]. Second, the *h-index* is highly correlated with research output (number of publications), and in this sense heavily depends on scientific age (i.e. active years as a researcher) and gender (more on this below), since a researcher's pool of scholarly papers and the citations that each paper receives increase over time (Kelly and Jennions, 2006). Third, the *h*-index privileges

individuals publishing with multiple co-authors. Collaborative authors obviously have higher research outputs than single authors and have more colleagues to cite their collaborative publications (García-Pérez, 2009; Kelly and Jennions, 2006). According to Van Raan (1998: 427), collaboration also "implies a considerable broadening of the audiences around the authors, enhanced by more intensive networking".

Some of the modalities presented have been argued to disadvantage women (García-Pérez, 2009; Symonds et al., 2006). Several studies for instance detect a gender bias in research collaboration in favour of male researchers (e.g. Abramo et al., 2013; Bozeman and Corley, 2004; Kyvik and Teigen, 1996; Prpic, 2002)[5]. A recent study of researchers at Aarhus University also indicates that women on average publish more single-authored papers and have a slightly lower propensity for international research collaborations (Nielsen, 2016a). But the most crucial of these modalities from the perspective of gender equality concerns the *h*-index's high correlation with publication output. Historically, women have been found to publish fewer scholarly papers than men (Cole & Zuckerman, 1984); and while this gender difference have been shown to decrease over time (Xie and Shaumann, 2003), the most recent literature documents a continuous bias in favour of men (Mairesse and Pezzoni, 2015). The sociology of science offers a variety of explanations to this so-called productivity puzzle. Some scholars argue that childbearing lowers women's scholarly output during the early career stages (Kyvik and Teigen, 1996; Mairesse and Pezzoni, 2015). Others relate the gender gap to systemic causes such as variations in employment rank and access to funding (Xie and Shauman, 1998), degree of disciplinary specialization (Leahey, 2006), differences in collaborative patterns, and time dedicated to research and other tasks (Taylor et al., 2006).

Data and methods

This study unfolds within the framework of a larger research project focusing on the structural challenges to gender equality at Aarhus University. The case-study approach provides unique opportunity to relate the qualitative findings of this article to relevant quantitative patterns identified in complementary papers revolving around gender and scientific performance in the same organization (see Nielsen, 2015 2016a). Aarhus University is a public institution of HER with more than 40,000 students and approximately 11,000 employees. The university employs around 4,000 researchers (including approximately 1500 PhDs) and comprises a broad range of disciplinary domains and fields of research.

Assessment reports

Since bibliometric measures are used for a variety of goals and purposes in academic organizations, one of the main challenges has been to cover the diversity of the existing institutional evaluative procedures and practices in an adequate manner.

With considerable effort – and some luck – I have been able to gain access to 44 systematically selected assessment reports[6] from recruitments for associate professorships at Aarhus University in the period 2005–2012. The Danish associate professorship title – as is the case in the Anglo-American promotion model – is a tenured position, normally following three to five years of temporary or fixed-term employment as either postdoc or assistant professor. The American tenure track system is rarely employed in Denmark and positions at the postdoctoral level may be filled for a maximum period of four to five years at the same institution. The associate professorship appointment is therefore often considered to be the first real 'safe haven' for young Danish scholars attempting to establish a research career in the academy. When this study was carried out, women comprised 17 per cent of the full professors, 33 per cent of the associate professors, 41 per cent of the postdocs/assistant professors and 51 per cent of the PhDs at Aarhus University.

The assessment reports provide unique opportunity to investigate to what extent and how bibliometric measures and indicators are employed when appointment committees assess applicants' scientific merits. More specifically, I have focused on the weight ascribed to these measures in the judgment of the research candidates' existing research curriculum and aimed to clarify which kinds of research behaviour are rewarded when

Table 1: Selection Criteria – Assessment Reports:

- Only publicly announced vacancies for associate professorships or equivalent positions within the period 2005–2012 were considered relevant - Only vacancies with at least three applicants were considered relevant - Only vacancies with both male and female applicants were considered relevant - Twelve reports from each of Aarhus University's four faculties were requested (Arts, Business and Social Science, Health and Science & Technology)

using bibliometric tools. Criteria for the selection of assessment reports are specified in Table 1.[7]

Specifications on the research disciplines represented in this documentary material (i.e. the disciplines in which the relevant vacancies have been announced) and year of appointment are available in the Appendix, Table A. Moreover, analytical displays illustrating the different types of scientific performance measures employed in the evaluation of applicants in the documentary material are enclosed in the Appendix, Table B, C, D and E. I also draw on the official procedural documents guiding the evaluative work of assessment committees. These documents have been used for two purposes: a) to inform the qualitative interviews with the department heads; and b) to obtain information on the official status ascribed to scientific performance measures by assessment committees and department heads.

Before proceeding, it is relevant to note that assessment committees at Aarhus University do not prioritize among the candidates or select the final nominee for positions at associate and full professor level. Rather, their task is limited to identifying the qualified applicants for a given vacancy. The department heads typically make the final appointment decision in correspondence with the faculty deans. Indeed, existing research on recruitment and selection practices at Aarhus University, documents that department heads play an important part in identifying potentially relevant candidates for research vacancies at the university prior to the actual recruitment process (Nielsen, 2016b). A closer look at the evaluative practices of this group of managers thus seems particularly informative for the purposes of this study.

Interviews

I have conducted qualitative interviews with 24 of the 27 department heads at Aarhus University. I have used an open-ended interview approach, mixing conversation and structured questions to collect data. More specifically, I have asked questions in three broad areas of academic management: *evaluation criteria related to academic appointments* (how is research performance assessed in this process and what types of performance are rewarded?), *use of bibliometric measures and indicators in mid-level research management* (how are they used and for what purposes?), *the introduction of new models of performance assessment* (have they affected existing procedures of performance measurement and management and how?). Further, I have asked the interviewees to consider whether and how gender-related issues influence the selection practices in their departments and how they account for such issues in the recruitment process. Twenty of the 24 interviews have been conducted face-to-face, typically in the department head's office. The rest have been carried out over the phone. The interviews – lasting between 30 and 90 minutes – are analysed using Nvivo software. Analytical displays highlighting the different metrics employed by department heads in the evaluation of scholarly merits are enclosed in Table F, G, H and I in the Appendix.

Obviously, scientific performance merely represents one of several selection criteria in academic recruitment and selection. When asked to describe the central characteristics of the ideal research candidate, the interviewees emphasized other evaluative criteria such as preceding experience with research management, ability to obtain funding, and teaching qualifications. Yet research performance was highlighted as the core criteria in most interviews, and as noted by several

interviewees, a strong track record with respect to scientific outcomes is considered a premise for obtaining funding and managing research projects.

Analysis

The presentation of the analysis is divided into three main parts. First, I elaborate on the different bibliometric approaches employed by assessment committees in the identification of qualified applicants for associate professor positions. This part of the analysis draws exclusively on findings from the assessment reports. Second, I discuss the modalities and potential adverse gender consequences related to the use of different types of bibliometric measures. This part is mainly based on interviews with department heads and insights from the procedural documents guiding evaluative practices at Aarhus University. Moreover, this part includes selected examples from the assessment reports to illustrate how bibliometric measures are employed in the evaluation process.

Bibliometric measures at Aarhus University

At Aarhus University, despite many within-group variations, the NHS disciplines use bibliometric measures and indicators more frequently than the SSH.[8] As illustrated in Table D and E in the Appendix, publication counts, citation counts, h-indices, counts of first-author and senior-author publications, journal impact scores and measures of increasing or decreasing productivity trends over time are all frequently used bibliometric tools in assessment committee's evaluations of research merits in the NHS. The emphasis on bibliometric measures tends to be particularly advanced in disciplines such as biochemistry, biology, computer science and biomedicine.

In addition to quantitative measures, assessment committees in the NHS also make judgments concerning the quality and prestige related to publication channels. In computer science, for instance, where conference proceedings play an important role, evaluators make clear distinctions between contributions to 'high standing', 'medium standing' and 'low standing' conferences, but also between 'mediocre' and 'leading' journals. This type of distinction is present in most of the assessment reports, and several assessment committees also highlight authors' contributions to top journals, such as *Nature*, *Science* and *The Lancet*, as pivotal indicators of scientific merit.

In comparison, assessment reports in the SSH (see Table B and C in the Appendix) are considerably longer and characterized by more in-depth, qualitative evaluations of applicants' scholarly contributions. This is especially the case within the humanities and in the less quantitative parts of the social sciences (e.g. sociology and business communication). While the less quantitative SSH disciplines also account for publications in national and international peer-reviewed journals and articles in anthologies and monographs, bibliometric measures such as citation counts and *h*-indices receive no emphasis whatsoever. Instead, the evaluators usually provide comprehensive and in-depth assessments elaborating on the theoretical and analytical approaches employed by applicants and discussing how they contribute to the existing research literature in the field.

The more modest emphasis on quantitative measures of research output and past research achievements in the qualitative parts of the SSH may open space for a greater focus on the actual content of an applicants' work and his/her future research potential. This could serve as one of the explanations why more women succeed in obtaining permanent research positions in these disciplines than in the more quantitative parts of the social sciences and the NHS. This is discussed further below.

The predominantly quantitative areas of the social sciences (e.g. business administration and economics), in addition to publication counts, also make use of discipline-specific journal rankings and, in some cases, journal impact factors. This indicates a higher degree of mutual dependence in these disciplines than is the case in the humanities and the more qualitative part of the social sciences. As pointed out by Fry (2004), disciplines with a high level of mutual dependence must agree on what is considered a valid contribution to the research literature in their field, and thus have more tightly controlled research cultures and communication systems.

As discussed earlier, the potential gender bias associated with the evaluative use of journal impact factors and journal ratings is mainly an issue in the SSH .The following discussion therefore limits its focus to these fields.

Bibliometric indicators – modalities and potential gender consequences

The emphasis on journal rankings and impact factors in the SSH, according to the interview material, is strongest in disciplines weighted in favour of quantitative approaches (e.g. economics, business administration, political science). In these areas, the department heads frequently use terms such as 'internationally recognized journals', 'top journals', 'highly ranked field journals', 'general field journals', 'mediocre journals' and 'unknown journals' to make distinctions on the quality and prestige of applicants' scholarly contributions. Reflecting on the question of how research merits are evaluated, a department head explains:

> The easiest thing for the appointment committee to assess – because it's well-documented – that's the articles written by the applicants. And yes, this varies a lot, because people are different and their views on what counts as quality vary a lot. But they need to make an evaluation of the candidates' track records. What's the quality of their papers? And some of that can be assessed relatively easily, right? … In some areas it's relevant to look at the impact factor, in other areas it's relevant to look at what kind of journals this is, right? (Social Sciences)

As illustrated in the quote, the accreditation of knowledge through rankings and impact factors is attractive for SSH evaluators, because it offers seemingly objective tools for overcoming internal disagreements on what counts as quality. By transforming distinctive qualities into common comparable metrics, such tools establish easily applicable hierarchical relationships between journals or scholars, hereby making it easier for evaluators to ignore qualitative nuances and differences that are not expressed in the metrics (Espeland and Sauder, 2007).

As touched upon earlier, however, relying on journal impact factors and rankings is not an adequate strategy for evaluating a researcher's impact on the existing literature. Further women have been shown to more frequently engage in topics and approaches less prevalent in the most highly regarded social science journals, and on average score lower on journal ratings and impact factors than men. When asked about whether any gender differences exist in the research interests, topics and approaches of his staff, a department head from the social sciences comments:

> No, I don't think so. And this is because of these women, who are highly aware of the risk of researchers ending up in the trenches. Well, I don't know whether it's a 'trench', but… There seems to be a tendency among Danish women that some research areas are more popular than others. Children and education, for instance – that kind of research seems to attract more women … And what has been very explicit among the older women in this department is the importance of career supervision to make sure that young women don't all end up doing research on children. There's nothing wrong with that, but there seems to be a tendency. (Social Sciences)

As observed by Whitley (2007, 10), the standardization of research objectives and quality criteria "means that the diversity of intellectual goals and approaches … decline over time". This is illustrated quite well in this example, where some research topics are considered less likely to reach top journals and hereby become taken-for-granted as "trenches" in the field. Journal ratings and impact factors, in this sense, not only endow evaluators with analytical tools to establish hierarchical relationships between scholarly publications; they at the same time contribute to form the content of knowledge production by changing how people make sense of their day-to-day activities, thus producing career obstacles for (women) researchers diverging from the prevailing approaches and research topics. While such processes of commensuration risk advantaging an already successful group of predominantly men scholars, more research is needed to fully estimate their stratifying gender effects.

Output, impact and the temporal morphology of the academic career

When asking the department heads to describe the central characteristics of the 'employable' candidate for tenured positions, most respond by emphasizing the weight and volume of applicants' existing research as the most central criterion. This is also evident in the assessment reports, where research merit in most cases is evaluated before anything else. In the following, attention is focused specifically on three different approaches to evaluating research output: citation counts, h-indices and measurement of performance over time.

Citation counts: The evaluative practice of counting and comparing the citations obtained by candidates in their papers (i.e. research impact) is widely employed in the natural sciences and parts of the health sciences, and most of the department heads describe this measurement as an important supplement to publication counts (See Table H and I, Appendix). Further, citation counts are stated to be an important element in the faculty guidelines in the natural sciences defining the basic criteria for assessing scientific merits. More specifically, the document states that the qualified candidate should have many papers [professor positions] or some papers [associate professor positions] with good citation numbers (dependent on scientific field and number of years after PhD) (Aarhus University, 2013). As discussed earlier, paper-based citation counts — in a gender perspective — can be viewed as the least problematic of the typical scientific performance metrics employed in individual research assessments, since women and men tend to be cited at similar rates at Aarhus University.

Yet adverse gender consequences may be at play when citation counts are employed to capture a researcher's cumulative scholarly impact over time. As illustrated in the bar-charts and figure text in Figure 1[9] (taken from an assessment report in the natural sciences), this way of counting citations privileges candidates with high publication rates and many co-authored publications (more on this below). The multiplicity of contextual factors circumscribing researchers' cumulative citation rates are here rendered invisible in favour of seemingly objective comparisons of past performance. By taking as default the track records and career patterns of a successful group of predominantly male scholars, such evaluative practices, in other words, risk disadvantaging candidates diverging from the norm with potential implications for gender stratification.

H-index: The *h*-index, as mentioned earlier, is a proxy developed to capture both publication rates and citation impact in a common metric. This metric has been heavily promoted by journals such as *Science* and *Nature* (Symonds et

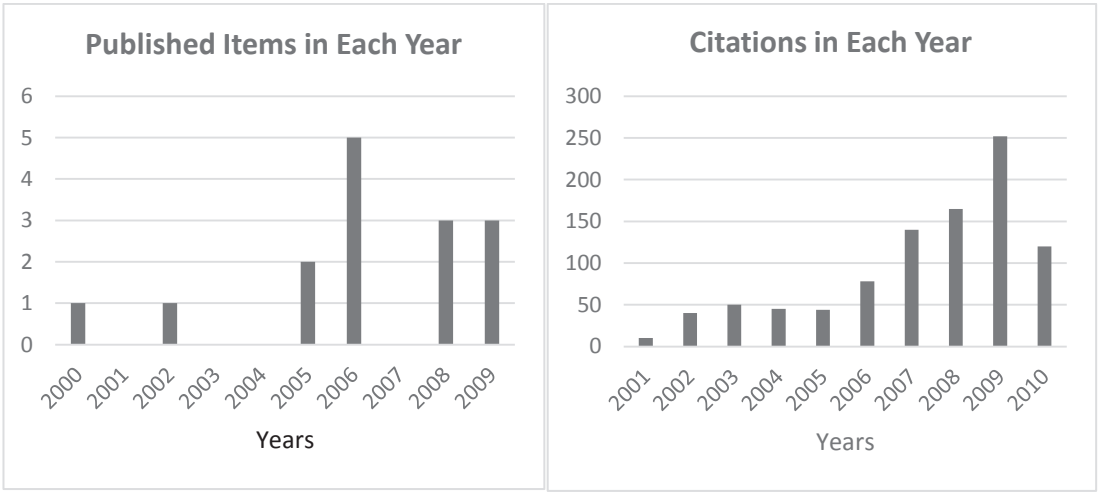

Figure 1: Measuring performance rates over time (assessment report, NHS).
Over the past 5 years: 13 papers published with a significant impact (>6)
Over the past 10 years: 9 papers published with a significant impact (>6)
Last year he was cited 256 times and 118 this year to-date (across articles)

al., 2006) and is widely employed by assessment committees and department heads in the health and natural sciences at Aarhus University (See Table H and I, Appendix). The aforementioned guidelines used for assessing scientific merit in the natural sciences also emphasize the *h*-index as a central performance criterion. More specifically, this document states that candidates for full professorships are expected to have an *excellent h*-index, while applicants for associate professorships should have a *good h*-index (dependent on scientific field and number of years after PhD) (Aarhus University, 2013). As discussed earlier, a number of modalities must be taken into account when using the *h*-index in research assessments; and if left unnoticed, some of these modalities have been argued to put women at a disadvantage. To briefly restate, the *h*-index privileges researchers publishing in sub-fields with high citation frequencies, and researchers who have many co-authorships and many scholarly publications.

When reflecting on their own evaluative practices of recruitment, many of the department heads also emphasize some of these modalities. Referring to the methodological shortcomings of *h*-indices, a department head from the natural sciences comments:

> You really need to be careful. You can't compare an experimental scientist with a theoretical scientist in this field. There is an inherent difference in the h-index and in between. (Natural Sciences)

This quote touches upon the first of the modalities discussed above, which is an issue raised by several of the department heads. The second modality, relating to the strong correlation between research output and the h-index, is also a crucial methodological concern among many interviewees. Three interviewees note:

> Obviously, citations depend on the age of the candidate right? There is also the *h*-index, which measures impact and so on, but it is very dependent on age, and of course you look at that right? If the *h*-index is very different from that of other candidates, then you start to wonder; because this means that this person doesn't get cited very often (Natural Sciences)

> In my opinion, the emphasis on the *h*-index is far too strong. My experience tells me that it takes many years for a researcher to reach high citations. This is why I think we should avoid emphasizing this issue too much. But of course, they're expected to have reached a certain number of citations and publications, but … I don't expect the *h*-index to be a double-digit number, but it has to be over seven or eight, depending on age. (Natural Sciences)

> We take this with a pinch of salt, and I clearly understand the connection between things here. We don't say "okay this man with an *h*-index of 35 is better, he's better than the one with an index of 17". This isn't necessarily the case, but he's older, and he's been publishing more articles, and that leads to more citations for a normal employee. And then you can ask… do you want a young employee or an old, experienced one? That's another question. Sometimes you might need one with 'more hair on the chest'. But in another vacancy, you might need a young, dynamic researcher with 'ants in the pants'. (Natural Sciences)

As the quotes indicate, department heads call for circumspection when interpreting the *h*-indices of applicants. However, while issues of scientific age tend to be very important to the interviewees, gender is not mentioned by any of the NHS department heads when reflecting on the limitations of the *h*-index. The quotes also illustrate that although *h*-indices are considered less useful in the evaluation of younger researchers, applicants for tenured positions are still expected to have reached a certain *h* when applying for positions at the associate professor-level. The third quote stands out as particularly interesting. It tends to be structured around a temporal norm of the typical (male) career trajectory, distinguishing between two idealized images of the successful scientist – the highly experienced older candidate and the hyper-productive younger combatant. As returned to below, one might question how this temporal norm complies with the (un)usual career paths of many female researchers.

As noted earlier, examining the applicants' performance trends over time is a frequently employed evaluative practice within the NHS and parts of the social sciences. Comments similar to those below are also present in several of the 48 reports.

> The applicant has a scientific production, which documents experience with different techniques within cardiovascular research. However, the production seems stagnant at a modest level, and an increase is definitely needed. (Health Sciences)

> Given that the applicant completed a PhD in 1997, the number of peer-reviewed journal articles may be a little disappointing, but both the quality and quantity still seem to be merely adequate for a tenured position. (Social Sciences)

Similarly, the department heads clearly emphasize the crucial importance of considering performance trends when evaluating scientific merits. Two interviewees from the more quantitative fields in the social sciences explain:

> These things influence our evaluations, and they also influence me when I recruit staff. I understand that a researcher needs time to settle, but an increase in productivity is important, because it indicates success. (Social Sciences).

> Well, the quality is something that you… it's relatively easy, right? You can look at what kind of journal it is, and there will be several rankings of journals. And then we look at trends. Does it look like the person's productivity is rising or falling? (Social Sciences)

The strong evaluative emphasis on research output and performance trends over time may entail indirect gender consequences. As noted by Espeland and Stevens (2008) "numbers often help constitute the things they measure by directing attention, persuading, and creating new categories for apprehending the world"; and although many of the department heads clearly emphasize that bibliometric indices are only one of many strategies for evaluating scientific merit, it is reasonable to contend that these metrics promote an evaluative culture privileging past achievements over future potential, thus rewarding traditional career paths and publication patterns.

