MEDIATING PUBLIC SCIENCE: EXPERTS, POLITICS, AND CLIMATE CHANGE IN THE NEWS MEDIA IN CANADA

BERNHARD ISOPP

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Abstract

This project offers a reconstructionist science and technology studies (STS) analysis of climate change coverage in three Canadian newspapers, the *Globe and Mail,* the *National Post*, and the *Toronto Star* from 2006 to 2013. It employs a combination of framing, critical discourse, and philosophical analyses to address two core questions: (1) Why has climate change been represented in these newspapers in the ways it has? (2) What effects have these newspapers had in shaping issues of climate change? These broad inquiries are organised by a set of six more specific conceptual concerns stemming from STS: i) How do scientists relate, engage, and compete with other actors in influencing climate change coverage? ii) To what extent can these newspapers be understood as a site of scientific practice, communication, and knowledge production? iii) What broader social, political, and economic factors are linked to the competing representations of climate change and actor coalitions that emerge in these newspapers? iv) What broader images, ideologies, and philosophies of science and scientists shape and emerge from these media discourses? v) What do STS conceptions of scientific rhetoric suggest about these discourses? vi) How is the authority of science and scientists established, affected, challenged, and undermined through and by all these interacting influences and processes? While the answers to these questions are multifaceted, the authority of science is a culminating theme. Here there is ambivalence: concerned and sceptical voices in these newspapers accuse each other of politicisation, while appealing to the authority of objective, apolitical science to bolster their positions. A paradox appears in that the more fervent the appeal to unpoliticised science, the more the politicisation of science is on display. A normative suggestion is offered: the discourses found in these newspapers all involve rhetorical, ideological, authority-seeking, and thoroughly political appeals to science, thus undermining any hope of grounding responses to climate change in science that is free from politics. But they are not all equivalent: some offer a means to sincere and accountable public deliberations involving scientific knowledge, and thus are preferable for addressing climate change.

For Auguste

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Preface

While this dissertation is the culmination of my doctoral work, the overall project was conceived several years earlier, if only in an inchoate form. In 2006, in the third year of my undergraduate degree, I wrote a paper for my Environmental History class in which I – sophomorically, I can now admit – argued for the importance of an interdisciplinary perspective on climate change. I thought there were surely lessons in the environmental histories that I was learning that would be critical in addressing the issue. At that point, little did I know that there was already a sophisticated interdisciplinary field dedicated to making sense of complex technoscientific problems. I endeavoured to build an understanding of this field – science and technology studies – in my Master's in the Graduate Program in Humanities at York University. Serendipitously, while doing this work, York decided to open a Graduate Program in Science and Technology Studies to which I was admitted for my PhD. Now, 12 years after writing that environmental history paper, I have completed this interdisciplinary project on climate change.

My longstanding interest in climate change was born less out of academic curiosity – though as a rich and challenging case study, climate change certainly fits the bill – and more out of genuine worry. In 2006, climate change presented, by all measures, a real and daunting problem, one that I hoped my academic work could make sense of in some small way. But I must confess that when I started my doctoral work, I privately hoped that by the time I finished this study, we would be well on our way in addressing climate change. International legally-binding emissions reduction treaties would be in place, people would have adjusted their consumptive behaviours, the requisite investments in renewable energy and low carbon technologies would have been made, and above all, our politics would have shifted to discussing the issue seriously and taking action. In such an optimistic scenario, the lessons learned from this study could be applied to future problems. But as time passed and my work progressed, I realised that this outcome was becoming less and less likely. Alas, two weeks before I wrote this preface, the IPCC published a special report revealing that whatever efforts we have put forth thus far to meet emissions targets have been dismally ineffective. In a foreboding coincidence, they warn that we have as little as 12 years to make drastic changes if we want to keep global warming below 1.5 degrees Celsius and stave off the more disastrous consequences of climate change.

These worries thus set an important background to this study. What follows is what can be considered an engaged STS project – one that I ultimately hope can inform interventions and actions in addressing climate change. Such an endeavour presents difficulties. While working on this dissertation I contributed to a project aimed at promoting climate change literacy amongst various Canadian audiences. One of the major challenges I encountered was ensuring that the materials we produced not

only contained reliable information on the scientific basis for the theory of anthropogenic climate change but also encouraged understandings of the complex ways that this scientific knowledge takes form, gains credence, and meets contestation in social, political, and cultural contexts. Without this crucial perspective, I thought, the literacy we wished to promote would reflect deficit model thinking and be burdened with too many problematic assumptions about the role science can play in guiding policy and action.