Many years ago, March and Simon (1958: 165) introduced the term 'uncertainty absorption' to describe social processes in which "inferences are drawn from a body of evidence, and the inferences instead of the evidence itself, are then communicated" (cf. Espeland and Stevens, 2008). The analysis of the assessment reports reveals a similar pattern. Issues of quality and content tend to receive less emphasis in the evaluative practices of the NHS and the more quantitative parts of the social sciences than in the qualitative SSH disciplines. Evaluators may therefore fail to account for the nuances of existing contributions and future potentials in more than just quantitative ways. Reflecting on how the proliferation of bibliometric indicators has affected the evaluative practices, an interviewee with many years of leadership experience in the natural sciences comments:

> This is something which has emerged within the last 5–10 years. Before, you couldn't measure … well before Google scholar, it wasn't possible for us to measure citations within this discipline. So, what we did 10–15 years ago if we wanted to hire a person was to look at their CVs and then classify each paper and say "these five are good conferences, these are mediocre and the rest is shit". That was how you measured the researcher – by looking at conferences and journals. And if you go 10 years back, you looked more at each of the papers. Well, there were fewer papers and fewer applicants. It was less demanding at that point. And if you go 20–30 years back – at that point the assessment committees read your papers. They don't do that anymore! (Natural Sciences)

Although most research evaluators and department heads would probably hesitate to support the last part of this quote, the development described by the interviewee constitutes an illustrative example of how the accessibility of advanced bibliometric tools has spawned a certain type of 'uncertainty absorption'. Evaluative inferences tend to be drawn from the output of quantitative performance metrics rather than the actual research that these metrics are developed to measure.

While this development may harm both women and men, the existing literature indicate that a disproportionate number of younger female researchers facing "the dilemma of synchronizing the often-conflicting demands of three clocks: the biological clock, the career clock (as in timetables for tenure), and a spouse's career clock" (Sonnert and Holton, 1996: 70) may experience crucial challenges conforming to this new evaluative regime.

To be sure, not all female researchers become mothers or have male spouses, and numerous other factors also contribute to the gender gap in publication rates. Nonetheless, family commitments, in the large perspective, tend to play a crucial role at this career level.

A 2008 study focusing on Danish academics, for instance, reveal that women in top research positions have fewer children than their male colleagues (Verner, 2008). These findings echo the work of Mason and Goulden (2004) showing that American male researchers who father children early in their career are 38 per cent more likely to achieve tenure than women in the same situation.

Scholars have pointed to conflicts between family responsibilities and the gendered structure of the academic career path, when explaining these patterns. Bailyn (2004), for instance, asserts that the first stages of the academic trajectory, which often coincide with the point in life when many academics start families, are characterized by enormous pressure for quick success. According to her, this pressure may put a disproportionate share of female academics at a slight disadvantage due to gender variations in family-career tensions.

The existing literature on the question of gender, family characteristics and publication rates is, however, inconclusive. Kyvik (1990) and Kyvik and Teigen (1996) provide evidence of a negative impact of motherhood on scientific publication rates, while Fox and Faver (1985) and Fox (2005) find women with young children to publish at higher rates than women with no children or school-age children. Similarly, Cole and Zuckerman (1991) fail to identify negative effects of motherhood on scientific publication rates.

In this case, it is relevant to note that the studies presented above limit their focus to researchers who have already obtained tenure track or tenured positions. This means that they do not account for the initial processes of selection and exclusion in the research system. In other words, they are merely comparing the impact of motherhood on the pool of researchers who have already 'survived' one or several steps of academic promotion. In this sense, Fox and Faver (1985), Fox (2005) and Cole and Zuckerman (1991) are not providing sufficient evidence for rejecting the hypothesis that early-career researchers experience cumulative disadvantages due to motherhood and domestic obligations.

Moreover, the studies by Fox and Faver (1985), Fox (2005) and Cole and Zuckerman (1991) all draw on American data, while Kyvik (1991) and Kyvik and Teigen (1996) provide insights into the Norwegian situation. This means that structural and socio-cultural differences between the countries may contribute to explaining some of the disparities in the outlined results. Seierstad and Healy (2012) highlight the Scandinavian countries' family-friendly policies and their inherent affirmation of women as the main carers of the family as a distinctive structural feature limiting the advancement of female researchers in this particular socio-cultural context. The Scandinavian countries, for instance, all provide significantly longer periods of paid maternity and parental leave than the US, meaning that Scandinavian women (and some men) will have longer periods of research inactivity early in their careers than their American colleagues (Kyvik and Teigen, 1996).

Another crucial concern in this regard relates to the question of whether gender differences in the weekly allocation of time for research activities are taken into account when employing bibliometric measures to evaluate scientific achievements. In a 2012 survey aiming to assess the psychological work climate at Aarhus University, all researchers were asked to estimate how they, on average, distributed their work time across different types of tasks and activities. As illustrated in Table 2, women's self-estimated weekly allocation of time for research was lower than that of their men colleagues across all scientific ranks with a women to man ratio of 0.91:1 (25.0/27.4) for PhDs, 0.78:1 (16.9/21.7) for postdocs, 0.84:1 for associate professors (10.5/12.5) and 0.86:1 (11.6/13.5) for full professors. The difference was particularly noteworthy for faculty in postdoc level positions, which as illustrated in the existing literature is a career stage characterized by high demands for quick success in terms of scientific achievements (see e.g. Müller, 2014).

One way of interpreting these data could be that on average male researchers are better at administrating their time in terms of direct

Table 2: Weekly time spending (Psychological Work Place Assessment)

	PHD		POSTDOC		ASSOC. PROF.		FULL PROF.	
Tasks	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Keep yourself updated	6.0	5.2	6.7	5.8	7.8	6.7	9.7	7.7
Research	25.0	27.4	16.9	21.7	10.5	12.5	11.6	13.5
Research administration	1.8	1.7	4.0	3.1	5.1	4.3	5.7	5.2
Other administration	0.7	0.9	1.7	1.5	4.0	3.6	4.9	3.9
Teaching/ preparation	4.4	4.3	7.3	6.6	7.9	7.3	8.4	9.0
Supervision	0.8	0.9	2.4	2.9	4.0	3.6	5.0	4.8
Dissemination	0.6	0.5	1.0	0.7	1.2	1.6	1.9	2.0
Other (e.g. consultancy)	3.7	3.2	4.9	2.1	6.8	6.4	6.1	4.4
Total	**43.0**	**44.1**	**43.9**	**44.4**	**47.2**	**46.0**	**53.4**	**50.5**

N = Grade D: F(382), M(350); Grade C: F(182), M(262); Grade B: F(273), M(591); Grade A: F(47), M(212). Source: Human Resources, AU.

research outcomes. Another interpretation, however, might be that women take on broader 'invisible' organizational responsibilities (Fletcher, 2001), thus contributing to the functioning of the university in ways which are left unnoticed in bibliometrically based assessments of research trends over time. In other words, it is crucial that evaluators and managers take such issues into account when evaluating and comparing academics' scientific achievements.

In the last part of my interviews, I specifically asked the interviewees to consider whether and how gender-related issues influenced the recruitment and selection practices in their departments. As expected, several of them responded in words quite similar to the statements below:

> We DO NOT look at whether the applicant is a man or a woman when we recruit. The selection has nothing to do with that. We look at the qualifications … We don't think, "we want a man" or "we want a woman". (Health Sciences)

> Well honestly, I have to admit that I don't look at it [gender]. What we want is the best – the person that fits the picture the best. Sometimes it's a girl, sometimes it is a boy … or women and men. Well, it's not an issue, and I know that some people think it should be … Actually, our gender balance is OK, and this is also because we have many talented girls, but you're right… many of them leave before they go very far …When I look at recruitment, this isn't something… We want talented girls, and we have that, but it's not something we… We primarily look at qualifications. (Social Sciences)

As illustrated, the department heads consider the existing recruitment and selection processes to be gender-neutral and clearly emphasize that only the very best candidates will get through. I coin this "the narrative of the gender-blind organization". Interestingly, the performance measures discussed in this article come to function as managerial technologies supporting this narrative. They adhere to the prevailing ethos of the academic meritocracy by standardizing the criteria for organizational advancement and ensuring transparency and accountability in the selection processes, thus reducing the space for the practice of direct discrimination and nepotism. In

view of the persistent gender inequalities in the academic system, however, this narrative can be viewed as problematic. It disregards the potential differential impact of scientific performance measures on women and men, and reinforces prevailing disparities in resources and opportunities. By adhering to the gender-blind narrative, the department heads may overcome accusations of any type of direct discrimination or nepotism, but they may at the same time unintendedly prevent many talented researchers with 'unusual' research interests and career trajectories from succeeding as academics.

During the interview with the first of the two department heads quoted above, I chose to follow up on the interviewee's reflections on the *gender-neutral* nature of the existing recruitment practices. I clarified that the main purpose of my interviews had not been to reveal issues of direct nepotism and discrimination against women. Rather, I aimed to obtain a better understanding of the unintended differential impact of existing recruitment and selection practices on women and men. Interestingly, this made the interviewee open up and recognize one of the central biases related to these practices:

> Well, I agree. Clearly, things will be distorted, because we look at the h-index and things like that. Because it depends on your publication productivity and women simply haven't had the time to write the necessary number of publications. In view of that, I agree. Already at that point, we distort things. But this isn't intentional, right? (Health Sciences)

The interviewee's response constitutes an illustrative example of how social processes of commensuration related to the use of bibliometric measures decontextualize knowledge and render some aspects of organizational life invisible by shaping and constraining the cognition and behaviour of research evaluators (Espeland and Stevens, 2008).

In this regard, it is relevant to note that most interviewees, when asked directly about whether and how they compensate for parental and maternity leave periods in their selection practices, clearly emphasize that such breaks in a career are always taken into account and that having children would never disadvantage an applicant. Interestingly, however, the issue of a potential relation between CV gaps and parental leave periods is not raised once in any of the 44 assessment reports. Likewise, very few of the interviewees account for the subsequent periods of increased domestic responsibilities related to starting a family, which may limit the productivity of many (women) researchers with small children. Instead, they adhere to the idea that researchers, when 'back in business', should be measured against the same objective criteria as anyone else. This idea is epitomized most clearly in the quotes below.

> It's evident in the CV when children are in the picture. What's interesting is whether they're capable of getting back on track … One of the persons we hired had two maternity leave periods, and there were also a couple of years without any scientific production – and that made good sense. If people have shown their worth and shown that they're capable of getting back on track… In that case, I would have no worries about hiring. (Natural Sciences)

> One or 2 years of absence due to parental leave isn't that important. Well, for us it's all about getting the best candidate, and if that's a woman with children… well, that's fantastic and impressive, but that's not what we look at. We look at their qualifications regarding research, teaching and so on. (Health Sciences)

As illustrated, the prevailing understandings of research potential, capabilities and scientific worth tend to be strongly intermingled with issues of past performance and research output, which may contribute to explaining why more female than male researchers continue to face challenges in obtaining permanent recruitment at Aarhus University.

Conclusion

This study has attempted to make visible aspects of gender biases in how quantitative metrics are put in to practice in scientific performance assessments. Drawing on assessment reports and interviews with department heads, the study illustrates how bibliometrics, when used at the individual

level, can serve to perpetuate existing gender inequalities in academia by providing indisputable and easily measurable proxies for merit that decontextualizes scientific achievements and transforms different qualities into common metrics.

The study adopts a 'practice perspective' teasing out the modalities employed by research evaluators when using such metrics; modalities which often tend to disregard variations in scientific styles, career trajectories and particular life-circumstances, hereby disadvantaging candidates diverging from the (male) norm.

Consider, for instance, the accreditation of knowledge through journal ratings and impact factors in the social sciences. As illustrated in the interview material, this form of assessment is attractive among evaluators, because it offers seemingly objective tools for overcoming internal disagreements on what counts as quality.

In a gender perspective, however, the use of such proxies may entail adverse consequences. A disproportionate share of female researchers have been proven to engage in topics, styles and methodologies with a lower likelihood of being published in prestigious journals, and women, on average, score lower on impact factor scores and journal ratings than their men colleagues.

At the same time, the use of such proxies risk narrowing the diversity of intellectual goals and approaches at play in departments, hereby producing career obstacles for (women) researchers diverging from prevailing approaches and topics.

Further, publication counts, *h*-indices and assessments of cumulative citation and publication rates tend to be employed with little regard for the non-traditional circumstances and career obstacles facing many female researchers. Indeed, the use of such measures often come at the expense of longer, more in-depth and content-focused evaluations of scientific merits. They privilege past achievements over future potential, hereby putting scholars that do not comply with the temporal norms of the typical (male) career trajectory at a slight advantage.

Following Haraway (1989), one could contend that these measures facilitate a detachment of evaluative judgment from it socially situated vantage point. Despite their potential gender effects, they come to function as technologies supporting a managerial narrative of the gender-blind organization. They standardize the criteria for organizational advancement and ensure transparency and accountability in the selection process. By relying on such measures, managers may overcome accusations of any type of direct discrimination or nepotism. However, while this approach may lead to the recruitment of scientists with a strong CV and track record, it may at the same time prevent many talented researchers with interest and career trajectories diverging from the norm from being recognized for their contributions and succeed as academics.

One of the strategies that evaluators can adopt to overcome this potential bias is to move beyond the prevailing narrative of the gender blind organization. As clearly illustrated in this study, many department heads are eager to employ bibliometric measures in fair and objective ways, which implies being sensitive and responsive to gendered variations in research interests, approaches, and career developments. At first hand, this may seem counterintuitive, since gender categorization has been proven to implicitly influence academic assessments and evaluations (Valian, 1999). However, the academic appoint process is not double-blinded by nature (the first names of candidates are always given to evaluators), meaning that unconscious gender bias will operate irrespective of whether we explicitly account for gendered variations in the selection process or not. In line with the recently announced *Leiden manifesto* offering principles to guide the use of research metrics in evaluations of performance (Hicks et al., 2015), my suggestion therefore is to always supplement the use of quantitative proxies for merit with in-depth and systematic qualitative considerations about variations in expertise, experience, activities and career progression along gendered lines; even when comparing large numbers of researchers. Such an approach could help render visible some of the potential gender biases related to the use of quantitative performance metrics, hereby making academic recruitment and selection processes less gendered in their stratifying outcomes.

The potentially gendered aspects of quantitative performance assessments highlighted in this study leave ample room for further investigations. One question concerns the potential adverse gender effects related to the use of journal rankings and impact factor scores as proxies for quality in the SSH disciplines. Obtaining an in-depth understanding of this question, implies a more systematic mapping of gender variations in research interests, topics, approaches and methods. In this regard it is also crucial to account for variations across different stages of the academic career, since the publication behaviour of women (and men) leaving the academy at an early scientific age (i.e. years after PhD) may vary considerably from the publication behaviour of those who remain.

Likewise, a comparative study investigating the influence of family formation on the publication productivity of early career academics across varying socio-cultural contexts could provide much needed information adding further nuance to the scholarly debate over the existence of a 'motherhood penalty'.

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NOTES

1 Espeland and Sauder (2007: 6) define *reactivity* as a process in which "individuals alter their behavior in reaction to being evaluated, observed or measured".

2 Basically, the journal impact factor is an indicator developed to measure the importance or influence of a specific journal within a scientific field for a given time period by providing an estimate of the average frequency with which scholarly papers are cited in the journal during the preceding 2 or 5 years.

3 For thorough discussion of these shortcomings, see Gläser and Laudel (2007) and Weingart (2005).

4 Whereas field normalized citation scores can be used to overcome this bias in paper-based citation counts, the h-index does not normalize citations across fields.

5 Whereas fractionalization can be used to overcome this bias in publication counts, the *h*-index is not based on a fractionalized count of publications.

6 The human resources department has been very helpful in this regard by opening up their recruitment records. Due to the time-demanding process of anonymizing the reports, the administration limited my access to 48 systematically selected assessment reports. The selection of the final reports has taken place on the basis of a dataset provided by the human resources department, including statistical information regarding all recruitments for research positions from 2005–2013.

7 Originally, the assessment reports were obtained for a broader case study on evaluative practices in academic recruitment and promotion, which is also reflected in the selection criteria. 12 assessment reports were requested from each of the university's four scientific areas. However, due to complications in identifying the reports at the human resource department I ended up with altogether 44 documents. 12 from Science & Technology, 13 from Health, 11 from Business and Social Science, and 8 from ARTS (humanities).

8 NHS refers here to disciplines pertaining to departments in AU's faculties of Science & Technology and Health. SSH refers to disciplines pertaining to departments in AU's faculties of Business and Social Science and ARTS (humanities).

9 Figures and text are reconstructions of photo-copied figures appearing in one of the assessment reports.

Appendix:

Table A: Overview of the appointment reports

Science/Technology	Health Sciences	Business/Social sciences	Humanities
Molecular biology (2009)	Public health (2008)	Business administration (2012)	Theology (2009)
Computer science (2012)	Biomedicine (2012)	Political Science (2010)	Literature (2011)
Geoscience (2012)	Clinical medicine (2012)	Business Communication (2012)	European studies (2011)
Mathematics (2011)	Biomedicine (2011)	Business administration (2011)	French (2006)
Chemistry (2011)	Public health (2011)	Law (2013)	Aesthetics and communication (2011)
Cross disciplinary (2010)	Cross disciplinary (2006)	Business administration (2012)	Media science (2007)
Biology (2010)	Public health (2006)	Management (2007)	History (2011)
Molecular biology (2005)	Biomedicine (2007)	Business communication (2006)	History (2011)
Mathematics (2007)	Clinical medicine (2011)	Economics and business (2007)	
Chemistry (2006)	Public health (2011)	Law (2010)	
Computer Science (2008)	Clinical medicine (2012)	Economics and business (2010)	
Environment. Science (2010)	Biomedicine (2007)		
	Public Health (2005)		

Table B: Humanities (appointment reports)

	Pub. count	***Citation count***	***h index***	***impact factor* (prestige)**	***Journal rankings* (over time)**	***Productivity trends***	***Co-authored/ solo-authored* (relative to productivity)**	***Scientific Age***
Theology	X							
Literature	X							
European Studies	X							
French	X							
Aesth. & Comm.	X						X	
Media Science								
History	X						X	X

Table C: Business/Social Sciences (appointment reports)

	Pub. count	***Citation count***	***h index***	***impact factor*** **(prestige)**	***Journal rankings*** **(over time)**	***Productivity trends***	***Co-authored/ solo-authored***	***Scientific Age*** **(relative to productivity)**
Business adm.	X			X	X		X	X
Political Science (Sociology)	X							
Business Com.	X				X			
Law								
Management	X				X			
Economics	X				X			X

Table D: Health (appointment reports)

	Pub. count	***Citation count***	***h index***	***impact factor*** **(prestige)**	***Journal rankings*** **(over time)**	***Productivity trends***	***Author sequence*** **(first/middle/ last)**	***Scientific Age*** **(relative to productivity)**
Public Health	X	X	X	X	X	X	X	
Biomedicine	X	X		X	X	X	X	
Clinical medicine	X			X	X	X	X	
Cross-disciplinary	X			X			X	

Table E: Science and Technology (appointment reports)

	Pub. count	***Citation count***	***h index***	***impact factor***	***Journal rankings* (prestige)**	***Productivity trends* (over time)**	***Author sequence* (first/middle/ last)**	***Scientific Age* (relative to productivity)**
Molecular biology	X	X	X	X	X	X	X	X
Computer science	X	X	X		X			X
Geoscience	X						X	X
Mathematics	X							
Chemistry	X					X		
Cross-disciplinary (Physics)	X							
Biology	X	X	X	X	X		X	
Environment. Science	X						X	

Table F: Humanities (interviews)

	Pub. count	***Citation count***	***h index***	***impact factor***	***Journal rankings* (prestige)**	***Productivity trends* (over time)**	***Author sequence* (first/middle/ last)**	***Scientific Age* (relative to productivity)**
Culture and Society	X				X			
Education	X							

Table G: Business/Social Sciences (interviews)

	Pub. count	***Citation count***	***h index***	***impact factor***	***Journal rankings* (prestige)**	***Productivity trends* (over time)**	***Author sequence* (first/middle/ last)**	***Scientific Age* (relative to productivity)**
Business administration	X			X	X			
Business communication	X				X			
Economics	X			X	X	X		
Political Science	X				X			
Interdisciplinary (Business/ Engineering)	X	X		X	X	X	X	X

Table H: Health (interviews)

	Pub. count	***Citation count***	***h index***	***impact factor***	***Journal rankings* (prestige)**	***Productivity trends* (over time)**	***Author sequence* (first/middle/ last)**	***Scientific Age* (relative to productivity)**
Public Health	X		X		X	X	X	
Biomedicine	X	X	X	X	X	X	X	
Clinical medicine	X	X	X	X		X	X	
Legal medicine	X							
Odontology	X		X					

Table I: Science and Technology (interviews)

	Pub. count	***Citation count***	***h index***	***impact factor***	***Journal rankings* (prestige) *(conferences)***	***Productivity trends* (over time*)***	***Author sequence* (first/middle/ last)**	***Scientific Age* (relative to productivity)**
Molecular biology	X	X	X	X		X		
Computer science	X	X	X		X			
Geoscience	X	X	X		X	X		X
Mathematics	X	X			X			
Chemistry	X	X	X					X
Biology	X	X	X	X	X			
Physics	X	X	X		X	X		
Engineering	X	X	X		X			
Agroecology	X		X	X				
Food science	X	X	X		X			
Animal science	X		X	X	X			X
Environment. Science	X		X	X	X			

Speaking for Nature: Hobbes, Latour, and the Democratic Representation of Nonhumans

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Abstract

Environmental theorists have often considered how best to represent nature's interests. This essay develops an approach to the democratic representation of nonhuman nature by examining the relation between Bruno Latour's account of representation and that of Thomas Hobbes. Both Hobbes and Latour develop a constructivist theory of representation as an ongoing process that partly constitutes what it represents. In this respect, Latour's account complements the constructivist turn in recent democratic theory, and it suggests a promising avenue for representing nonhumans. However, Latour also follows Hobbes in viewing representation as a matter of unifying and replacing the represented. This aspect of Latour's approach obscures certain key features of representative democracy in pluralist societies. The last part of the essay takes up an aspect of Hobbes's theory neglected by Latour, the notion of representation by fiction, which suggests a way of representing nonhumans that offers more support for representative democracy than other approaches.

Keywords: Latour, Hobbes, representation

Introduction

Environmental theorists have frequently asked who "speaks for nature" or "represents nature's interests" (Dobson, 1996, 2010; Eckersley, 2000, 2004, 2011; Goodin, 1996; O'Neill, 2001, 2006). This essay develops an approach to the democratic representation of nonhuman nature by examining the relation between Bruno Latour's account of representation and that of Thomas Hobbes. One of Latour's most significant early essays draws directly on Hobbes's political theory (Callon and Latour, 1981), and Latour presents his influential argument that "we have never been modern" in terms of the controversy between Hobbes and Robert Boyle (Latour, 1993). Latour has also repeatedly referenced Carl Schmitt's Hobbesian rejection of transcendental foundations for politics (Latour, 2002: 26, 38; Latour, 2004: 278n64; Harman, 2014: 141-147). And as I show later in this essay, Latour discusses representation with terminology that directly echoes Hobbes. It is thus not surprising that Graham Harman (2014) describes Latour as "a liberally minded Hobbesian who adds inanimate entities to the political sphere" (Harman, 2014: 5). Harman even reports that he once "asked Latour about his earliest enthusiasm in political philosophy, and without hesitation he answered: 'Hobbes'" (Harman, 2014: 5). Harman goes on to argue that Latour has an ambivalent relation to the Hobbesian tradition, but "his tension with Hobbes is the engine of his entire

political philosophy" (Harman, 2014: 19).[1] Harman sees Hobbes's influence in Latour's constructivism and in the "Power Politics" of Latour's early studies on scientific practice as strategic alliance building (Harman, 2014: 3-4, 29-31, 180). Harman does not address Hobbes's theory of representation and its central role in Latour's political theory.

Both Hobbes and Latour develop a constructivist theory of representation as a process that transforms what it represents. They both argue that the represented are at least partly constituted by the process of representation itself. In Latour's terminology, representation involves mediation and translation between various spokespersons and the hybrid associations of humans and nonhumans that they represent (Latour, 2004). In these respects, Latour's account complements the constructivist turn in recent work on representation by political theorists (Disch, 2015). A constructivist approach to representing nonhuman nature is more conductive to pluralist democracy than approaches based on nonnegotiable moral or scientific claims. However, Latour's account of representation remains inadequate for the democratic representation of nonhumans, due in part to his apparent reliance on additional aspects of Hobbes's theory. Like Hobbes, Latour portrays representation as a matter of uniting and replacing disparate individuals by a single authoritative spokesperson (Latour, 2003: 150; Latour, 2013: 341). Representatives thus effectively act in place of their constituents, leaving little room for ordinary citizens in the process of representation itself. To be sure, Hobbes rejects democracy and Latour endorses it, but they both assume an opposition between citizen participation and political representation. Latour does not advocate direct democracy, but he implicitly adopts its logic of identity, which says that representatives ideally should do what their constituents would have done. In this respect, and despite his well known constructivism, Latour remains indebted to a correspondence model of representation as a mirror of reality. Echoing Hobbes, Latour portrays representation as a matter of *constructing* a unified people by authorizing representatives who then, ideally, substitute for and thus directly *correspond to* the people's collective will. Of course, Latour argues that such correspondence is inevitably imperfect, and so representation is always disappointing. But he offers no other view of representation that might prove less disappointing. Latour's approach thus provides little support for efforts to understand the diverse ecology of representative claims that characterize democratic politics today.

I develop the beginnings of a more promising approach in the last part of the essay, by taking up an aspect of Hobbes's theory neglected by Latour: the notion of "representation by fiction" (Hobbes, 1991: 111-114). Hobbes argues that if a person or thing cannot authorize its own representative, a representative can be authorized by someone else. The person or thing is then represented "by fiction." Nonhumans cannot authorize their own representatives, and Hobbes's discussion of "representation by fiction" suggests a way of representing nonhuman nature that, despite Hobbes's antipathy toward democracy, is actually more conducive to representative democracy than other approaches.

Nature's epistemic trustees

Most accounts of how to represent nonhuman nature rely on humans adopting the role of nature's trustees, and the authority of such trustees generally rests on scientific research, moral intuition, empathic understanding, indigenous culture, or some other form of knowledge broadly defined (Carbone, 2004; Eckersley, 2004: 121-126; Goodin, 1996; O'Neill, 2001: 494-495; Schlosberg, 2007: 193-199).[2] According to Goodin (1996: 844), for example, humans can best represent nonhumans by discerning and internalizing their interests and then acting with those interests in mind. Dobson (1996: 137) proposes that nonhumans could be represented by human "proxy-representatives," who would be elected by a designated "sustainability lobby" comprised of professionals charged with determining the conditions under which the animals, species, or habitats in question will survive and flourish. Dryzek (2000: 149) recommends that we respectfully "listen to signals emanating from the natural world" and then rely on those signals to assess nature's interests. Eckersley (2011: 237) sees nature's representa-

tives as "self-appointed guardians or trustees of nature who want the community at large to share in the duty of care they feel towards their ward." These accounts often assert an analogy between the political inclusion of nonhumans and the inclusion of women, ethnic minorities, and other previously excluded social groups (Dobson, 2010: 753; Eckersley, 2011: 241, 244-49; Latour, 2004: 69). These accounts also generally acknowledge that nonhumans cannot directly authorize their representatives or hold them accountable. And as O'Neill (2001) points out, humans who represent nonhumans probably cannot claim authority based on perceived resemblance or likeness between themselves and those they represent. So most accounts argue that science, morality, or other epistemic resources can be used to discern the interests of nonhuman nature and justify claims to represent it (Eckersley, 2011: 252; O'Neill, 2001: 496). From this perspective, the authority of nature's representatives depends primarily on their claim to know something about nature.

These efforts to expand standard conceptions of political representation to include nonhumans clearly speak to an urgent moral and political need. They rightly note that existing institutions of electoral democracy often create incentives for public officials to favor short-term concerns and powerful interests over the needs of nonhuman nature, future generations, and people in other countries. They also vividly capture the idea that nonhuman nature should not be reduced to a material resource for human exploitation. They rightly reject the modernist dichotomy between humans as endowed with free will and agency, on the one hand, and nonhuman nature as inert matter, on the other.

Unfortunately, most accounts of representing nonhuman nature adopt a correspondence view of representation that undermines their democratic aims. As Michael Saward (2006; 2010: 111-120) argues, most such efforts view representation as the unidirectional transmission of information from nonhuman nature to its representatives. From this perspective, representation involves first discerning and then promoting nature's interests in a manner that is either morally authentic or scientifically objective. These authors do not portray representation as a matter of dialog or interaction between representatives and constituents. Instead they tend to cast the representative as a passive recipient of input transmitted directly from the represented. The implicit ideal is Rosseauean direct democracy, which strives for an identity of citizens and their government. This approach is driven by an ethic of immediacy that views representation as a mirror of reality (Brown, 2009: 70-78; Saward, 2006: 191).

With regard to epistemology, the correspondence view of representation has long been persuasively challenged by constructivist approaches in pragmatist and feminist philosophy, science and technology studies, and related fields (Jasanoff et al., 1995). From a constructivist perspective, representations of nonhuman nature—whether in science, art, morality, or politics — are always partly constituted by cultural values, social interests, and political decisions.

In terms of its political implications, the correspondence approach tends to lead in one of two directions. Because representatives inevitably fail to perfectly mirror the represented, a correspondence view of representation may generate intense skepticism toward representative institutions and the concept of representation itself. Such skepticism appears in Rousseau, advocates of direct democracy, and various forms of populism. Alternatively, the correspondence approach may offer support for elitist theories of representative government, which assume that governmental decisions should correspond to the preexisting reality of an objective public interest discerned by virtuous experts. In either case, deliberation and judgment is reserved for a governing elite, and ordinary citizens are asked only to express their unmediated will through voting, protest, or public acclamation (Brown, 2009).

Most importantly, when nature's trustees are understood in terms of a correspondence view of representation, they are likely to become either moral or scientific technocrats who attempt to shut down democratic debate with claims to speak for nature's objective interests. Nonhumans themselves cannot object to being represented by technocratic trustees. But when such trustees make non-negotiable demands that leave little room for democratic debate and compromise, they are likely to be rejected by other humans.

Indeed, technocracy is not the actual problem, because when major interests are at stake, such as with regard to climate change, claims to speak for nature are inevitably contested. Nature's trustees then easily become just one more interest group among many. They compete among themselves and against other representatives who speak for other interests. Conflicts become entrenched and irresolvable, because for those who claim to represent objective interests, compromise seems like failure (Sarewitz, 2004).

In light of such difficulties with the idea of representing nature, some have argued that the entire project is misplaced. Ted Nordhaus and Michael Shellenberger (2007: 39, 50) reject the notion that environmentalism depends on "representing nature's interests," because they think it reinforces a romantic view of nature as pure and pristine, requiring protection from human intrusion. They argue that the question of who speaks for nature is itself "profoundly authoritarian," because it allows those with scientific expertise, local knowledge, or some other epistemic resource to dominate public decision making (Nordhaus and Shellenberger, 2007: 102). Similarly, Kerry Whiteside (2013: 354) argues that nonhuman interests cannot be represented in a democratic manner, because nonhumans cannot hold their representatives accountable. Whiteside (2012: 7) concludes that "representing nature" should be understood solely as a matter of "making representations" of nature, in the sense of portrayals that "stand for" natural phenomena, rather than as "acting for" nonhuman interests. More generally, Whiteside argues that in wealthy consumer societies, the short-term interests of humans are already represented far too well, so more representation is not necessary. For Whiteside (2013: 339), "The logic of representation itself is part of the problem." Whiteside thus challenges Latour's "reliance on the concept of representation," because it does not provide any substantive ethical standards but only promises to involve "more of today's people, with whatever values and concerns they *happen* to bring with them" (Whiteside, 2012: 2, 9, original italics). Rather than figuring out how to represent nonhuman nature, Whiteside argues, green theorists should instead design deliberative bodies with "enough authority to oblige representative legislatures to revise or withdraw proposals deemed environmentally unfit" (Whiteside, 2013: 354). Whiteside does not explain what could ensure the democratic legitimacy of such deliberative bodies, nor why they would not also become involved in making claims to represent various constituencies. Indeed, deliberative citizen panels frequently make a variety of representative claims (Brown, 2006). More generally, it seems impossible to avoid entirely claims to speak for nature's interests or to go beyond "the logic of representation" (Whiteside, 2013: 399). Various practices of representation – political, artistic, scientific – are pervasive in human societies. They are also inseparable from democratic politics, and they implicate nonhuman nature in various ways (Brito Vieira, 2009: 251; Brito Vieira and Runciman, 2008: 191).

Constructivist theories of representation and nonhuman agency

New approaches to representing nonhuman nature can draw on the work of political theorists who over the past two decades have been engaged in a fundamental rethinking of political representation. This rethinking has included both a "representative turn" and a "constructivist turn" in democratic theory (Disch, 2015). First, according to theorists of the representative turn, political representation is not merely a pragmatic concession to the size of modern states, as many participatory democrats have assumed, but rather an inevitable component of nearly all democratic systems (Plotke, 1997; Urbinati, 2006). Except perhaps in very small groups, some people always end up speaking for others. Many democratic theorists have thus criticized the widespread idealization of direct democracy, and they have shown how representation actually improves democracy by opening a gap between public opinion and government decision making, thus increasing possibilities for public deliberation, judgment, and mobilization. These thinkers also treat political representation as a dynamic process, rather than a product of electoral authorization and accountability, and as manifest in a wide range of different kinds of associations, rather than focused in state

institutions (Mansbridge, 2003; Urbinati and Warren, 2008; Young, 2000).

Second, according to theorists of the constructivist turn, representative claims should not aim for direct correspondence to fixed and preexisting constituencies, but should be understood as partly constituting those same constituencies (Ankersmit, 1996: 45-51; Saward, 2010; Disch, 2012). From this perspective, political representation inevitably contains an aesthetic and performative dimension, such that the process of making representative claims shapes both the representatives and those they represent. This does not necessarily mean that representatives create their constituencies from scratch. Preexisting physical properties, cultural values, and societal interests shape and constrain the range of representative claims that will seem plausible to any given audience (Disch, 2015: 490, 493; Saward, 2006: 192-193; 2010: 75, 80, 192). But these preexisting properties, values, and interests do not determine what counts as representation, nor do they provide an adequate standard for assessing the democratic legitimacy of representative claims.

A useful framework for analyzing the democratic legitimacy of representative claims appears in Saward's *The Representative Claim* (2010: 36-38). According to Saward, representation involves five elements: a *maker* of representations puts forward a *subject* (the representative) that stands for an *object* (the represented), which is related to a *referent* and is offered to an *audience*. For example, the Executive Director of Greenpeace USA (maker) offers Greenpeace USA (subject) to the citizens of the United States (audience) as standing for the survival needs (object) of all the world's people and ecosystems (referent). By distinguishing between the object of representation and its referent, we can see how the represented is constructed in the process of representation. The referent shapes but does not determine the object of representation, and no representative claim captures everything about its referent. Put differently, representation involves making claims not only about what the represented want or need, but also who they are (e.g., hard working people, endangered species).

Whether or not someone counts as a representative, and whether or not their activity amounts to representation, depends on the judgment of the relevant audience. Who belongs to the relevant audience depends on the purpose of representation in a particular case (Rehfeld, 2006).[3] In the most familiar cases, the audience of a representative claim overlaps with the object of representation (that is, the represented). When a candidate for public office addresses his or her electorate and claims to represent their concerns, the electorate is the audience and its concerns are the object. But in some cases, such as the previous example of Greenpeace, the audience differs either partly or entirely from the proposed object of representation. An official from Greenpeace USA speaks to an audience of US citizens about the needs of the entire planet. People sometimes make a claim *to* some people that they speak *for* other people or things. Such claims are *legitimate* to the extent the audience accepts them as valid. In many cases, such legitimacy may not be democratic, such as when the United Nations accepts the envoy of a nondemocratic country as representing the citizens of that country. The extent to which representative claims are *democratically legitimate*, according to Saward (2010: 143-160), depends on acceptance by the represented themselves.[4] An audience might accept a representative claim, thus creating a legitimate representative, but insofar as those who accept the claim are not also the represented, the claim is not democratically legitimate. Democratic legitimacy also depends on the extent to which such acceptance develops in a context of democratic norms, procedures, and conditions (political equality, public deliberation, etc.), however those may be understood in a particular context. As I discuss in more detail later, democratic legitimacy is best examined not primarily in terms of particular representative claims but the political system as a whole.

Of course, most if not all nonhumans lack the capacities necessary for critically assessing human claims to represent them. In Saward's terms, this means that even if nonhumans are part of the intended constituency of a representative claim, they cannot become part of the actual constituency, because they cannot assess and accept the

claim (Saward, 2010: 150-151). Later in this essay I propose a way of coping with this challenge. Here it is worth noting that just because nonhumans cannot assess representative claims does not mean that they have no rights or do not deserve moral consideration. Nor does it mean that all humans necessarily possess the capacity to assess representative claims. The standard liberal-rationalist conception of an autonomous human subject has been persuasively refuted by feminists, pragmatists, communitarians, and more recently, by scholars of posthumanism, actor-network theory, new materialism, and related approaches (Gabrielson, 2016; Sayes, 2014). It seems clear that human agency and subjectivity are best understood as social and embodied, as including many nonrational components, and as depending on a wide range of nonhumans. Similarly, agency is probably best understood, not as a uniquely human attribute, but in terms of a spectrum of agentic capacities: insentient entities and most nonhuman animals lack the capacities for critical reflection and norm-responsiveness of most human adults, whereas human children and some nonhuman animals typically exhibit some but not all of those capacities.[5] Nonetheless, even if we reject an essential boundary between humans and nonhumans, and even if we acknowledge the many ways they constitute each other, we need not conclude that there is never any practical difference between them. In politics and political theory, and especially in theories of democracy, it remains useful to distinguish between humans and nonhumans for certain purposes. Among other things, nonhumans generally lack the capacities for critical reflection and norm-responsiveness that make democracy possible (Krause, 2011). This means that nonhumans require a particular kind of political representation. As I discuss in more detail later, human claims to represent nonhumans cannot be assessed by nonhumans themselves, but they can be assessed by other humans.

This view of agency may seem to conflict with Latour's "flat ontology," which rejects any essential distinctions between humans and nonhumans (Harman, 2009: 12-16; 2014: 18, 39-46; Latour, 1988). Latour (1987, 2005a) argues that all such distinctions be understood in terms of the hybrid networks that create and sustain them. For Latour, especially in an era of climate change, when "the Earth has now taken back all the characteristics of a full-fledged actor," the "competences" of both humans and nonhumans can be determined only after their "performances" (Latour, 2014: 3, 11). Latour has thus often been interpreted as rejecting any distinction between human and nonhumans.[6] But this is a misunderstanding, produced in part by Latour's own lack of clarity, as well as his shift in emphasis over time. To be sure, from a *methodological* perspective, Latour insists on agnosticism regarding the distribution of agentic capacities among and between humans and nonhumans. Before embarking upon any particular inquiry, we should never assume "in advance" which actors have which capacities (Latour, 2005a: 16, 41, 57, 160). But Latour has also repeatedly acknowledged that agentic capacities become stabilized over time, and so from a *theoretical* perspective that seeks in part to understand the relations among already constituted entities, Latour's writings support the obvious point that most humans can do many things that most nonhumans cannot (Brown, 2009: 180-183; Latour, 1987; Latour, 2005a: 76).

Latour's Hobbesian view of representation

In *Politics of Nature* (2004), Latour proposes an elaborate view of representative democracy as an ongoing process of making and remaking hybrid human-nonhuman collectives. He conceives this process in terms of a bicameral system involving two distinct "powers of representation" that must be exercised through "due process" (Latour, 2004: 108-116, 126). The "first house" in Latour's scheme has the power "to take into account." It detects and discusses new "propositions" that seek admittance to the collective, employing both "perplexity" and "consultation." The "second house" has the power "to arrange in rank order." It engages in "hierarchization" and "institution" to arrange new and existing members of the collective into stabilized forms (Latour, 2004: 109). Latour uses the case of mad cow disease to make his point (Latour, 2004: 111-114). In the early days of the crisis, prions

were identified as a potential cause of the disease, but their status within the collective was unclear, leading to much controversy over their physical properties and political implications (perplexity and consultation). It became necessary to determine the relative importance of various epistemic claims and policy options (hierarchization), and eventually to establish closure through different forms of codification and naturalization (institution), so that the relevant issues would "no longer be subject to discussion" (Latour, 2004: 114). Most significantly, Latour portrays the two powers of representation as hybrid activities that involve many different kinds of spokespeople, including scientists, politicians, economists, moralists. Each of these kinds of spokespeople has particular skills that they bring to the task of representation.[7]

Latour (2004: 112) says that the work of the first house should not be brought to a close "too soon," and especially not by the imposition of essentialist notions of pre-existing nature. But he also makes clear, as many readers fail to notice, that "there is no need to mix everything up" (Latour, 2004: 112). Once a controversy has run its course, the hybrid assembly will "find itself in the grip of a second power that must of course stabilize the controversy, bring an end to the agitation, and calm the states of alert" (Latour, 2004: 113). This stabilizing of the controversy amounts to establishing clear boundaries between facts and values. Following the closure of the controversy over mad cow disease, for example, "The prion will have become *natural*: there is now no reason to deprive ourselves of that adjective, which is very convenient for designating, on a routine basis, full-fledged members of the collective" (Latour, 2004: 114, original italics). Latour (2004: 41) thus seeks to avoid the "impossible choice between realism and constructivism." A "fact" is both real and constructed, and indeed, "it is *because* it is constructed that it is so very real, so autonomous, so independent of our own hands" (Latour, 1999: 275, original italics). Contrary to the assumption of many readers, Latour does not reject all distinctions between society and nature, values and facts, or humans and nonhumans; instead he *historicizes* such distinctions.