This dilemma motivates this project. The challenge is to remain cognisant of the critical insights of STS – that science must be understood as a social, political, and cultural phenomenon – while simultaneously acknowledging, precisely because science is always political in some sense, that (political) engagement depends on good scientific knowledge. Or, as one of the broad conclusions of this project, constructive public deliberations on how to address climate change depend on good understandings of science.

In trying to achieve this balance, I suspect that some will find my normative positions too modest. But these should be understood with a view to longstanding commitments to impartiality in STS. In this regard, my very starting point of affirming the prevailing scientific theory of anthropogenic climate change might be considered radical. Of course, many STS scholars before me abstained from impartiality in one way or another, from considering the anti-authority inclination of their work, to offering explicitly normative theories of expertise. For my part, of all STS' methodological and theoretical principles that allow for its special way of thinking about not just science and technology but a host of confounding questions, a commitment to reflexivity has always been its most distinctive and promising attribute.

Just as STS reveals that scientists' presumptions of neutrality quickly fall apart, reflexivity forces us to admit that so do ours. Holding a mirror to one's own work compels us to confront our own presuppositions, our own ideologies, and most importantly, our own values. Science, at its best, is also meant to be reflexively self-critical about all the taken-for-granted systems of thought and practice that underlie its inquiries of the world. It is often forgotten that the precursors of STS were conceived as the scientific study of science. Beyond the specific empirical findings and theoretical insights that STS can offer, its approach to reflexive analysis is perhaps the most valuable contribution it can make to public deliberations about climate change, where unreflective exhortations to scientific truth are commonplace and underlie the many impasses that stand in the way of effective and meaningful action.

1 Why do an STS Study of Climate Change in the Canadian Media?

In the opening pages of *We Have Never Been Modern*, Bruno Latour recounts reading his daily broadsheet and finding rich documentation of the "proliferation of hybrids" – entanglements of science and society, nature and culture, and scientific experts and politicians. The first story he comes across involves the hole in the ozone layer, which brings about intersections and conflicts between atmospheric chemists, CEOs of Monsanto, chlorofluorocarbons, the ecosphere, ecologists, refrigerator manufacturers, meteorologists, policy makers, and international treaties. In these newspaper representations he finds signifiers of the "modern constitution" which cuts these byzantine networks of actors and actants into familiar demarcations of economics, politics, science, and culture.

Latour then proceeds in the following hundred and fifty pages of his formative work to account for the paradox of the modern constitution – the purification of hybrids into distinct modern categories of nature and society, while they simultaneously multiply though the acts of translation that bring them back together. He maps out in detail the intellectual basis upon which the modern constitution has taken root and shaped our thinking about the world, finally proposing an intricate alternate epistemology and ontology so we can properly understand the co-production of science and societies. But for all his consideration for mediation and representation, he never returns to the newspaper.

Why not? While Latour has many targets in his essay in experimental philosophy, his work is in large part a statement about a broad scientific worldview: the titular "*We"* does not only denote scholars and philosophers. It is an argument about how society, writ large, thinks and should think about science. And in thinking about how "*We"* understand, conceptualise, value, enlist, and employ science, the newspaper seems pretty important. Indeed, by truncating the question – why study the *media*? – the answer is that the media are fundamental in shaping our worldviews and our enactments of them, including those about science in general, and about climate change in particular (Nelkin 1987; Burgess 1990; Boykoff 2011). The fundamentality of the media are at the core of the over-arching questions of this project: Why has climate change been represented in the media in the ways that it has? And what effects have the media had in shaping issues of climate change?

This is not just a question of public perception or understanding, though those are crucial. Of all the actors involved in the networks surrounding technoscientific controversies and the "obligatory passage points" that must be traversed, the media are often integral. Indeed, the media itself is a complex socio-technical network within technoscience, comprised of human actors, inscription devices, and technological apparatuses. Given this, why has the media not been more of a focus in science and technology studies (STS)?

The relationships between science – and climate change in particular – and the media have, of course, been explored in great detail. There are entire sub-fields and series of journals dedicated precisely to this question (the following chapter provides an overview of these works). And while the insights of science and technology studies find their way into these works in varying degrees, these are typically imports into disciplines with their own methodologies and theoretical frame works – media studies, science communication, or public understanding of science. I am reflexive of the fact that the boundaries between disciplines are porous, that each cope with their periodic or perennial identity crises, that definitive disciplinary mandates can be stifling, and that STS is a particularly nebulous discipline. However, in general, the relationships between science and the media have been underexplored from the perspectives of STS.

In what follows I offer an STS study of climate change in the media. This is not only to fill a conspicuous dearth. In truncating the above question in a different way – why *STS*? – the answer is that STS analysis has much to offer in answering the over-arching questions of this project. Key STS concerns with actors and networks, contexts of scientific knowledge production and practice, social factors influencing science, cultural images of science, rhetoric and boundary-work, and the authority and politics of science all promise crucial insights for making sense of the relationships between climate change and the media.

Two more abbreviations of the introductory question are in order. First, why *climate change*? If Latour had opened his newspaper a decade later, the first story he came across likely would not have been about the ozone layer, but climate change. It is hard to think of a case that more acutely and conspicuously entails the kinds of intersections between society and science, politics and nature, and ethics and ontology with which STS concerns itself. Climate change is not a narrowly scientific issue, but it is technoscience *par excellence*. STS thus seems uniquely well suited to make sense of it.

Finally, why *Canada*? From a theoretical perspective, the Canadian media presents an under-explored but promising case study. As the G8 country with the smallest population, Canada arguably has a disproportionate influence on the global stage. The degree to which Canadian media reflects and reinforces this influence thus offers an instructive case for examining relationships between the media and climate politics. Furthermore, its geopolitical proximity to the United States, the major agenda-setter in terms of international climate policy, offers a basis for comparative analysis which can further shed light on the complex intersections of different vectors of media influence and political power.

But climate change presents much more than a compelling case study of theoretical interest. I choose to study climate change because by all measures it presents a host of vital and pressing social,

economic, political, environmental, and ethical issues. These issues do not exist abstractly but are tied to the tangible concerns emerging from local geographies, infrastructures, and populations. As this project aims in part to inform responses to these concerns, I have chosen to study the locale in which I am most engaged.

So why do an STS study of climate change in the media in Canada? Because climate change is of critical importance, the media are fundamental in shaping how issues of climate change have unfolded, Canada is a lived context of political engagement, and STS is conceptually apt for making sense of all this.

1.1 Understanding Climate Change in the Media Through STS

This project seeks to answer two core research questions: (1) Why has climate change been represented in the media in the ways that it has? (2) What effects have the media had in shaping issues of climate change?

The core set of data I draw on in addressing these questions is a large sample of articles from 2006-2013 from the leading Canadian broadsheet newspapers, the *Toronto Star, Globe and Mail,* and *National Post*. As I discuss in Chapter 3, this time frame is formative to the development of climate change issues. To analyse this sample, I employ a set of approaches that are largely derived from media studies: content, framing, and critical discourse analyses. In addressing question (1), I direct these analyses to a set of sub-questions: In these newspapers, what do reporting trends look like and what accounts for peaks and low points in coverage? What framings and discourses are predominant (or absent) and what accounts for this predominance? How do reporting trends, framings, and discourses relate to one another? And what explains the differences and similarities between the different newspapers' coverage?

I also examine cases of interactions between climate scientists and these newspapers. These cases explore a sub-sample of articles from these newspapers involving overt claims-making on behalf of scientists. This is supplemented with a small number of interviews with media-active Canadian climate scientists. These cases attend to a set of sub-questions that bear on question (2): Why have some Canadian climate scientists become conspicuously media-active? What risks do media-active scientists face? What effects have these media-activities had on scientists' professional activities? And what consequences have these newspapers' coverage of climate change had in terms of the role and status of scientists as expert claims-makers?

In all of these inquiries I take climate change as a "technoscientific" issue in Bruno Latour's sense: not one confined to the narrow contexts and interests of scientific insiders, but an issue that extends through many contexts and involves diverse interested actors (Latour 1987). Climate science is, of course, crucial here – but climate science does not constitute the totality of climate change technoscience. Indeed, it is worth reiterating that even from this perspective, climate change cannot be understood as a singular issue, but many (often competing) issues. To employ another of Latour's distinctions: I treat climate change not as a *matter of fact*, but as a *matter of concern* – or more properly, *matters* of concern (Latour 2004).