Despite his parliamentary metaphors, Latour's account of representation is clearly not restricted to familiar state institutions. He sees a need for "techniques of representation in different types of assemblies," and he notes that "parliaments are only a few of the machineries of representation among many others" (Latour, 2005b: 21). Unfortunately, Latour does not discuss how different kinds of assemblies might relate to each other, and he gives no account of their different functions as parts of a political system (Whiteside, 2012: 13). Nonetheless, Latour's account of representation offers a provocative challenge to political scientists who restrict their analyses to electoral politics and state institutions, neglecting the many hybrid forms of sociotechnical representation that shape our common world. But what exactly does Latour mean by "representation"?

In many respects, Latour takes his basic view of representation from Thomas Hobbes.[8] Hobbes's account of representation is multifaceted and complex, and Latour's writings, as well as my comments here, only touch on a few aspects. Nonetheless, examining the relation between Hobbes and Latour in this regard helps illuminate the potential and limits of Latour's theory of representation. According to Hobbes's (1991: 120) famous account of the social contract in *Leviathan*, "the multitude" of disconnected individuals in the state of nature agree with each other to give up their natural right to determine for themselves how to protect their own lives, and they authorize one person or assembly to be their representative. They "reduce all their Wills, by plurality of voices, unto one Will: which is as much as to say, to appoint one Man, or Assembly of men, to beare their Person" and to "submit their Wills, every one to his Will, and their Judgements, to his Judgment" (Hobbes, 1991: 120). Most importantly, Hobbes draws on the medieval legal doctrine of corporate personhood to argue that the disconnected members of the "multitude" are not yet a "Person," they do not yet have a collective identity, until they authorize a representative. As Hobbes puts it, "A Multitude of Men, are made One Person, when they are by one man, or one Person, Represented" (Hobbes, 1991: 114; Brito Vieira, 2009: 159-160). Through the social contract, they establish themselves as a "Person," also called a "Commonwealth"

or "State," with a collective identity. They become "authors" of a sovereign power, which is an "actor" that acts in their name. For Hobbes, that is, the creation of a commonwealth and the authorization of its representative occur simultaneously (Skinner, 2005). There is no people with a collective identity prior to its representation. Moreover, Hobbes's sovereign does not represent the conflicting identities and interests of particular individuals. The sovereign represents an abstraction called a "Commonwealth" or "State," and it represents individual citizens only with regard to the lowest common denominator that unites them, which is their fear of violent death and desire for safety (Brito Vieira, 2009: 181). Hobbes thus sees political representation as a matter of constructing a commonwealth, rather than corresponding to pre-existing public will, opinion, or interest. In this respect, Hobbes's account of representation is similar to recent constructivist theories of both science and politics.

But Hobbes has little sympathy for democracy, and Hobbesian citizens must renounce their right of self-rule. They agree to "own" every action of their representative, as if they had done it themselves, and not to object to their representative's actions on their behalf (Hobbes, 1991: 112).[9] For Hobbes, representation does not require political expression or advocacy by the represented. Indeed, he sees conflict as a threat to political unity and public safety. The sovereign is obliged by natural law to preserve the commonwealth, but only the sovereign may judge what serves that purpose. In this respect, Hobbes's sovereign representative not only unifies the people but also effectively *substitutes* itself for them, leaving them no role in the process of representation (Brown, 2009: 118-124; Brito Vieira, 2009: 158-187, 252-253; Brito Vieira and Runciman, 2008: 24-28).[10]

Latour's account of representation has echoed several basic features of Hobbes's theory with surprising consistency ever since an influential early essay with Michel Callon (Callon and Latour, 1981). Callon and Latour draw on Hobbes to provide an account of the processes of translation through which mico-actors (individual humans and nonhumans) transform themselves into macro-actors (institutions). Rather than conceiving micro and macro as two fundamentally different levels of analysis that require different analytical tools, Callon and Latour show how micro-actors become macro-actors by building networks of entities whose interests they translate into a common will. Callon and Latour seek "to show what sociology becomes if we maintain Hobbes's central hypothesis—provided we replace the contract by a general law of translation" (Callon and Latour, 1981: 279). In place of Hobbes's social contract, Callon and Latour present a method for examining how representatives gradually establish themselves through ongoing processes of translation that create alliances and build institutions. For example, Callon and Latour show how efforts to establish a French electric vehicle program involved attempts to unite diverse and conflicting interests under a single representative. But whereas Hobbes (according to Callon and Latour) built the Leviathan "using only contracts and the bodies of ideal, supposedly naked, men" (Callon and Latour, 1981: 294) — that is, using only social elements — Callon and Latour show how those seeking to establish electric vehicle technology built hybrid associations that combined technical and social elements. They had to bring together claims about consumer preferences, for example, with claims about battery technology. Callon and Latour thus present themselves as going beyond Hobbes's account of representation by including both human and nonhuman actors. Latour repeats this argument in later writings (Latour, 1993: 24-27), so it is worth noting that Hobbes actually did *not* conceive the social contract in purely social, non-materialist terms. Hobbes was a materialist philosopher who understood human beings as "thinking bodies" and the social contract as partly constituted by material phenomena and concerns (Brown, 2009: 107-115; Frost, 2008). The more important point here, however, is that Hobbes provides a key inspiration for Latour's thinking about representation. Moreover, Latour's later writings retain at least four key elements of Hobbes's theory. Both Hobbes and Latour view representation as (1) not corresponding to a pre-existing constituency, but instead (2) constructing, (3) unifying, and (4) substituting for the represented. The first two elements offer conceptual support for democratic

efforts to represent nonhuman nature, while the second two elements threaten to undermine such efforts.

First, Latour's account of representation echoes Hobbes when he argues that it makes little sense to expect representatives to simply mirror the pre-existing views of the people. In Hobbes's time, both defenders of Parliamentary sovereignty and their democratically inclined critics, the Levellers, assumed that Parliament should "stand for" the English people. They agreed that its members should come from all relevant walks of life and its decisions should faithfully correspond to the people's will and opinion. They merely disagreed on whether Parliament was sufficiently representative in this sense. Hobbes argued, in contrast, that no representative body could represent its constituents in this sense, because the people only comes into being through being represented (Skinner, 2005). Similarly, Latour (2004: 152) argues, "A representative who demands that citizens faithfully obey him has no more sense than citizens demanding that politicians faithfully represent them." For Latour (1993: 143), the belief that representatives should directly correspond to their constituents reflects a misplaced distrust of mediation, a "desire for an immediate world, emptied of its mediators."

Second, Latour shares Hobbes's view that processes of representation construct the same constituencies they represent. As noted previously, Latour argues that representatives should not attempt to shut down public debate by appealing to established facts and values, but rather should construct facts and values through "due process." The purpose of representation in both science and politics is to "allow the progressive composition of a common world" (Latour, 2004: 53). Neither scientists nor politicians speak for pre-existing entities, but rather they mobilize and partially constitute the people and things they represent. A people and any other collective identity should be understood as a "provisional unity" that needs to be continually reestablished and maintained (Latour, 2004: 147; Disch, 2008: 92). Moreover, Latour argues that it is not enough to point out that human representations of nature are always mediated. Many social scientists are proud to show that "they are not naive enough to believe in the existence of an 'immediate access' to nature," and yet they still assume that a single universal nature exists beneath or behind all of its social representations (Latour, 2004: 33). For Latour, in contrast, representation involves the creation of new and different natures. Latour thus insists that today's multiculturalism should be complemented by "multinaturalism" (Latour, 2004: 29). Latour here differs from Hobbes, whose materialism assumes a universalist conception of nature as always and everywhere the same. Nonetheless, Latour's constructivist account of representation clearly echoes elements of Hobbes's theory. And Latour's challenge to technocratic claims about nature's objective interests holds considerable promise for the democratic representation of nonhumans. But this potential is undermined by two other elements of Latour's approach.

For over thirty years now, Latour has followed Hobbes in portraying representation as a matter of assembling disparate individuals into a unified whole with a single will. For example, Callon and Latour (1981: 279) argued, "Whenever an actor speaks of 'us,' s/he is translating other actors into a single will, of which s/he becomes spirit and spokesman." Similarly, in his more recent work Latour writes that politicians seek "to obtain the unheard-of metamorphosis of enraged or stifled voices into a single voice" (Latour, 2004: 148). And he has repeatedly portrayed representation as one-half of "the Circle" of politics: "the multitude becomes a unit—representation—before the unit becomes a multitude again—obedience" (Latour, 2003: 150). In Latour's most complete formulation, he writes:

> Start with a multitude that does not know what it wants but that is suffering and complaining; obtain, by a series of radical transformations, a unified representation of that multitude; then, by a dizzying translation/betrayal, invent a version of its pain and grievances from whole cloth; make it a unified version that will be repeated by certain voices, which in turn . . . will bring it back to the multitude in the form of requirements imposed, orders given, laws passed. (Latour, 2013: 341)

These requirements, orders, and laws are then translated, transformed, and opposed by "the multitude," leading to new grievances and another

trip around the never-ending Circle of politics. By tracing the Circle, Latour writes, "we pass time after time from multitude to unity and from unity to multitude" (Latour, 2013: 345; see also Brown, 2009: 172, 178-180, 178-179).

On the one hand, Latour here departs from Hobbes in suggesting that citizens might express grievances about the decisions of their representative. And whereas Hobbes insists that all representative institutions in a commonwealth must be sanctioned by and remain subordinate to the sovereign, which is the "absolute Representative of all the subjects," Latour has a much more open-ended view of an "assembly of assemblies" (Hobbes, 1991: 156; Latour, 2005b: 21). On the other hand, like Hobbes, Latour adopts an undemocratic image of "the multitude" as an inarticulate collection of people that "does not know what it wants," and so representatives must "invent a version" of its desires "from whole cloth" (Latour, 2013: 341). Latour thus suggests that representation does not require ongoing communication between representatives and those they represent. Latour reinforces this view with his expressed skepticism toward public participation in the politics of science and technology (Latour, 2007: 818-819; Harman, 2014: 147). More generally, Latour's account of representation as a matter of the relation between "unity" and "multitude" clearly echoes Hobbes, not only in terminology, but also insofar as both Latour and Hobbes conceive representation in juridical terms as a private legal contract between a single principal (a unified people) and its agent (the representative). Principal-agent views of representation are common in democratic theory, but they are rightly criticized for failing to involve an audience that assesses the relation between principal and agent (Brito Vieira and Runciman, 2008: 69). Moreover, whereas principal-agent theories of democracy portray representation as a matter of authorization and accountability, Latour portrays "the Circle" as a matter of representation and obedience. In this respect, Latour's approach is just as well suited to nondemocratic as democratic forms of representation. A circle of politics that consisted of citizens authorizing their representatives and then holding them accountable would offer at least the beginnings of a democratic conception of representation. But Latour's approach owes more to Hobbes than to advocates of representative democracy.

Nonetheless, we might still ask to what extent democratic politics involves the kind of representation described by Latour. The moment when the "the multitude becomes a unit" (Latour, 2003: 150) might be understood as the outcome of a democratic vote, when diverse voters are momentarily united in their collective authorization of a single law, policy, or candidate. Latour does not discuss voting or any other specific mode of decision making, but his account of representation apparently attempts to capture that brief moment of unity, after the votes are counted and a decision is announced. It could be voters electing a candidate, legislators adopting a law or policy, or lab scientists agreeing on an interpretation of their data. The minority accepts the will of the majority, and temporary unity is produced. Latour does not discuss what he means by unity, but one can imagine different versions. Unity could merely require everyone's grudging acceptance that the decision was legitimate. Or unity could entail personal identification with the decision and the representative people or actions it produces. In either case, the people's sense of unity relies on the assumption that the majority speaks for the whole, that the will of the majority stands for the general will. This "necessary fiction" has become increasingly difficult to sustain in the face of the entrenched conflicts that divide today's pluralist societies (Rosanvallon, 2011: 13). Minorities today often refuse to see themselves in the decisions of the majority, leading to new forms and modes of representation beyond electoral politics. Latour says little about such matters.

Latour's reliance on the juridical aspects of Hobbes's theory of representation also fails to capture many other key aspects of democratic politics. Whereas legal contracts are only binding upon those who agree to them, the decisions of political representatives affect all their constituents, including many who disagree with the decisions. Similarly, we generally expect the winners of democratic elections to represent not only those who voted for them but also those who voted against them, as well as many who did not vote at all. Nonvoters who may require repre-

sentation include nonhumans, children, people in other countries, and future generations. These diverse constituents have conflicting identities and interests, always subject to change, which means that representatives inevitably betray some constituents while being faithful to others. Indeed, to the extent that individuals are internally conflicted, representatives will be faithful to one aspect of a person's identity, while betraying another aspect. Latour neglects these difficulties that arise with efforts to represent conflicting identities, interests, and forms of knowledge. In such contexts, constituents are never unified for long, and representatives do not betray all their constituents at the same time, in the same way, or to the same extent. Saward makes a similar point with reference to the symbolic frontispiece of Hobbes's *Leviathan*, which portrays the body of the ruler as composed of the people: "Such symbols may capture realities, but they may also (*must* also—the symbolism of oneness is necessarily fictional *at some level*) gloss over realities such as necessary misrepresentation, shifting interests that are not spoken for, the selectivity of portrayals of constituent interests, and so on" (Saward, 2010: 91, original italics). This means that elected officials are "effectively *forced* to misrepresent us," due to features of the very electoral systems that allow them to represent us in the first place" (Saward, 2010: 92, original italics).

Latour's account obscures this internally differentiated character of democratic representation. To be sure, Latour repeatedly recognizes that politics is disappointing because representatives inevitably betray their constituents (Latour, 2003: 145, 151-152). But he implicitly retains faithfulness as an aspirational ideal, and he fails to offer a different ideal in its place. "Politicians and scientists all work on the same propositions, the same chains of humans and nonhumans. *All endeavor to represent them as faithfully as possible*" (Latour, 2004: 148, italics added). Latour suggests that we should stop being disappointed when our representatives betray us, but he says little about how they might represent us in a way that is less disappointing.

Finally, Latour also follows Hobbes in portraying representatives as effectively substituting for the represented. Conceived in this sense, representation amounts to a principal-agent relationship in which principals hire agents to do tasks they cannot do themselves (Brito Vieira and Runciman, 2008: 66-73). Latour's account of representation as substitution appears most starkly in his early discussion of technologies as "delegates" that substitute for humans (Latour, 1992). Latour asks us to think of a door hinge, for example, as the delegate of those who would otherwise have to put a hole in a wall and then repair it every time that someone wanted to leave or enter a building. Similarly, when faced with the problem of an unreliable porter, Latour writes, one has two choices: "either to discipline the people or to *substitute* for the unreliable humans a *delegated nonhuman character* whose only function is to open and close the door" (Latour, 1992: 231, original italics). Technologies are delegates of humans, Latour suggests, and as such they substitute for the humans who would otherwise perform the tasks of the technologies. In more general terms, Latour argues elsewhere, "[T]here is not much difference between people and things: they both need someone to talk for them. . . . In each case the spokesperson literally does the talking for who or what cannot talk" (Latour, 1987: 72). What do the spokespeople say? "Only what the things they represent would say if they could talk directly. But the point is that they cannot" (Latour, 1987: 73). When someone's attempt to represent me is successful, Latour writes, "What you are saying is what I would have said if I had spoken" (Latour, 2003: 156). Latour notes that efforts to represent others by substituting for them do not always succeed, and dissenters may raise concerns that a purported spokesperson actually speaks only for him or herself (Latour, 1987: 78). The term spokesperson thus designates "the *entire gamut* running from complete doubt (I may be a spokesperson, but I am speaking in my own name and not in the name of those I represent) to total confidence (when I speak, it is really those I represent who speak through my mouth)" (Latour, 2004: 64). Latour thus acknowledges that not all efforts to represent others necessarily amount to successful substitution, but he suggests that substitution is the standard to which representatives should aspire.

Latour's view of representation as substitution not only echoes certain aspects of Hobbes, it also sounds a lot like the typical participatory-democratic critique of representation. Participatory democrats often suggest that because governments inevitably fail to mirror the citizenry—that is, governments fail to substitute for the citizenry by doing what it would have done—representation offers only a second-best, pragmatic alternative to direct democracy (Barber, 1984: 145-146, 245-251). Recent political theories of representation, in contrast, as noted previously, view representative democracy as a distinct governmental form in many ways superior to direct democracy (Plotke, 1997; Urbinati, 2006; Urbinati and Warren, 2008). Latour ignores this body of literature. The result is that direct democracy—with its underlying Hobbesian view of sovereignty as unified collective will—haunts Latour's account of representation.[11]

Moreover, Latour neglects the important differences between representation and substitution. Substitute teachers or football players are usually not directly responsible to those they replace, but rather to their employers or professions. Nor are the actions of substitutes usually binding upon, or otherwise attributed to, those they replace (Pitkin, 1967: 131-133; Whiteside, 2013: 349-350). Similarly, advocating on someone's behalf or serving someone's interests does not by itself amount to representation. Teachers do not usually represent their students, nor doctors their patients, nor plumbers their customers. In each of these cases, some people are serving other people's interests, but their actions are not usually attributed to those they serve. Nor are those being served in any sense *present* in the relevant activities (Brito Vieira and Runciman, 2008: 67-68). In this respect, many accounts of representing nonhuman nature are better understood as calls for nature advocacy.[12] Moreover, it seems to belong to the concept of representation — at least to the concept of political representation, as distinct from artistic, scientific, or other forms of representation — that representative claims be contestable. If the represented lack the competence or capacity to object to what is said or done on their behalf, as in many examples of trustee representation, then someone else must be able to object on their behalf. Representative claims thus require an audience that evaluates the claims (Rehfeld, 2006; Saward, 2010: 48; Brito Vieira and Runciman, 2008: 72-73; Urbinati, 2006: 20; Young, 2000: 126). And while all forms of political representation arguably require an audience, the role of the audience becomes especially important in democratic contexts, when we want to assess whether representative claims are democratically legitimate, as discussed previously. Finally, conceiving representation as substitution mistakenly assumes the need for an identity of rulers and ruled, which is both impossible and undesirable. It is impossible because the citizens of pluralist societies are too diverse to be fully represented by any one representative. It is undesirable because it entails the replacement and passivity of the represented, thus establishing a false opposition between political participation and representation. Representative democracy, in contrast, requires ongoing participation by the represented (Urbinati, 2006; Young, 2000: 124-128). For all these reasons, insofar as Latour portrays representation as substitution, his account offers little guidance for the democratic representation of nonhuman nature.

Representing nature by fiction

In the preceding section I argued, first, that Latour's account of representation provides valuable resources for understanding how claims to represent nonhuman nature partly constitute the same constituencies they represent. And I argued, second, that Latour's account is less helpful for thinking about how the representation of nonhuman nature can be democratically legitimate. His reliance on a view of representation as substitution, and his assumption that representation aspires to collective unity, offer little guidance for understanding how claims to represent nonhuman nature might be legitimated in pluralist democratic societies. A more promising approach can be found in an aspect of Hobbes's theory that Latour surprisingly neglects: his account of how to represent those who cannot authorize their own representatives.

Authorization involves formal procedures that confer authority to act for some person or thing. A formally authorized representative is *in authority*,

whereas a representative whose authority rests on substantive competence is *an authority* on some topic. Politicians may have very little substantive competence (some names come to mind), and yet still be formally authorized to represent their constituents. Conversely, scientists have substantive expertise, but unless they acquire elective office, they generally lack the formal authority conferred by popular elections. In this respect, formal authority is usually associated with politics, and substantive authority with science. But these two kinds of authority are frequently intertwined. Formal procedures such as peer review and experimental protocols help establish scientific authority, and in this respect substantive expertise relies on formal authorization. And although critics often lament the incompetence of democratic governments, voters are unlikely to repeatedly reelect politicians who lack any substantive competence whatsoever.

Most citizens do not have an opportunity to formally authorize the environmental groups, NGOs, and transnational institutions that claim to represent their presumed interest in protecting nature. And nonhumans cannot directly authorize those claiming to represent them. O'Neill (2001: 494; 2003: 270) concludes that authorization cannot play any role in the representation of nonhumans. But another look at Hobbes suggests a different answer.

As noted previously, Hobbes argues that the sovereign does not represent individual citizens in their particularity but the abstract entity of the state (Brown, 2009: 128-132). And because the state is an abstract entity, it cannot authorize its own representative. The sovereign is thus authorized by a multitude of individuals through the social contract, and the sovereign then represents the state. In Hobbes's terminology, this means that state is not represented "truly" but rather "by fiction." Those who represent "truly" are authorized by those they represent. Those who represent "by fiction" are authorized by someone else (Hobbes, 1991: 111; Brito Vieira, 2009: 147-148, 172). Figure 1 shows Hobbes's theory of representation by fiction in the case of the sovereign authorized by the multitude to represent the state.

As Hobbes (1991: 113) goes on to explain, "There are few things, that are uncapable of being represented by Fiction." As examples of entities that can be represented by fiction, Hobbes mentions "a Church, an Hospital, a Bridge," as well as "Children, Fooles, and Mad-men that have no use of reason" and "the Gods of the Heathen." These people and things cannot authorize their own representatives, but "those that are the Owners, or Governours of those things," or have "Dominion" over them, may authorize representatives for them (Hobbes, 1991: 113). The owner of a church, hospital, or bridge, for example, might appoint someone to "procure their maintenance," and that person would represent those things by authority of the owner. Similarly, with regard to children and others who lack reason, "he that hath right of governing them, may give Authority to the Guardian" (Hobbes, 1991: 113).[13] The state differs from Hobbes's other examples of representation by fiction, because the state is created from scratch by the authorization of its representative, and it continues to exist only through representation. This means the state cannot have any interests independently of its representation

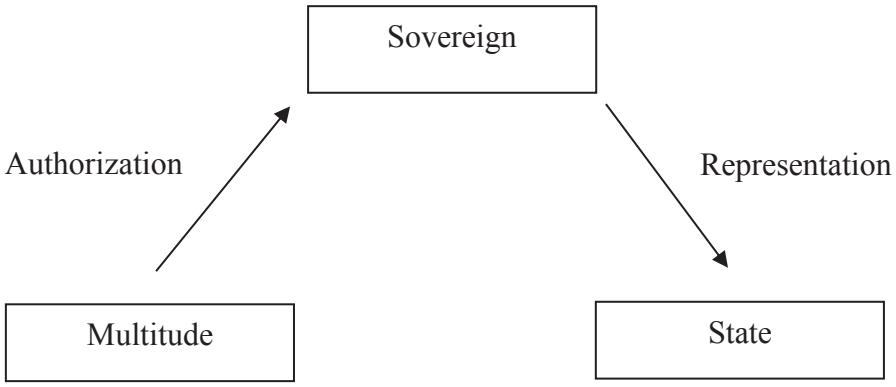

Figure 1. Hobbes's theory of representation by fiction (adapted from Runciman, 2009: 21).

by the sovereign. Citizens thus have no basis to contest how the sovereign represents them in their collective identity as a state (Hobbes 1991: 124). But Children, fools, madmen, and inanimate objects exist and may have interests prior to and independently of being represented, and those interests might become matters of dispute. Actions of a legal guardian on a child's behalf, for example, might be challenged by another representative of the child appointed by a court (Brito Vieira, 2009: 157-158).[14]

Hobbes's discussion suggests the need for an audience of representation. Not only can a bridge not authorize its own representative, but it also cannot recognize its representative as such, and so others must recognize the bridge's representative. In this respect, Hobbes sees representation by fiction as an ongoing process in which citizen witnesses, as the audience of representation, imaginatively construct a relationship between representatives and those they represent (Runciman, 2000; Skinner, 1999; Brito Vieira, 2009: 143-144, 248-253). Slightly revising Saward's (2010) framework, we might say that representation by fiction involves an *owner* who authorizes an *actor* to stand for a *person by fiction*, which is related to a *referent* (the entity that cannot authorize its own representative), before an *audience*.

Hobbes's notion of representation by fiction offers a new way to think about representing nature's interests.[15] Like the children, gods, and inanimate things mentioned by Hobbes, nonhuman entities and processes cannot authorize those who claim to represent them. But those who want to represent a particular nonhuman animal, species, habitat, or ecosystem, or even the entire planet, might do so "by fiction." The fiction is that the nonhumans can authorize and take responsibility for their representatives. Following Hobbes, representatives of this sort need to be authorized by the private owners or public authorities with dominion or legal rights over the nonhumans in question. For Hobbes, the single absolute sovereign has dominion, but in a context of popular sovereignty we might say it is the entire citizenry. The authority to represent nonhuman interests, from this perspective, rests not primarily on claims to moral or technical knowledge, but on formal authorization and its recognition by an audience. And whereas Hobbes aims to reduce or eliminate conflict over the standards of effective representation, in a democratic context we might depart from Hobbes and promote lively debate among competing claims to represent nonhumans. Most nonhumans lack the capacity to assess how they are being represented, but such assessment can be undertaken by the audience of representation.

This approach does not meet the standard of democratic legitimacy outlined previously, because only the audience and not the represented themselves can assess a claim to represent nonhuman nature. But this poses less of a problem if we view representative democracy as comprised of a diverse ecology of institutions, and democratic legitimacy as a potential attribute of the entire political system rather than particular representative claims (Brown, 2009: 204-206; Parkinson and Mansbridge, 2012; Rosanvallon, 2011; Saward, 2010: 163-168). Modern democracies depend on many practices and institutions that are not themselves entirely democratic. Expert advisory committees are usually not directly accountable to ordinary citizens, but if they provide the expertise that citizens require, they can improve the fairness and effectiveness of the entire political system. Citizen protest movements and advocacy groups are often highly partisan and non-deliberative, but if they call attention to excluded issues and constituencies, they can improve the deliberative quality and representativeness of other institutions and the system as a whole. The democratic legitimacy of such practices and institutions is indirect. It depends on their fulfilling a particular role within a complex political system. From this perspective, democratic legitimacy does not require that nonhumans themselves assess representative claims on their behalf. It requires only that the human audience of such claims accept them as valuable contributions to an ongoing process of representative democracy.

Representing nature in this sense is a bit like trustees representing a charitable trust or directors representing a corporation (Brito Vieira and Runciman, 2008: 96-103). Since a corporation, as an abstract entity, cannot authorize its own representatives, they need to be authorized by a third

party. The corporation's owners or shareholders thus authorize a board of directors to represent not only the owners or shareholders but also the corporation itself. Unlike the epistemic trustees discussed earlier, whose authority rests on claims to moral or scientific expertise, the authority of Hobbesian trustees depends on formal authorization and the recognition of such authorization by the relevant audience. The relevant audience is not nonhumans themselves, but the human citizens to whom nature's trustees address their representative claims. Figure 2 suggests how democratic publics might both authorize trustees to represent nonhumans and then seek to hold them accountable.

This Hobbesian perspective on representing nonhuman nature does not depend on answering vexing questions about nonhuman agency and interests – or more precisely, it transforms such questions into political rather than scientific or philosophical problems. For Hobbes, representation does not require the discernment of genuine interests or identities but only their fictive attribution.[16] This does not mean that Hobbes is a radical constructivist who sees no material constraints on successful representation. Hobbes makes clear that the authority of representatives extends only "so far-forth as is in their Commission, but no farther" (Hobbes, 1991: 112). The sovereign who represents the commonwealth is commissioned to secure the requirements of civil peace, which "requires great knowledge" in many different areas, and hence the advice of various counselors (Hobbes, 1991: 180). If the sovereign fails to secure civil peace, the subjects are no longer obligated to obey (Hobbes, 1991: 153). And anyone who violates the laws of nature will suffer "Naturall Punishments," which are the inevitable negative consequences of intemperance, rashness, injustice, pride, and other imprudent attributes and actions (Hobbes, 1991: 253-254). Similarly, when Hobbes says that a guardian who represents by fiction will "procure the maintenance" of a hospital or bridge, Hobbes suggests that such maintenance must fulfill certain preexisting requirements (Hobbes 1991: 113). But representatives, not their counselors or those they represent, have final authority to decide on the means of fulfilling those requirements. A Hobbesian approach thus involves acting *as if* nonhumans have specific interests and support certain policies, even if we cannot agree on whether they actually have interests or what they are (Smith, 2012: 108). If an official of the U.S. Environmental Protection Agency, who is publicly authorized to represent nonhuman nature, says that polar bears *want* their habitat protected, and the official's audience accepts the claim, the official has become the legitimate representative of the polar bears. Like a novel or play, Hobbesian representation by fiction does not require that we entirely forget the representation is a fiction, as long as we simultaneously allow ourselves to think and act as if it were not.[17]

Hobbes's theory of representation by fiction suggests that some advocates for nonhuman nature might complement the epistemic justifications of their representative claims with claims

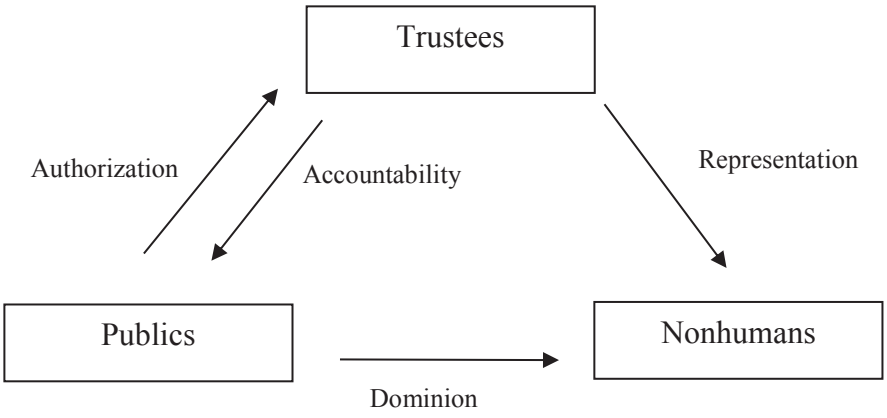

Figure 2. Democratic representation of nonhumans by fiction

based on formal authorization. Governmental environmental protection agencies, for example, might be seen as formally authorized by the electorate to represent nonhuman interests. Environmental organizations, animals rights groups, and green political parties might be understood as formally authorized by their members or voters to speak for nonhumans. The Dutch Party for the Animals (PvdD) holds numerous elected seats at all levels of government. In Los Angeles many Neighborhood Councils appoint a Director of Animal Welfare (Smith, 2012: 109-112).[18] To be sure, conceiving such organizations as formally authorized representatives of nonhuman nature will not guarantee protection of nonhuman interests or eliminate political conflict. Members of the relevant audience might dispute the representative's actions, and there may be additional disagreements over who belongs to the relevant audience. For Hobbes, any such disagreements must be quickly and definitively resolved by the sovereign, and the sovereign must be either a small assembly or a single individual. In today's pluralist democracies, in contrast, political legitimacy depends on broad public debate that includes diverse and conflicting efforts to speak for nonhuman nature. But a Hobbesian approach may help prevent such debate from becoming preoccupied with intractable philosophical or scientific disagreements. It may be especially helpful when the time comes for ending debate and making provisional yet authoritative decisions.

Conclusion

Taken by themselves, neither Hobbes nor Latour offers a theory of representation fully amenable to representing nonhuman nature in democratic societies. Useful resources for developing such a theory appear in their shared view of representation as a process that does not directly correspond to preexisting attributes but partly constitutes what it represents. But Latour's reliance on the juridical aspects of Hobbes's theory, especially his view of representation as a matter of unifying and replacing the represented, undermines the democratic potential of his account of representation. A more promising approach appears in Hobbes's theory of representation by fiction.

Representation by fiction is clearly not the only way to represent nonhuman nature. Different institutions support different types of representative claims, and vibrant democracies require an ecology of different kinds of representation. Saward (2006: 197) thus argues for "institutionalising multiple modes of representing a range of shifting human and nonhuman interests" such that we can "test openly in argument varied representations of nature." From this perspective, the representation of nonhuman nature is best understood as distributed across diverse institutions with diverse mandates, constituencies, and capacities. This means that whether nature is well or poorly represented depends not on any single representative body, but on a global ecology of representative institutions. Some institutions might rely primarily on epistemic claims to represent nonhuman nature. But given the frequent failure of epistemic claims to acquire public support, it seems prudent to view some individuals and institutions in Hobbesian terms as publicly authorized to represent nonhuman nature by fiction.

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Notes

1 Latour's most prominent departure from Hobbes occurs in his rejection of Shapin and Schaffer's claim that "Hobbes was right" to assert that scientific knowledge is determined by society (Shapin and Schaffer, 1985: 344). In response Latour asserts, "No, Hobbes was wrong," because both humans and nonhumans play a role in the construction of scientific facts (Latour, 1993: 26). Despite their disagreement over whether Hobbes was "right," these portrayals share a mistaken view of Hobbes as a radical social constructivist who saw no causal role for material things in either science or politics (see Brown, 2009: 107-115). I discuss this issue in more detail later.

2 Smith (2012: 99-125) is an important exception and makes some of the same points as this article.

3 Rehfeld (2006: 15-17) suggests that it is relatively easy to identify the relevant audience and whether it accepts someone as a representative, and thus whether representation "in fact" exists. Normative conflicts, he suggests, should focus on the legitimacy of the representatives rather than who they are. Saward (2010: 27-28, 55-56), in contrast, argues that the *intended* audience and/or constituency of a representative claim may differ from the *actual* audience and/or constituency. Moreover, audiences and constituencies emerge and change through the process of representation, and so both the identity and legitimacy of representatives are often a matter of ongoing contestation.

4 More precisely, the democratic legitimacy of a representative claim depends on its acceptance by the "appropriate constituency," which includes both the actual and intended objects of a representative claim. That is, it includes all the people who accept or assert that a claim represents them, regardless of whether or not the person making the claim intended to represent them (Saward, 2010: 148-149).

5 Donaldson and Kymlicka (2011, 2014) rightly argue that domesticated animals exhibit many characteristics of membership in human communities, including responsiveness to social norms, even if they cannot reflect on such norms.

6 Harman (2014: 81-82) argues that "the early Latour" asks us to "dissolve" modernist dichotomies between nature and culture, while Latour's identification of distinct "modes of existence," including "science" and "politics," each with its own criteria of felicity, belongs to "the late Latour". Latour has certainly shifted his emphasis over time, but Harman overstates his argument. At least as early as *Science in Action* (1987), Latour argued that the closure of controversies results in stabilized boundaries between subjects and objects, nature and culture, facts and values. Indeed, Harman (2014: 29) claims rather extravagantly that "since the work of the late Latour began in secret in the late 1980s, it was actually simultaneous with the early and middle periods." Harman goes on to say that the "old and new voices of Latour may co-exist for some time to come," but this "presents no problem, since they are perfectly compatible" (Harman, 2014: 81). It seems that these two "voices" are better understood as component parts of a single approach that does not entirely reject modernist boundaries but provides a methodology for showing how they become established and stabilized over time.

7 Politicians and scientists both represent the same world, but they do so in different ways. The notion of faithful representation means something different for each: "scientists have to maintain the distance between the propositions that they load into language and what they say about them, so that these two things will not be confused." In contrast, politicians need to "confuse them by continually modifying the definition of the subjects who say 'we are, we want.' The former are guardians of the 'them,' the latter masters of the 'us'" (Latour, 2004: 148).

8 Portions of this section draw on Brown (2009: 108-110, 172-180)

9 Even though Hobbes rejects any kind of citizen participation that would challenge the sovereign, he suggests that citizens must participate in upholding a public image of themselves as a unified people. Hobbes's theory of representation thus goes beyond the moment of sovereign authorization (Pitkin, 1967), and it suggests the need of an ongoing process for maintaining sovereign authority (Brito Vieira, 2009; Runciman, 2009).

10 Ankersmit (1996: 45-46) uses the term "substitution" differently than I do here. He associates the notion of representation as substitution with aesthetic or constructivist theories of representation, which he contrast with mimetic theories that require an identity of representative and represented. In contrast, I follow Urbinati (2006: 18-25, 104) and Young (2000: 126) in characterizing mimetic and juridical theories as based on the "substitution" or replacement of the represented by the representative. Mimetic and juridical theories differ in their criteria for establishing someone as a representative (resemblance and authorization, respectively), but they both remove the represented from the process of representation.

11 As Brito Vieira (2009: 241-242) writes, "Hobbes's theory of political representation reproduces the psychologically oppressive identity logic of direct democracy. Hobbes's theory generates an absolute coincidence between people and sovereign, represented and representative, as for him 'the people' does not exist except as united in one sovereign representative whose will must count as the will of everyone." She also explains, partly disputing the account in Ankersmit (1996: 29), that Hobbes's theory of representation goes beyond this logic of identity, because he asks citizens to adopt a double perspective: with respect to their shared identity, citizens must see themselves in the state; and with respect to their particular identities, they must accept their separation from the state and its sovereign representative whose actions they may not dispute (Brito Vieira, 2009). In this respect, Hobbes's theory of representation contains elements of both identity and difference, mimesis and poiesis. Nonetheless, the key point here is that Hobbes sees the relation between the sovereign and the state as a relation of identity, like that between the people and the government in theories of direct democracy.

12 Eckersley (2011) uses the phrases "nature advocacy" and "representing nature" synonymously, but the first phrase fits her account much better than the second. She argues only that environmentalists should be advocates for the intrinsic value of nonhuman nature, not that such advocacy should involve the figurative presence of nonhumans or be attributed to them. On the difference between advocacy and representation, see Smith (2012: 116-117).

13 "In handing over authority to procure the thing's maintenance, the owner or governor makes manifest his intention to treat the thing as something enjoying an existence and interests of its own, which deserve special protection, in so far as they may stand over and above the transient interests of its several owners or governors. Once the inanimate thing starts being personated, it gains animation, allowing us to speak of the thing's will, interests and actions for the first time. . . . therein lies the fiction" (Brito Vieira, 2009: 154).

14 The state also differs from Hobbes's other examples of representation by fiction, because the latter all require the existence of a state that can establish who has dominion.

15 This section expands on Brown (2009: 124-132). See also Brito Vieira and Runciman (2008: 101, 189-192)

16 Hobbes's notion that we fictively attribute interests to nonhumans has affinities with Marres (2012: 1-2, 104-105, 111-112), who approaches nonhuman agency not as a general philosophical question but as a performative accomplishment of particular settings that invest things with various capacities. But Marres says little about the specific relations of political authority and representation among those who invest nonhumans with agency (see also Disch, 2016: 632).

17 In the case of a stage play, a playwright or theater company authorizes an actor to represent a fictional character on the stage. The playwright or theater company, not the character, is responsible for what the actor says in the character's name (Brito Vieira 2009: 155).

18 Efforts to attribute legal personhood to animals also rely in part on formally authorizing humans to represent nonhumans (Smith 2012: 118-123; Wise 2010). But such efforts offer legal rather than political representation. They seek to ensure the enforcement of existing laws to protect the welfare and dignity of individual animals, rather than to create new policies that can be attributed to collective nonhuman interests. The Swiss canton of Zurich, for example, once employed an animal advocate, authorized by law to represent the interests of animals in court (Donaldson and Kymlicka 2011: 208). See also the website of the Nonhuman Right Project: https://www.nonhumanrightsproject.org

Diplomacy in Action: Latourian Politics and the Intergovernmental Panel on Climate Change

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Abstract

The Intergovernmental Panel on Climate Change (IPCC) reviews scientific literature on climate change in an attempt to make scientific knowledge about climate change accessible to a wide audience that includes policymakers. Documents produced by the IPCC are subject to negotiations in plenary sessions, which can be frustrating for the scientists and government delegations involved, who all have stakes in getting their respective interests met. This paper draws on the work of Bruno Latour in order to formulate a so-called 'diplomatic' approach to knowledge assessment in global climate governance. Drawing on observations during IPCC plenaries, this paper argues that a Latourian form of diplomacy can lead to more inclusive negotiations in climate governance. Latour's ideas on diplomacy help to identify values of parties involved with the IPCC plenaries, and allow those parties to recognize their mutual interests and perspectives on climate change.

Keywords: Diplomacy, IPCC, climate governance

Introduction: the Intergovernmental Panel on Climate Change as a diplomatic arena

It is obvious, or at least it should be, that the governance of climate change requires knowledge on what this global problem is all about, and where solutions may be found – it is not enough to conclude, following Bruno Latour, that we have arrived in the Anthropocene and that "Gaia is against us" (Latour, 2013: 486). Things become less obvious, however, when one tries to imagine the best way of connecting science and politics around questions concerning nature, which is something Latour (2004) addresses. Nature is commonly seen as a unifying element outside of the human sphere. However, Latour (2004) argues nature is not so much a unifying figure, but rather a dividing figure: pluralism is concomitant with 'nature', since society contains a multitude of often incommensurable perspectives on nature.

In this paper, we examine how science and politics become intertwined in the plenary sessions of the Intergovernmental Panel on Climate Change (IPCC). The IPCC is an international body for the assessment of climate change that was established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). The IPCC produces extensive analyses of scientific[1] research on climate change in 7-year cycles that culminate in the production of Assessment Reports. These documents are finalized during plenary sessions in which all countries that are member of the United Nations or WMO can ensure their interests are met, which involves elaborate diplomatic procedures. The plenary sessions are led by an elected officer (in most cases the 'Working Group Co-Chair') who, besides having been nominated by his or her own country and having gained sufficient political support in larger groups of countries to get elected, is typically also one of the leading climate scientists in the world.[2]

One of the most important procedural rules during IPCC plenaries is that delegations need to reach consensus in the form of a univocally accepted report, which includes line-by-line approval of the so-called Summary for Policymakers (SPM). This way of organizing the proceedings slows things down quite a bit (it may take days to agree on just a couple of pages), but also offers opportunities for real diplomatic encounters between the authors and the representatives of countries. Not only do all of the countries present have to agree; the authors themselves also need to unanimously accept the SPM. The final accepted report, which includes the SPM, serves as the benchmark for the assessment of climate-related risks and measures for years to come, so the stakes are high indeed. The scientific reputation of the co-chairs and authors are on the line (since any overstatements on the reliability of the science or any underestimation of the risk of climate change may backfire later). At the same time, co-chairs and authors need to be flexible enough to deliver a report that is found useable by policymakers and politicians. The latter groups of actors (both bureaucrats and even ministers in some occasions) will consider the political 'spin' they can give to the report in the media in their countries, and what positions can be supported in the context of the UN Framework Convention on Climate Change (UNFCCC). Moreover, both groups – the scientists and the country delegates – are heterogeneous. Among the authors there are disagreements on what are the best representations of the scientific evidence, and among the countries there are clear and plain political divergences, which are mostly related to assessments of economic impacts of either climate change or of proposed solutions to climate change, or both. Even though the meetings of IPCC plenary sessions are closed to the public and journalists are not allowed in the room, there are organizations that keep a close eye on what is happening. These organizations include fossil fuel organizations, environmental NGOs, and other organizations that represent different interests.

The negotiations that ensue due to the partial compatibility of perspectives and interests can be likened to a prisoners' dilemma game, where countries are better off reducing their emissions collectively, but think they benefit more from continuing to emit individually. The plenary sessions of the IPCC involve a highly multiplicitous arena of voices, which somehow need to address climate change in unison and assess possible actions. As a result, plenary sessions involve an intense process of negotiation between numerous government representatives and the authors of IPCC reports. These negotiations involve organizational, legal, political, ethical and also psychological elements, besides debate on preferred scientific presentations of the evidence base. Often, the interests of the delegations involved only partially overlap. Not all country delegations are similarly composed; some countries give the lead of the delegation to their nation's meteorological office, and thereby attempt to prevent that political motives become visible in how they proceed. Ultimately, delegations operate according to a governmental instruction and as a result cannot escape from being involved with politics.

The plenary sessions leading to the acceptance of IPCC Assessment Reports have the potential to create an inclusive space for negotiation by allowing those involved to voice their opinion. However, the selection of representatives features

exclusivity. Governments send representatives in the form of delegates who are involved with politics in their home countries. In the case of the climate system and possible 'solutions' to the problem of climate change, the IPCC's leadership selects representatives of scientific communities in the form of lead authors who reference scientific publications in their respective assessment chapters.

Science (through the authors) can play an important role as an epistemological arbiter in deciding what findings are seen as legitimate (i.e. supported by the underlying scientific literature). Although science is the dominant way of speaking that is deployed during IPCC proceedings, authors who believe in 'speaking truth to power' by means of 'objective' scientific insights are often surprised by the other ways in which delegates speak back, employing other registers of 'objectivity'. In turn, delegations who think they can speak power to science can find themselves overruled by scientific consensus. Ultimately, both sides have to respect each other and need to reach consensus.

In this article, we relate IPCC plenaries, seen as settings that are replete with all kinds of relations (e.g., political groups, legal means, organizational frames, emotional attachments) and different perspectives on climate change, with Latour's (2002, 2011, 2013) work on Modernity and diplomacy, in particular his views on politics. Latour (1993) is renowned for arguing for the existence of 'imbroglios of humans and non-humans' that defy comfortable categorization in modernist categories such as 'Nature' and 'Culture'. One need only open the newspaper, Latour (1993: 1 ff.) argues, to realize that science, politics, nature, and religion are often intertwined in such a way that clear-cut categories are of little help in understanding the world. Yet, during IPCC plenaries (and socio-technical controversies more generally) it is often Science that is mobilized as a universal arbiter that delivers exhaustive descriptions of issues and resolves misunderstandings. Latour refuses to take recourse to "Nature, as known by Reason" (Latour, 2002: 9) to resolve political conflicts. Instead, Latour (2004) argues that Nature, as explained by the natural sciences, has been mobilized as a disinterested third party, in the (vain) hope that it could settle questions related to environmental governance once and for all.

Latourian politics involves "the progressive composition of the common world" (Latour, 2002: 7). This common world cannot be taken for granted because it is not already constituted, and existing constructions may be challenged by alternative constructions. Diplomats play a prominent role in Latourian politics since they "know that there exists no superior referee, no arbiter able to declare that the other party is simply irrational and should be disciplined." (Latour, 2002: 37-38) Latour's idea of politics as progressive composition of the common world does not bode well for an approach to climate governance that relies primarily on science. After all, Latour (2002, 37-38) disagrees with the idea that objective scientific knowledge forms a universally valid arbiter that can resolve political conflicts once and for all. Thus, as we argue at greater length in section 3, Latour's understanding of politics can be framed as a diplomatic project through and through, for it is diplomats who become the arbiters in the pluralistic political landscape he describes.

By intertwining Latour's work on politics and diplomacy with our experiences as members of the Dutch delegation during several IPCC plenaries (for AP this entails 7 plenaries in the period from 2001 until 2014; for MK two plenaries in 2014), we propose ways in which climate governance can be enriched. We argue that it is important to respect the diversity of political interests without losing appreciation of climate science. Doing so can help to ensure that the IPCC reports contribute in a meaningful manner to climate governance. We have observed both naivety and frustration among many authors about the political dimension of their IPCC work – and some have made pleas for getting rid of country-approved SPMs for that reason. In the end, however, some authors who were first new to the process become aware that they are themselves doing politics, rallying groups of countries behind their representation of the evidence base. We acknowledge that balancing science and politics can be a frustrating endeavor. Both delegations and authors may not want to find their perspectives ignored, but the inclusion of as many different perspectives as possible yields challenges as well. The process

of ensuring the diverging interests of delegations and authors are met involves the hammering out of a document – where the actors are all operating under a multitude of organizational scripts – that can be accepted by all parties involved. In building this consensus, sacrifices may very well need to be made, which may also mean that the final texts become a collection of generic statements that are vague enough to allow different interpretations. Unanimous approval of the IPCC summaries is advantageous, since it forges documents with which all governments can in principle agree, also for use in subsequent negotiations within the UN climate convention (UNFCCC). The other side of the coin is that the documents produced become rather generic and unsuitable for the practice of climate governance. Highly sensitive issues can become veiled due to opaque language. Texts become inclusive of multiple opinions to the extent that they cover such a wide range of views on climate change that they lose specificity and, as a result, applicability in the domain of climate governance. A possible outcome is that policymakers are unable to use IPCC reports in any meaningful way.

Despite the presence of a multitude of voices, we do not believe that the IPCC has fully realized its diplomatic potential in terms of bridging the interests concomitant with heterogeneous perspectives. The IPCC can be better equipped to do justice to this multitude of voices, provided diplomatic interventions along the lines that Latour proposes are integrated more reflexively in the process of producing and approving IPCC reports. In order to illustrate the present difficulty of such diplomatic interventions (and the dominance of the order of speech that many authors would prefer to maintain), we draw on our experiences during IPCC plenaries to reflect on the inner workings of the IPCC. This analysis and the associated plea may help to improve future diplomatic encounters between science and politics in the activities of the IPCC.

Building an inclusive space of negotiation through diplomatic interventions aligns well with Bruno Latour's (2013) notion of diplomacy developed in his latest book *An Inquiry into Modes of Existence* (AIME), in which Latour focuses on 'diplomatic work' across various 'modes of existence'. Although this concept needs to be explained at greater length below, modes of existence can be provisionally defined as "different modes of being" that "emerge historically and internally to specific cultures, rather than being a priori categories of the mind or the world." (Bryant et al., 2011: 14) Each mode of existence has its own criteria for truth and is incommensurable with other modes. Table 1 below briefly illustrates the modes we deploy in our examination of the IPCC in this paper. Each mode is explained briefly in the table and will be explained in greater detail as our analysis proceeds. It should be noted that Latour's (2013) AIME describes a total of 15 modes. We cannot do justice to the depth of Latour's analysis and instead focused on those modes that in our view figured most prominently during the IPCC plenaries we attended. We adopt Latour's notation of the various modes, which consist of a three letter acronym between square brackets for each mode[3].

Diplomacy can be performed by reflexively doing 'intermodal' work that untangles confused ontologies and facilitates understanding between the adherents of various modes of existence (Maniglier, 2014). This intermodal work invites those who subscribe to a particular mode of

Table 1. Latourian modes used in this paper.

Mode	Description
[POL]	Politics, understood as an ongoing circular movement between attempts to achieve political representation and attempts to unsettle existing political representations.
[REF]	Reference. Latour uses this mode to refer to scientific representations.
[ORG]	Organization, seen as the production and following of scripts.
[ATT]	Attachment, a term Latour uses to refer to desires.
[MOR]	Morality, understood as asking the question whether ends justify means.
[LAW]	Law, understood as legal procedural connections between one step and the next.

existence (e.g. **[POL]** or **[REF]**) to redescribe themselves in the light of alterity, which can establish and improve intermodal communication. We deliver a somewhat instrumental reading of Latour's notion of diplomacy by arguing it can help to furnish the IPCC plenaries as a more inclusive political platform for climate governance. Our aim is not so much to use Latour's notion of diplomacy to solve the issue of climate change per se, but rather for cherishing institutionalized communication between science and politics, which can jointly characterize the problem of climate change. Our guiding question in this article is as follows: how can Latour's work on diplomacy enhance the IPCC plenaries as inclusive platforms for climate governance?

Methodology and paper overview

As stated above, we draw on our experiences as members of the delegation of the Dutch government during several IPCC plenaries. During these plenary sessions, we were part of a team responsible for ensuring the interests of the Netherlands were met during the negotiations. In this paper, we draw on our experiences during the IPCC plenaries that took place in Stockholm (September 23 to September 26 in 2013), Yokohama (March 25 to March 29 in 2014), and Copenhagen (October 27 to October 31 in 2014). Our methodology can be identified as the ethnographic approach of participant observation. On a daily basis we produced a combined reflexive log of the proceedings during the plenary sessions and contact groups and of our own roles in these. These logs were shared with governmental colleagues in the Netherlands. Our role was far from passive, since we were an active part of the negotiations that led to the approval and acceptance of IPCC reports. We proceeded as follows. First, we ensured that problems with the draft text of the IPCC report that were flagged by a team of specialists in the Netherlands were addressed during the IPCC plenaries. Second, close collaboration with others in the Dutch government led to sets of instructions tailored to each plenary session that needed to be followed through. As a result, the instructions acted as a script by shaping how we conducted ourselves in the mode of organization **[ORG]**. Awareness of the Dutch political context also went into these scripts **[POL]**[4]. Third, we ensured collaborations and interventions were planned and executed when necessary.

Although we were very much part of the processes of negotiation between incompatible perspectives we describe in the following, we do not think this implies an insurmountable bias in our view of the IPCC. Rather, by articulating our own approach to these negotiations, we demystify our own preoccupations and actions in an attempt to make them transparent to the reader. Thus, our writing can be framed as an attempt to demonstrate the diplomatic interventions Latour (2013) discusses, which involve a process of allowing adherents of modes of existence (including, but not limited to scientific practitioners and policymakers ranging from bureaucrats and professional diplomats to ministers) to express themselves in their own terms, whilst respecting other modes and ensuring that negotiation among the different modes is enabled and fostered.

In relating Latour's work on diplomacy with the practices of the IPCC, we proceed as follows. The following section briefly illustrates concepts from Latour's (2013) work related to politics and diplomacy, and subsequently refines the notion of diplomacy as further developed in AIME. Subsequently, we move on to two examples from IPCC plenaries: a discussion on climate sensitivity and conflict pertaining to an 'infographic' on climate impacts. We follow up on these examples by discussing Latour's more recent work (Latour et al. 2011; Latour 2013) on political representation and propose ways to refurbish the IPCC plenaries as more inclusive platforms for political deliberation on climate governance. We conclude the paper by proposing ways in which Latour's ideas on diplomacy and political representation could be implemented more reflexively in the organization of the IPCC, instead of the non-reflexive way in which diplomacy has been done in the IPCC until now.

Latourian politics and diplomacy

Throughout his work, Latour abstains from the idea that scientific knowledge can be based on an objective and accurate representation

of a presupposed outside world that is readily available to be known. For example, Latour (1993, 1999) argues that only the study of scientific practices can explain how scientists attribute objectivity, accuracy, reliability, and truth to scientific knowledge. The work and maintenance that make up scientific knowledge can be explained by an analysis of networks of human and non-human 'actants', and the ways in which these actants are brought together and change through a process that Latour describes as 'translation', which refers to "the work through which actors, modify, displace, and translate their various and contradictory interests" (Latour, 1999: 311). Translation produces actor networks that are hidden from view in a process identified as 'purification', which implies scientific theories are detached from their history, obtain the status of 'objective' representations of nature, and are granted the ability to speak on behalf of nature.

Thus, Latour (1993) studies scientific practices with the aim of supplanting epistemological assumptions pertaining to objectivity with the articulation of the multiple heterogeneous actants that make up actor networks. This analysis extends beyond scientific knowledge. Latour rejects the modernist dualism of mechanical nature versus society constructed *ex nihilo*, and argues there is no such thing as an a priori society. Modern conceptions of the world rely on strict bifurcations between Man, Nature, Mind, and Matter. As argued above in the introduction, Latour points to the existence of imbroglios of human and non-human actants that ultimately compose what we come to call 'society'. This rejection of a pre-given Society has repercussions for Latour's conceptualization of politics. Graham Harman (2014) argues that Latourian politics cannot be based on an idea of a state of nature, which obstructs the idea that a particular society or politics can correspond with or deviate from this state of nature. Society persists through translation and can neither be grounded "in natural right or in an unquestionable sovereign authority", nor can it be based on the idea of a "natural human equality or the irreducible character of diversity in a world devoid of absolute truth" (Harman, 2014: 30). Political truths are provisional and are composed of networks that are forged by the most powerful actants.

In his later work, Latour (2011, 2013) no longer wishes to reduce all actors to the same ontological footing, and instead emphasizes the distinctions between various 'modes' of being and emphasizes the plurality of worldviews that, taken together, compose the world we live in. Different domains (e.g. science, law, and economics) imply different ontologies, or (combinations of) 'modes of existence'. Drawing on terms from semiotics, Latour compares the notion of mode of existence with 'regimes of enunciation', which

> set up what comes next without impinging in the least on what is actually said.
> Like a musical score, the regime merely indicates the tonality, the key in which one must prepare to play the next part. So this is not about looking for what is underneath the statements, their condition of possibility, or their foundations, but a thing that is light but also decisive: their mode of existence. It tells us 'what to do next'. (Latour, 2011: 309.)

There is no knowing object or knowing subject a priori to a mode of existence. Rather than being pre-existing categories, modes of existence emerge from historically and culturally specific sites.

In a world populated by various modes of existence, metaphysicians are involved with diplomatic work across different modes, effectively furnishing intercultural work through which confused ontologies can be untangled and understanding between various social groups can be reached (Maniglier, 2014). AIME aligns well with the increasingly wide-spread realization that modernist facts and values, such as Mind and "the institution of matter" (Latour, 2013: 118), are running out of steam and need to be re-envisioned as values rather than objective facts, especially *vis à vis* present-day ecological crises. The process of untangling the Modern constitution is referred to as 'ecologizing modernity', which requires the constitution of a "whole new diplomacy" (Latour, 2013: 103) that is able to accommodate different modes of existence. Articulating modes of existence involves ontology, seen as an inquiry into the existence of things, as well as studying the relations these things entertain and the behaviors and values they exhibit. Seen in this way, ontology *is* ecology.

Diplomacy is a necessary activity in the face of a plurality of modes of existence. Latour (2002) explains diplomacy as a way to furnish 'multinaturalism', where different values form a unity as "the end result of a diplomatic effort" (Latour, 2002: 3). Diplomats are invited to let go of grand modern categories like Science, whilst retaining the power of the sciences (Latour, 2002: 45) and letting negotiations between different perspectives "resume in earnest" (Latour, 2002: 48). This approach to diplomacy aligns well with Latour's work in AIME, which entails the following ideas about diplomacy:

> The present investigation is presented as a diplomatic enterprise in the sense that there is no outside arbiter – survival of the fittest, universal reason, state, law, laws of nature etc. In this case, for want of a "referee" acceptable to all, we must "retake language" and, with the aid of a minimal number of forms, organize identification and bring negotiable and non-negotiable positions into contact with each other. It is because the common world needs to be composed that we must have recourse to a diplomatic procedure. (Latour, 2014)

The introduction of AIME (Latour, 2013: 2-6) contains an anecdote of a scientist who takes recourse to an explanation that illustrates the diplomatic character of AIME. Latour alludes to a climate scientist who is criticized by a climate skeptic. Rather than taking recourse to science's potential to acquire objective and reliable knowledge, the climate scientist does not invoke a presupposed epistemic process of Science to defend his claims. Instead, he goes on to list the various means through which a scientific understanding of climate change is produced. Speaking in terms of Latour's own Actor Network Theory (ANT), the scientist in question maps out the various elements of the network in which he himself is enrolled. This imbroglio of objects, agencies, and institutions has the ability to manufacture 'objective' knowledge. Latour not only delights in the description of science thus given, but also thinks this is the right way forward for the climate scientist. Retaining the power of the sciences involves articulating the 'chains of translation' (Latour, 1999: 91ff.) that make up scientific knowledge. Constructivist analyses of the sciences reframe scientific practice and could lead to "opening the peace talks again by rephrasing the war aims of all parties" (Latour, 2002: 41).

Such a constructivist exposition of chains of translation in climate science is also important due to the plurality of voices that can be found in the author teams responsible for writing the IPCC reports. The IPCC bases its reports on substantial reviews of scientific publications and is not involved with doing research itself. Although the authors need to base their findings on scientific publications that discuss various aspects of climate change, they often end up having diverging interpretations. As a result, different perspectives on climate change need to be condensed into an 'objective' representation of the current state of climate science. For this reason, it is important that the IPCC acknowledges the role of expert judgment. Thus, the scientific underpinning of the IPCC's findings is made amenable for contestation if deemed necessary. A further example of this is the development and implementation of criteria to assess the quality of scientific findings by using 'uncertainty' qualifiers, which enhances the transparency of IPCC documents by exposing the chains of reference and the underlying scientific processes. Those involved acquire the possibility to understand how the scientific basis of the IPCC's findings was established.

Latour's proposal to expose the chains of translation of science does not mean that he thinks the values of the Moderns simply need to be abandoned. If 'we have never been modern', as Latour (1993) has stated, the question is to ask what we have been instead. AIME emerges as a positive version of Latour's earlier diagnosis of the Moderns. Rather than rejecting the values of the Moderns outright, the diplomatic task at hand here is to understand the experience and modes peculiar to the Moderns. The diplomat enables the Moderns to speak out for their own values in a way that fosters negotiation with other modes. It is the task of the diplomat to help the various parties in a conflict find out what it is they are fighting for (Latour, 2002: 50). The perspectives of all involved are approached in a 'respectful' manner. Put differently, it is important not to reduce the perspective of one practitioner to that of another, e.g. by reducing one practice to another by arguing

that science is only a social construction, or by reducing differences to an irreducible opposition, e.g. by radically opposing science with politics or religion.

Diplomacy involves identifying the different 'interpretive keys' (Latour, 2013: 319) that belong to different modes of existence and making sure that category mistakes are avoided: "the rational degenerates into parasitic rationalization as soon as we lose or confuse the keys" (Latour, 2013: 319). Diplomacy involves "a practical relationalism that seeks, in a protocol of relationship-building and benchmarking, to avoid the ravages of relativism – that absolutism of a single point of view" (Latour, 2013: 481). In other words, Latour's diplomacy is a plea for a pluriverse that accommodates a multiplicity of modes of existence. The figure of the diplomat, "as devious as he is naïve" (Latour, 2013: 484), plays an important role. Constructing a more accommodating pluriverse does not involve bringing down existing institutions, but rather the accommodation of different modes of existence: "[w]hat we want is an institution that follows the trajectory of its own mode of existence without prejudging the rest, without insulting the others" (Latour, 2013: 482).

As we show below, diplomacy helps to foster a more inclusive form of climate governance, e.g. by better accommodating the interests of all involved. We provide two examples of diplomacy in action. In each case, we outline the perspectives and actions of those involved, and perform a diplomatic analysis ourselves, i.e. by attempting to untangle confused modes of existence. In addition, we explain how diplomatic interventions along the lines proposed by Latour could inform the negotiations during IPCC plenaries. As a result, diplomacy could have helped to establish a more inclusive and reflexive space of negotiation in which the perspectives of those involved are accommodated, ensuring the possibility of seeking acceptable compromises.

Diplomacy in action 1: climate sensitivity

Our first example of diplomacy in action discusses events on the last day of plenary approval session for the Working Group I contribution to the IPCC's Fifth Assessment Report (AR5) in Stockholm (Thursday 26 September 2013). Working Group I addresses natural science questions pertaining to the climate system: e.g. how much warming do the greenhouse gases that are emitted by human activity cause? The negotiations in this example of diplomacy in action concern the politically and scientifically sensitive issue of the 'equilibrium climate sensitivity', which is a theoretical quantity that represents how much the Earth would warm up in the long run from a doubling of the carbon dioxide concentration relative to the pre-industrial era. For many decades the estimates for this quantity have ranged between 1.5°C and 4.5°C. Given that the world had already decided to keep the temperature below 2°C, this theoretical quantity, an in particular its uncertainty, could be regarded as politically relevant in the climate negotiations: when the climate sensitivity is high the greenhouse gas emissions will have to be reduced further to keep the temperature below 2°C than when the sensitivity is low.

This issue was sensitive in Stockholm even more since it had already been in the news (through 'leaks') that the range of the 'climate sensitivity' compared to the previous IPCC report (AR4, 2007) was to be adjusted. Because of new studies, the lower bound had gone down to 1.5°C, while it had temporarily (since 2007) sat at 2°C. Politically, some countries wanted to highlight that climate may be less sensitive to greenhouse gas emissions, while other countries could not stomach the emphasis on the (lowered) low scenario – they wanted to retain emphasis on the (unchanged) high scenario. Scientifically, more references had become available based on a particular type of estimation methods (which gave lower climate sensitivity outcomes). Effectively, the narrative of the authors in the construction of the new climate sensitivity range had changed from the narrative of six years earlier. This is nothing to be embarrassed about: every round the evidence base has evolved and every round the authors are asked to give their best expert judgment.

In the plenary session the authors proposed to delete the following sentence from the summary:

> The lower temperature limit of the assessed *likely* range is thus less than the 2°C in the AR4.

The suggestion to omit this sentence was based on the argument that the ranges between the subsequent reports were incomparable due to differences in methodology. According to the authors, the way chains of reference were built up were different from one report to the next **[REF]**. Some countries objected: they claimed that policy-relevant information would then disappear from the summary and they could not accept that. For them, deletion of this sentence would make it more difficult to politically rally groups around the claim that climate change could be less severe than was expected earlier **[POL]**, although they could not admit this so openly in the IPCC proceedings. Subsequently, after the plenary meeting could not reach an agreement, one of us (AP) found himself later that morning around a standing table in an informal consultation group on the climate sensitivity text. The representatives of a number of countries had been sent out of the session to negotiate with each other and with the authors. There were countries that found it important that a comparison was made with AR4 and there were countries against doing this. There was a mix of reasons and motivations, clearly at the crossing of the modes of reference **[REF]** and politics **[POL]**, but also uncertainty guidelines **[ORG]** and emotional attachments **[ATT]** of both country delegates and authors were thrown into the mix (including AP's own, who had strong views on how uncertainties had to be addressed and was highly driven to obtain closure on this matter). These negotiations took place in a 'pressure cooker', since the chair of the session wanted to have results quickly.

The initial proponents of keeping the eliminated sentence found it very relevant for their policy-makers to show that the lower limit has been reduced – and stated so. Opponents used two arguments to defend the deletion: (1) by highlighting just the lowering of the lower bound one ignored that the upper bound had remained the same, and for many policy-makers the upper bound was at least as important as the lower bound; (2) the methodologies differed between AR4 and AR5, so that the range would be incomparable. Having heard all this, the authors together produced a new draft text, in which they went along with the opponents, picking up on their second argument. However, in this way they did not get their politics right. The authors were wrong to assume that that argument would sway the initial proponents of keeping the eliminated sentence (and AP thought, that the argument was not sound anyway).

AP saw all of this happen and concluded that they were not going to converge in this way. He realized that a compromise was possible along the line of the first argument of the opponents. For a moment, this compromise had been on the table as an acceptable option for important proponents and opponents: refer to both the reduction of the lower bound and the unchanged upper bound. This should be easy! But the authors had by now been put entirely on the wrong track, so he would have to make a very solid intervention, against the authors and against a powerful country. And he had to speak to the authors in terms of underpinning **[REF]** after he had spoken to the country most strongly pushing for the phrase on the lowering of the lower limit in terms of interests **[POL]**. So he asked the authors first to confirm that AR4 and AR5 ranges, although they have been established in different ways, are indeed similar in that they both represent an expert judgment with a similar degree of likelihood. They could not deny it, and reluctantly they confirmed it. Then he scored his goal: this meant that the argument that the ranges were not methodologically comparable was invalid, and that nothing stood in the way for the authors to include upper and lower bounds for both AR4 and AR5. He also mentioned that this compromise was already at hand and strongly urged the countries to now agree with it. This diplomatic intervention struck the right keys both scientifically and politically, effectively prevented a further dynamic and led to convergence within the next 5 minutes. They could all go back to the plenary hall, where the session was slowly but surely on the way to the finish line. A little later the following phrase came along: "The lower temperature limit of the assessed *likely* range is thus less than the 2°C in the AR4, but the upper limit is the same". No country had any further comments and the text was approved.

Diplomacy in action 2: representing climate impacts

As illustrated above, the intended outcome of each plenary session of the IPCC is a policy-relevant document that addresses climate change in a topical manner, is adopted by all countries involved, and acts as an international benchmark for subsequent research on climate change and climate-related policymaking. In practice, this means that agreements are established through negotiations where diverging interests meet and agreements can be produced, often in the form of compromises. Here we give a second example of such a process of negotiation, this one featuring diverging perspectives on an information graphic, or 'infographic'. Even though these negotiations featured only partially compatible interests, the parties involved did eventually reach an agreement.

During the plenary session of the Synthesis Report, the figure below (Figure 1) was presented for consideration to the countries present. The figure locates observed impacts of climate change at geographical locations. The impacts in question can be attributed to climate change with varying levels of confidence (see the explanation of attribution in the lower-left corner). Attribution turned out to be the subject of much debate. Impacts that cannot be attributed to climate change in a 'scientifically acceptable' manner (i.e. being up to par with the scientific standards upheld by the IPCC) are not included in the figure **[REF]**. Several countries from Africa, Latin America and South America proposed to customize and even remove the figure, since they observed large gaps between the figure and 'reality': for them the impression conveyed by the figure was politically hard to swallow **[POL]**. One delegation remarked that the figure was also representative of differ-

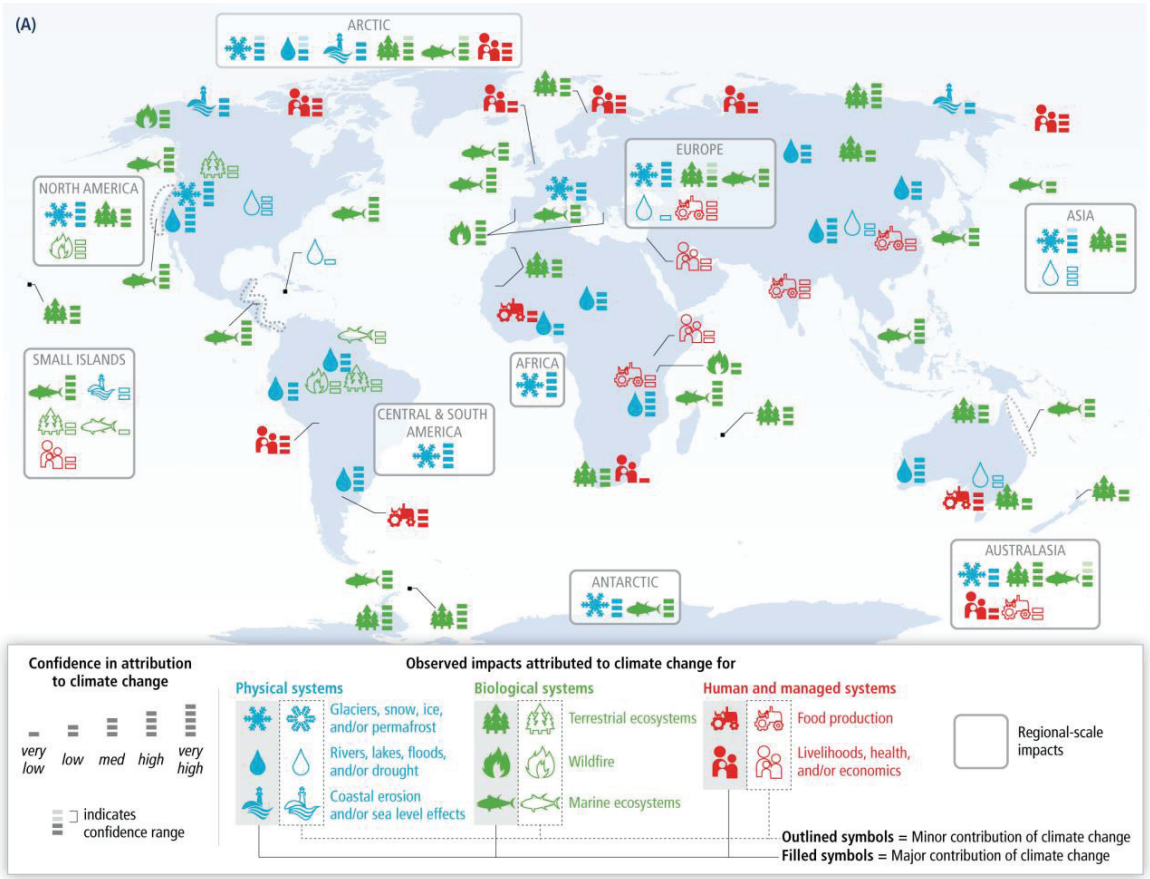

Figure 1. Figure SPM.2A (IPCC, 2014a: 7) showing observed impacts that can be attributed to climate change for physical, biological, human, and managed systems. As discussed in the text, this map was the subject of a heavy debate.

ences in the availability of funds for scientific research: since developed countries had more resources to do research on the extent to which impacts can be attributed to climate change, this also led to a higher chance of successful attributions of impacts to climate change and a larger number of attributed impacts included on the figure. This should accordingly lead the IPCC to have moral scruples over this figure **[MOR]**: in the poor countries the impacts of climate change are expected to have more negative effects but they are at the same time less well known because they are less studied, which could be seen as a 'perversity' indeed.

These concerns, coming from other modes of existence, were understandable to many delegates (including MK), because the figure represented an extremely important aspect of climate governance, namely the extent to which climate change already had a negative impact. Although attribution was addressed in the caption of the figure, it was conceivable that a figure like this would take on a life of its own. As Latour (1986: 19) points out, "[t]here is nothing you can dominate as easily as a flat surface". It would probably be widely shared, and the subtleties behind 'attribution' might not be taken into account. Rather, the figure was likely to act as an exhaustive representation, which would also be due to the perceived authority of the IPCC.

But the authors were at first not open for a diplomatic exchange. They kept repeating that attribution of observed impacts had to be based on available scientific literature, which was evaluated on the basis of scientific criteria and guidance upheld by the IPCC, implying a 'crossing' of **[REF]** and **[ORG]**, which Latour writes as **[REF • ORG]**[5]. A crossing of modes joins modes that have different effects. In this case, representation on the basis of scientific criteria [REF] is combined with the IPCC's procedural requirements [ORG], yielding an obdurate mixture of knowledge deemed scientifically sound that also aligned correctly with the IPCC's procedural criteria. The authors of the figure stressed that their work had already been approved during the Working Group II session of the IPCC in Yokohama in March 2014 **[LAW]**. According to its authors, the figure constituted a "major advancement" and was representative of global impacts that could be reliably attributed to climate change. This information was meant to provide a scientific basis to advocate for adaptation and mitigation. In addition, the figure also provided insight into topics that needed to be studied more extensively, and the geographical areas where more work on the impact of climate change needed to be done. In other words, the figure had an illustrative role, but also an epistemic one as an articulation of knowledge gaps.

One delegation proposed to update the caption of the figure by adding a sentence stating that an impact missing on the map did not mean that this impact in question has nothing to do with climate change. After more negotiations, the following caption was proposed:

> Figure SPM.4: Widespread impacts in a changing climate: Based on studies since the AR4, global patterns of impacts in recent decades attributed to climate change. Symbols indicate categories of attributed impacts, the relative contribution of climate change (major or minor) to the observed impact, and confidence in attribution. Locations without symbols may be affected by climate change impacts that have not yet been detected and attributed to climate change. See WGII SPM Table SPM.A1 for descriptions of the impacts.

Apparently, the authors had started to engage with the image in a diplomatic manner. Still, the aforementioned explanation and proposed caption did not appear to advance the discussion. One group of delegations emphasized the importance of displaying only impacts that could be legitimately attributed to climate change. Others stressed that the average policymaker would literally see the figure as a truthful representation of impacts of climate change. In short, one group emphasized the quality of the scientific process that led to the figure **[REF]**, the other group reasoned from the perspective of policymakers and politicians and how they could mobilize groups using the figure **[POL]**. Once again, the authors retorted that there was political relevance of keeping the figure as it was: via the scientific process underlying the figure it had been possible to convey the fact that there are indeed global impacts that can be attributed to climate change **[REF]**, and that climate change is no longer a hypotheti-

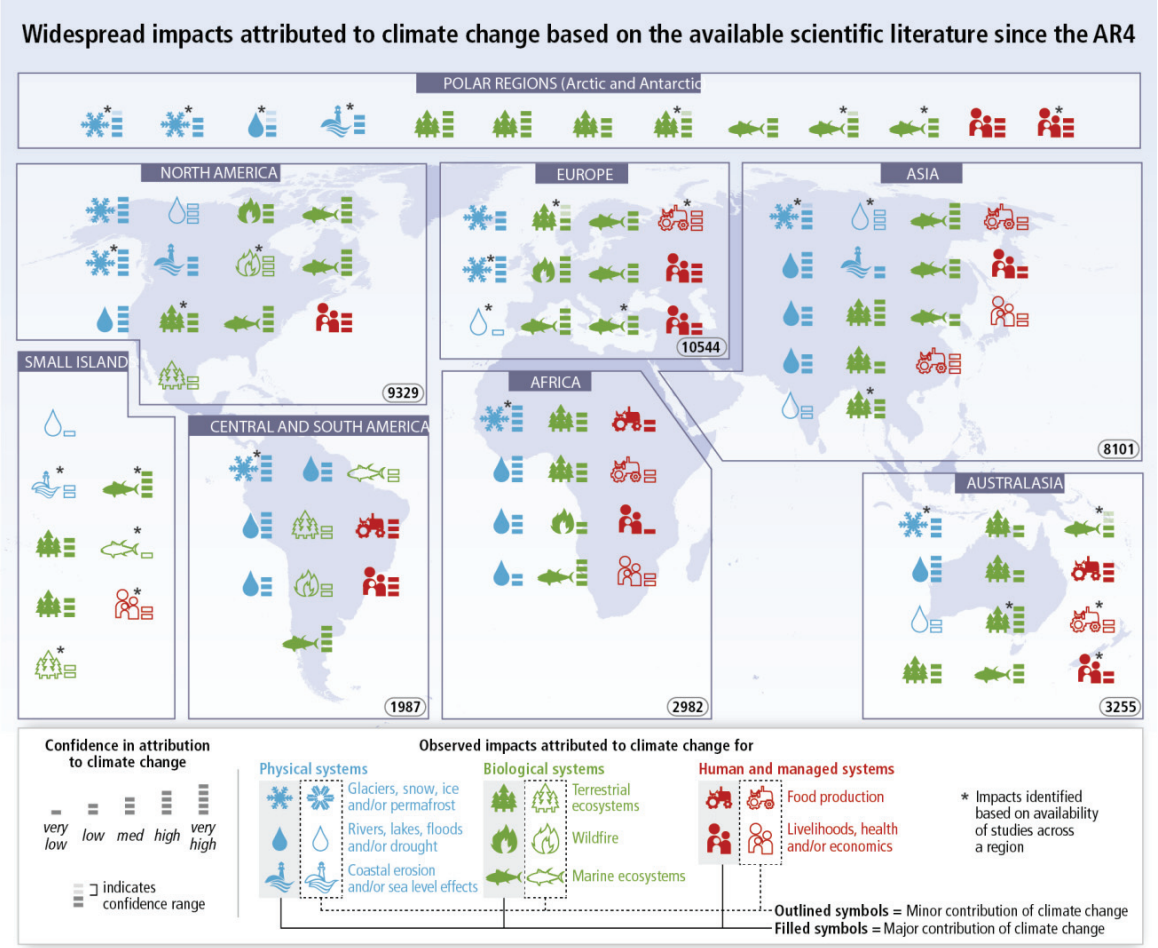

Figure 2. Figure SPM.4 (IPCC 2014b, 7) showing impacts that can be attributed to climate change according to scientific criteria established by the IPCC, as discussed during the finalization of the Synthesis Report.

cal problem and needs to be treated as a political issue **[POL]**.

The day after the foregoing events transpired, an agreement was reached in the form of a new figure (Figure 2). Due to the political sensitivity of the figure and the resistance encountered by its authors, a different design was chosen as an alternative. The map no longer actually functioned as a map, but rather as a collection of icons that represented observed impacts, which were displayed in a box that had the continent in question as a backdrop. However, the actual location of the observed impacts was now no longer represented. The new design coupled observed impacts to entire continents, causing the observed impacts to lose geographical specificity. In other words, whereas the previous figure allowed the coupling of an observed impact to a specific region, the new figure was more like a collection of impacts. The graphical representation of the continents had become a background, and now only provided general information about the location of observed impacts. Thus, content present in the previous version of the figure – the explicit information about the geographic specificity of observed impacts – was now (literally) wiped off the map: in the new chain of reference some information that was included in the previous version was lost **[REF]**. That being said, the new figure included a hint on the moral issue identified the day before: the numbers at the bottom of the boxes of each continent indicated the number of references on which the attribution of observed impacts for that continent was based (itself a measure for how many studies had actually been done). This proposal constituted an acceptable compromise for the plenary, but it had not come easily from the side of the authors.

MK with hindsight saw the proceedings around these figures as a lost opportunity. The density of information appear to be rather large and the boundaries of the paper format appear to have been reached. Although more and more voices within the IPCC had argued that different platforms and formats for dissemination needed to be explored, this was not the case during the foregoing negotiations. In the end, the question is whether the present form of the infographic suffices. The authors of the infographic were forced to implement a different design that no longer articulated the blind spots of research on climate impacts geographically on the map (although they did show up in the numbers in the lists). The interests of the various government representatives who contested the initial design had acquired a more 'balanced' representation of climate impacts, but one that lacked important geographical information: such information on attribution could have been mobilized in order to plea for additional research on climate impacts in specific geographical regions.

It appears that the clash between **[POL]** and **[REF]** here had created a compromise with potentially profound repercussions. Neither group had emerged victorious and there was relatively little understanding among the opposing country delegates for the intentions of the authors of the infographic. **[POL]** had impinged quite radically on the process of representing climate impacts.

The political circle

As became clear in the foregoing, delegations partaking in the IPCC plenaries attempt to have their interests met, which entails the consolidation of a multitude of voices due to the different and often incompatible agendas of the delegations and authors involved. Although diplomacy can be of benefit in terms of articulating values and building consensus between different delegations and with authors, it is not a silver bullet that will always yield a solution. Delegations may find their interests unaddressed and the authors of IPCC reports may find that their hard work on climate science is not taken up in the political process that is also involved in approving a report's summary. However, as we show in this section, Latourian diplomacy is a crucial building block for a more inclusive and accommodating – and more reflexive – form of climate governance. To bring home this claim, we need to explore **[POL]** in more detail, the mode of existence with which many IPCC authors could engage more productively.

[POL] should not be confused with **[REF]**, since this would feed into disillusionment in the form of a belief in 'rational politics'. This technocratic form of politics **[POL • REF]** leans heavily on positivistic science, and assumes scientists 'speak truth to power' by feeding scientific findings into the process of policymaking. The implication of rational politics is that scientific knowledge can simply be taken up as is, without any mediation. However, there is no such thing as knowledge or truth without mediation in a Latourian ontology: "[d]emanding that scientists tell the truth directly, with no laboratory, no instruments, no equipment, no processing of data, no writing of articles, no conferences or debates ... without stammering [or] babbling, would be senseless" (Latour, 2003: 147 quoted in Harman, 2014: 83). The IPCC's relationship with science, expressed in the often-encountered dictum "policy relevant but policy neutral", is unable to account for the processes of mediation that take place once scientific knowledge needs to be taken up by policymakers.

Like the other modes, **[POL]** has its own felicity conditions involving language and action that unifies internally conflicting and disparate 'multitudes', or masses of people. For Latour, **[POL]** entails a cycle from multitude to political representation that is never-ending and inherently disappointing: some voices are amplified whilst others are drowned out in the tumultuous uproar of the agora. Political representation involves the articulation of a position, but once this position is articulated and achieves political representation, other positions are excluded. The cycle from multitude to representation may lead to the dissolving of representation due to the concerns of a multitude that feels its concerns are insufficiently represented: "the ruler inevitably betrays the ruled and the ruled betrays the ruler in turn, through a series of translations or remixes of what one seems to tell the other" (Harman, 2014: 86). As a result, the cycle from multitude to representation will begin again, starting from a new and changed

multitude that once again attempts to construct political representation. There is no way in which the concerns of a particular multitude can simply be fed into politics. Believing the contrary would ignore the necessity of mediation, much like the aforementioned belief in rational politics.

Taking very specific and fixed political motivations as a starting point in negotiations will most likely frustrate political deliberation: those who demand their interests are met 'as is' are effectively doomed to disappointment, since any compromise will be framed as betrayal. The development of political representation is profoundly vulnerable: the political circle "can at any moment grow larger by multiplying inclusions, or shrink by multiplying exclusions. Everything depends on its renewal, on the courage of those who, all along the chain, agree to behave in such a way that their behavior *leads* to the next part of the curve" (Latour, 2013: 342, original emphasis). The renewal of the political circle can establish a situation in which the renewal of the political circle is less painful or frustrating, though it might as well "take a turn for the worse" (Latour, 2013: 343).

In Latour's multiverse that is populated by adherents to various modes of existence, Nature is not so much a universally valid and unambiguous arbiter against which the value of other perspectives can be weighed, but rather a dividing figure. These insights can be extended to the IPCC plenaries, which rely on the natural, economic and social sciences, and the humanities,[6] without those sciences having the power to unify the planet – they are not the ultimate epistemological arbiter that can settle conflicts once and for all, but modes among other modes. The IPCC may act as if there were such a final way to resolve conflicts between these modes, e.g. by heralding global climate models as impartial instruments that have the strongest voice in debates on climate change, but this ultimately entails a category mistake.

In those cases where **[REF]**, or any other mode, is hailed as a superior mode that will function as a universally valid arbiter to settle debates is where diplomacy will prove most of its value, i.e. by ensuring that adherents of particular modes articulate why they subscribe to a particular idea, and subsequently trying as best as possible to accommodate these different perspectives in the final outcome of IPCC plenaries. As argued above, **[POL]** is inherently disappointing, but is also 'experimental' in the sense that it refuses to settle on a particular way of doing politics: "[politics is] experimental because if we have to begin to agree on the basic furniture of the world … then politics is certainly finished, because there is actually no way we will settle these questions" (Latour et al., 2011: 46). As our examples of diplomacy in action show, pluralism is a prominent part of IPCC plenaries. If the IPCC plenaries fail to accommodate this plurality of perspectives, the political circle is likely to frustrate, for example by establishing a strict form of rational politics in which **[REF]** is the mode of choice. Diplomacy would go a long way into making sure other modes are accommodated.

That being said, there are important ways in which diplomatic work can be supported by the institutional setting of the IPCC. Pleas to use different ways to frame the challenge of climate change have sounded both within and outside of the IPCC, where different authors question the ability of the IPCC reports to make an impact on policymaking. Tendentious reporting on climate science, for example during the 'Climategate' affair in 2009, during which e-mail communication of climate scientists working on IPCC reports became the subject of widespread criticism, in combination with more acute financial and geopolitical crises, obstructs the ability of scientists and policymakers to make climate change a matter of more general concern (Pielke, 2005; Marquart-Pyatt et al., 2011). There are also calls for institutional renewal within the IPCC. It has been pleaded for instance by AP, also in a session with delegates, that reforms are needed in order to improve the way data and findings are used by actors at national and subnational levels. This can be done through continuous assessment and monitoring of what needs to be done when and where, alternative reporting mechanisms and novel forms of output, producing more special reports in collaboration with other organizations, engaging user communities in the production of climate assessments, and sharing resources to enhance the participation of developing countries (Petersen et al., 2015). Organizational reform could lead to the IPCC becoming more inclusive and better adapted to the requirements of particular contexts. More attention could be paid to cross-cutting and more

local issues, which could lead to the involvement of transnational organizations, multinationals, NGOs representing other non-national issues, and scientific organizations cutting through borders. Thus, one could argue, IPCC plenaries would shift from serving the self-interest of individual states to a different territorial attachment, effectively enacting new geopolitical frames of climate change. But it remains to be seen how far diplomacy can go to make this a reality.

Conclusion: invoking the political circle, again and again

What to make of the role of the diplomat after all of this? Latour (2004) draws inspiration from the work of Carl Schmitt, for whom the condition of war is defined by the absence of an indisputable arbiter who would be able to settle the conflict once and for all. In this context, the diplomat never uses "the notion of a common world of reference, since it is to construct that common world that he confronts all the dangers ... [h]e swallows his pride" (Latour, 2004: 212-213). Diplomacy may be experienced as a form of betrayal, as it involves the "[s]kill that makes it possible to get off a war footing by pursuing the experiment of the collective concerning the common world *by modifying its essential requirements*" (Latour, 2004: 240, emphasis added). In other words, the diplomat attempts to create new collectives by asking what can be given up in order to create such new collectives.

It is the work of the diplomat that can both enrich and frustrate the political circle. Diplomacy is a two-sided phenomenon: the betrayal that accompanies diplomatic intervention could lead to the exclusion of modes of existence, but may also lead to a renewed iteration of the political circle by taking up the challenge of articulating new collectives. Since so much hinges on the diplomat, a reasonable question is where he or she will come from, and what institutional setting will provide space to diplomatic interventions. Our suggestions concerning the latter matter provided in the previous section are only a modest beginning for such considerations. Let us end on a more positive note: the IPCC provides a fertile institutional setting for the exploration of such questions.

Diplomatic interventions have the potential to yield a more versatile and accommodating organization of the IPCC and its plenaries. Invoking the political circle again and again is a daunting prospect in terms of organizing, administrating, and maintaining the flexible political infrastructure that a more experimental Latourian politics entails. However, a more versatile and accommodating IPCC will help to address environmental challenges. It is not always possible for **[REF]** to be the preferred mode to settle debates in climate governance once and for all, which our case studies illustrate. Diplomatic intervention will position **[REF]** as a mode among modes, and will thereby inform the tremendous challenge of addressing climate change on a scale that truly encompasses global interests.

It is our expectation that Latour's diplomatic project can inspire the intermodal work described above. Thus, an inclusive space for environmental governance can be furnished without the presupposition of forms of politics that reach consensus. Rather, a more productive stance is to see politics as an interplay of forces, which may yield results that may very well be to the chagrin of those involved and society more generally. Latour's diplomatic project stresses the importance of taking up the struggle for political representation again and again, whilst acknowledging the struggle that this will entail. Even then, diplomats cannot provide an easy fix. As Latour himself admits: "As always, the parties in the conflict do not know exactly what they are fighting for. The task of the diplomats is to help them find out. And, of course, their offer of mediation, like mine, may fail" (Latour, 2002: 50-51). If anything, diplomats can enhance reflexivity about the modes at play in climate governance, and thereby help to build a more broadly shared acknowledgment of environmental governance as a problem strongly related to pluralism.

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Notes

1 'Science' is understood broadly here and encompasses not only the natural sciences, but also engineering, economics, social sciences, and the humanities.
2 In Latourian (2013) terms (see below) one could say that these co-chairs embody a 'crossing' of the mode of reference **[REF]** and the mode of politics **[POL]**. They have to speak well in both modes and are always at risk of being understood in the wrong key.
3 All modes used in this paper are based on Latour (2013).
4 While in practice specialists typically do not receive any comments from high-level civil servants or ministers on the governmental instruction, one way political awareness did trickle through in the Dutch instructions for the Fifth Assessment cycle was their emphasis on requiring sufficient underpinning of summary conclusions in the underlying report, in order to prevent political criticism on the IPCC's quality assurance procedures. Thus, for political reasons **[POL],** the way summary conclusions reference underlying text **[REF]** had becomes even more salient. See also Meyer and Petersen (2010).
5 Crossings discussed below follow the same formatting.
6 The IPCC takes all these sciences together under the mode of reference **[REF]**. Note that Latour (2013) does not categorize economics under this mode, nor would he categorize humanities subjects such as ethics under it.

Lockwood Alan H (2016) Heat Advisory: Protecting Health on a Warming Planet. MIT Press: Cambridge, Massachusetts. 244 pages. ISBN: 978-0-262-53448-2

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Introduction

'Heat Advisory' joins the ranks of books intended to mobilize the public on climate change by amassing scientific facts in a readable manner. Other examples in this space include George Monbiot's (2006) Heat: how we can stop the planet burning, and Elizabeth Kolbert's (2014) The Sixth Extinction. This book's angle is 'health,' broadly conceived, and its author, Alan Lockwood, is a neurologist, rather than an environmental journalist. This piqued my interest; perhaps the author would elucidate the relationship between heat and health at a neurological level, or launch a radical new take on climate change and health via a neurology's disruption of the physiological and psychiatric divide, providing an aperture for analyses that collapse man/nature, matter/thought and nature/politics?

However, driving this book is Lockwood's role in Physicians for Social Responsibility (PSA). His primary objective is to make the case that climate change is bad for health. In so doing, the book provides a useful survey of mainstream accounts of climate change and its impacts, particularly on health. Like Monbiot (2006) and Kolbert (2014), the objective is assembling conventional, institutionalised, accessible forms of evidence to justify 'doing something' about climate change. The book's scope demonstrates a Herculean effort, but this leaves its content rather general and thus its political utility somewhat limited – it is hard to see anyone using this book to make policy, although it has potential in lobbying for policy change, which Lockwood himself and presumably the PSA and others, will make use of. In the wake of Trump's election and the emerging ultra-conservative political order in the United States, the remarkable re-inhabiting of the political by existing institutions and their agents perhaps means that this book's decidedly non-radical approach will do surprisingly political work.

While acknowledging the context and purposes of 'Heat Advisory,' its content – the articulation of climate change, heat and health – is the focus of this review. For mainstream academic disciplines this represents a complex conjunction of different knowledges. From a Science and Technology Studies or Critical Geography perspective (among others), 'climate change', 'heat' and 'health' are profoundly contested, multiple and contingent, and their relations even more so. In the remainder of this review, we'll take a look at Lockwood's account and the more critical engagement that it inadvertently encourages.

Shifting Heat/s

The title of the book, 'Heat Advisory', utilizes the heatwave warning terminology of the United States' National Weather Service. Given this, the focus on extreme environmental heat and heat waves is surprisingly limited, and climate change's

influence on these events is not the launch-point of the book. Instead, climate change, heat and health are loosely assembled in the introduction. Heat appears first in reference to a 2005 World Health Organisation report (p. 3), where climate change is described as affecting ecosystems, which in turn affect health: here, increased temperatures are an ecosystem impact and heat illness is a health effect. However, Lockwood (p. 6-9) turns immediately to a different framing of health, as the absence of disease, and the Global Burden of Disease 2010 project. This shift seems to be based on climate change understood in terms of its emissions rather than impacts. Lockwood himself identifies this disconnect on page 42, where he notes heat-related morbidity and mortality aren't included in the Global Burden of Disease report, but fails to resolve this. What seems like an oversight in fact enables Lockwood to construct a broader relation between climate change and health where heat is not an impact but rather the cause of (other) climate change impacts which have health implications. These include heavy rainfall (resulting from warmer seas), sea level rise (via melting of ice caps), and, even more indirectly, changes in disease vectors, by (for example) creating more favourable environments for mosquito breeding, enabling the spread of Malaria.

The shifting position of heat from climate impact to driver of other climate impacts is a slight-of-hand, obscuring whether Lockwood is tracing a relationship from heat to health impacts or whether 'heat' is just being used as a proxy for climate change per se (see, for example the discussion of increased Carbon Dioxide levels on plant growth, food supply, and human nutrition, p. 81). The lack of clarity perhaps arises because the author is torn between the dramatic sounding but heat-specific title and the real objective of the book: stacking up all the reasons why climate change is bad for human health. However, it leaves useful disjunctures for critical accounts of heat, health and climate change.

Provocations

Glossing over the particularities of all the ways heat plays out raises at least two missed opportunities. First, of paying attention to the different ontics of heat and all the fascinating ways that heat 'matters' to, and as a result of, different (knowledge) practices. Although largely unacknowledged, multiple 'heats' emerge in the book, including multi-species and more-than-human heats (Oppermann et al., 2017; Oppermann and Walker, In Press): the heat that matters for the global climate system, for the human body's thermalregulation, for water's evaporation and precipitation, and for mosquito breeding. Tantalizingly, Lockwood notes "[in] agriculture, it is necessary to consider multiple species, not just humans" (p. 79), although he pursues these through a thoroughly modernist conception of nature.

The second, related, opportunity is to examine the ways in which heat is, while multiple, also profoundly relational, including in its co-productions with the multiple bodies and healths at play in the book (also implicit). For example, 95°F is too hot for humans to maintain a stable state (p. 46), but much lower temperatures are too hot for sea ice to do the same (p. 96-101). Relational also is the question of the political ecology (Bennett, 2009; Latour, 2007) of these heats as they traverse, transgress and disrupt different fields and come to matter in different ways for different bodies (Oppermann et al., 2017). In Heat Advisory, they are mostly kept discrete, so tensions between them are rarely visible. A nice example of how this could be done, relevant to the field of health is de la Bellacasa's recent book on care (2017). Heat Advisory's Chapter 8 on climate change, heat and violence resonated most with such an approach; Lockwood moves from 'lay' knowledges of heat to the multiple ways it flows and modulates through relations between the environment, geography, physiology, and bodies, roads and cars.

Conclusion

In sum, 'Heat Advisory' provides a broad overview of knowledge practices relating to heat, health and climate change, but lacks a systemic analysis of how these areas are related. In so doing, the book inadvertently raises important practical and theoretical challenges: what ecologies of multiple 'heats', 'bodies', and 'healths' are at play that shape climate change and our responses to it? How are these articulated in the constitution of problems and their governance? What of multi-species and more-than-human heat, and heat's multiple mate-

rialities, as it moves, is differently embodied and plays out ecologically? There are some well-established inroads to thinking about heat in this way, such as Prigogine and Stengers (1984) and notable recent attempts to tackle heat and its relation to climate change, such as Clark (2010); and Clark and Yusoff (2014). However we might choose to pursue these questions, 'Heat Advisory' is, both intentionally and unintentionally, a provocation to take them seriously.

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Abraham Flexner and Robbert Dijkgraaf (2017) The Usefulness of Useless Knowledge. Princeton University Press: Princeton, New Jersey. 104 pages. ISBN: 9780691174761

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The Institute for Advanced Study is one of the most prestigious, exclusive research centers in the world, at least in pure mathematics and mathematical, theoretical physics. It was catapulted into world recognition in 1933 with the hiring of Einstein as one of its first professors. The faculty hold lifetime positions, have no teaching or publication requirements, and few committee obligations. The Institute currently supports some 200 visiting 'Members' and 'Visitors' each year, among whom are some of the world's most promising postdoctoral students. It is a private institute, it gives no degrees, and is supported by endowments, grants, and gifts, and, to some extent, by the U.S. National Science Foundation.[1]

The Usefulness of Useless Knowledge is, in turn, a small, short book (c. 18.4 x 11.7 x 1.4 cm, 104 pages). It consists of two essays, one by Abraham Flexner, the other by Robbert Dijkgraad. Flexner was the first director of the Institute between 1930 and 1939; his essay was originally published in 1939 and lends its title to the book. Dijkgraad's essay, described as a 'companion essay', is the lead article. Dijkgraaf is a mathematical physicist, a professor at the Institute and its director since 2012.

Flexner's essay advances a menagerie of propositions, accompanied by a number of vignettes of various scientists. Flexner has a heroic appreciation of science: great scientists are typically individuals working alone. They are driven by unquenchable curiosity, apparently have no pecuniary interests, and pursue 'useless' knowledge whose value to society might lie in the distant future. For Flexner, technology and technological innovation have minor roles in scientific development; he is interested in thinking machines — brainiacs — even though some of his vignettes involve experimentalists. The less responsibilities these geniuses have, the more productive they will be. The fact that they are all together at the Institute — including faculty engaged in studies in economics, archeology, and the humanities — should increase their productivity as if they were tributaries joining together to form the mighty Mississippi.

Flexner's vignette about Nobel Laureate Paul Ehrlich (1854 – 1915) reflects some of the contradictions in the essay. Ehrlich's supervisor at the University of Strasbourg watched while Ehrlich was engaged in microscopic studies of animal tissue. Ehrlich was covering his desk with colored spots of different shapes and sizes. Ask what he was doing, Ehrlich said "Ich probiere" (something like "I'm giving it a go") whereupon the supervisor recognized Ehrlich's genius. According to Flexner, the supervisor "wisely left him alone". Next, we are told Ehrlich got his medical degree because his instructors realized that he would never be a practicing physician.

The idea seems to be that Ehrlich's achievements could be foretold: this is just the type of young genius that Flexner, seeking faculty for his

new institute, would be looking to hire. Instead, Flexner was hiring Einstein, poaching faculty from Princeton University, and bringing in Nobel Laureates as visiting Members.

Flexner ends his essay thusly:

> We make ourselves no promises, but we cherish the hope that the unobstructed pursuit of useless knowledge will prove to have consequences in the future as in the past. Not for a moment, however, do we defend the Institute on that ground. It exists as a paradise for scholars who, like poets and musicians, have won the right to do as they please and who accomplish most when enabled to do so. (p. 86 – 87)

Many of us, still waiting for TED talk invitations, may be misled by the celebration of our pursuit of useless knowledge. The Institute isn't hiring people because they have lots of curiosity, they're 'geniuses', and they promise to produce lots of useless knowledge. Flexner is dealing with thoroughbreds, winners of the Triple Crown. In his essay, Flexner is arguing for something, but what it is isn't immediately apparent.

Dijkgraad's essay "The World of Tomorrow" takes its name from the 1939 New York World's Fair but refers as well to the promise of the Institute. It begins, in part, by trying to clarify the meaning of 'useless knowledge'. At least since the turn of the 20th century, academic knowledge is disciplinary knowledge. The mathematicians and physicists at the Institute are among the creators of contemporary mathematics and theoretical physics. Their knowledge isn't useless, impractical, or knowledge 'not-yet-applied', at least for mathematicians and theoretical physicists; we just don't understand what they're talking about. As will be clarified shortly, Dijkgraad seems to end up with the practical distinction between, but no definitions of pure and applied research.

The second of Dijkgraad's philosophical 'moves' is to implicitly divorce himself from his faculty in 'historical studies' and the 'social sciences'. Flexner at the end of his essay briefly mentions Institute faculty in these fields and, among them, a female professor, Hetty Goldman. Dijkgraad doesn't seem to want any of this. He forgets everybody at the Institute except those in the discovering sciences, to all appearances excluding mathematicians as well except as they may aid and abet the theoretical physicists. The most likely reason is that it's difficult to compare achievements in sociology, art history, or economics with vaccines for rabies and anthrax, and the invention of the atomic bomb and the digital computer. If you want to celebrate research achievements, the case for the discovering sciences seems clearer, more powerful, and needs a lot less words.

A somewhat humorous element of the opening pages is that Dijkgraad discusses whether von Neumann may have been a greater genius than Einstein. The aim it seems is to show the power of the Institute's faculty — not even Einstein is the greatest of their geniuses — but one wonders whether Dijkgraad and other faculty keep genius tables in their offices.

Dijkgraad briefly says something about Flexner's life and philosophy. He then discusses the properties and benefits of 'blue-sky' research with examples such as the discovery of superconductivity in 1911 and the related discovery of the Higgs boson in 2012, the development of the internet, and the three-dimensional visualization of molecules by van't Hoff. None of the examples, however, seem directly related to the Institute. Then, starting on page 33, we get to the central point of the essay.

Dijkgraad tells us that U.S. government funding of research has been steadily declining, from 2.1% of the gross domestic product in 1964 to 0.8% at present, that "success rates in grant applications for basic research are plummeting across all disciplines", and that "[t]he 'metrics' used to assess the quality and impact of research proposals… systematically undercut pathbreaking scholarship in favor of more predictable goal-directed research." (p. 33 – 36) It doesn't take an Institute genius to figure out that Dijkgraad isn't talking about my pure, blue-sky research. He's talking about himself and the Institute (or at least part of the Institute). And, apparently, this is for our own good: with all the future consequences that could develop, Dijkgraad might as well say he wants more money for the good of our children. We might assume that this was the aim of Flexner's essay as well. Still during the Great Depression, Flexner was looking for benefactors that would

help finance and grow the Institute for Advanced Study.

This somewhat cloaked pleading for money gives an ironic twist to the *philosophical dream* that Flexner and Dijkgraad espouse. The faculty at the Institute are the privileged ultra-elite of the academic world; their sheltered pursuit of disciplinary knowledge is celebrated as their work's most attractive, promising feature. Yet, at the same time, in the same way, the Institute for Advanced Study seems a monument to a dying academic world. *The Usefulness of Useless Knowledge* presents an antiquated philosophy for a culture whose time may have already past.

Notes

1 Information on the finances of the Institute, including faculty salaries, have been difficult to find. I have relied here on Wikipedia, The Free Encyclopedia, "The Institute for Advanced Study", available at: https://en.wikipedia.org/w/index.php?title=Institute_for_Advanced_Study&oldid=819759705 (accessed 11 November 2017). The article indicates that the endowment in 2014 was $741 million USD.

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