I orient this project around a set of six over-arching conceptual categories: i) actors and networks, ii) contexts of scientific knowledge production and practice, iii) social factors influencing science, iv) cultural images of science, v) rhetoric and boundary-work, vi) and the authority and politics of science. These do not stem from a purely grounded analysis, but they have emerged as a particularly useful set of concerns and dispositions from which to address the core questions of this project, while offering a more focused set of sub-questions. There is an important reciprocity here. These categories and the questions they imply offer a means of analysing the causes and effects of media representations of climate change, while they conversely point to a set of theorisations that are representative of and integral to STS understandings of science. In other words, STS can reveal much about climate change in the media, while attending to representations climate change in the media as a case study can reveal much about the kinds of phenomena, relationships, and concepts with which STS is broadly concerned. This relationality crucially maps onto the core questions of this project: In addressing question (1), cultural images of science, for example, might be expected to play a role; reciprocally, in addressing question (2), one might expect that shifting cultural images of science to be an effect of media representations of climate change. Below I briefly sketch out the ways these conceptual categories apply to this project and the questions that emerge from them.

1.1.1 Actors and Networks

Research in STS has long been interested in the ways that science – and technoscientific controversies – unfolds as a result of coalitions and clashes between experts, politicians, policy makers, businesses, activists, advocates, and members of various publics (Callon 1986; Latour 1987; Latour 2004). It is perhaps here that the "politics" of science can be most readily found. Climate change involves precisely these kinds of coalitions and clashes, and examining the role of the these newspapers promises to deepen understandings of how these networks come about: media sources play a critical role in tracing

the emergence of these groups, as well as actively bringing them about by affording them a means of recruitment and influence and providing discursive space to shape public and policy deliberations on climate change. And the media themselves are constituted by a set of actors, namely, journalists, columnists, and editors. What role do these actors play in shaping climate change debates – not only in terms of framing broader public concerns or policy discourses, but in contesting and offering scientific knowledge-claims? Why do certain scientific actors become enrolled through and by the newspapers examined here? And what effects do these interactions have on scientific practice? Examining the role of media actors prompts both normative and explanatory questions about the constitution of the "core-set" of actors in technoscientific controversies (Collins 1981; Bucchi 1996; Rip 2003). By whom is science made?

1.1.2 Contexts of Science

A related question follows: where does science take place? It is clear from existing research that scientists routinely engage the media in a variety of ways (Bucchi 1996). But scientists themselves have traditionally viewed their media activities as extra-scientific excursions; traditional analytical models of science communication and public understanding of science have made similar assumptions, viewing media engagement as "popularisation" or "publicization" activities, secondary to the work of producing scientific knowledge. STS, too, may have inadvertently reinforced such a view. With a traditional focus on a core set of knowledge-producing actors, the preferred site of following scientists in STS has been in their own domains, in laboratories, research institutions, in the pages of scientific journals. And while many studies have followed the scientists into the public, the media have not been frequently treated as a site of science. I do not want to rehash debates about internalism vs. externalism in science here, but this study promises to further complicate any such distinction (see Shapin 1992). The relationship between science and the media has often been understood via a "two arena" model – each constituting a distinct realm with different practices, standards, and norms. Does this model hold up when examining the scientists who engage with these newspapers? Are their media activities supplementary their responsibilities as scientists, or integral? And what role does the "arena" of these newspapers play in challenging or legitimating knowledge claims about climate change?

1.1.3 Social Factors

The question of the effects of "social factors" on science has often been considered in terms of the way that "external" influences have determined the outcome of ostensibly "internal" scientific debates.

Since the main locus of my study is newspaper sources – which are typically viewed as "outside" the traditional arenas of science, this question is complicated here. Nonetheless, there is an overlap between STS and media studies, as both are interested in knowledge claims and representations of the world and the influence of various "social factors" on those representations. What accounts for the different representations of climate change, the variable recruitment of climate scientists, the differing visions of science, and the competing actor coalitions that emerge in the media sources examined here? In many ways, the potential explanations I look to are quite traditional – differing political and economic interests, ideologies, norms, and worldviews – but they nonetheless provide at least part of the answer.

1.1.4 Cultural Images of Science

Speaking of worldviews, one of the longstanding concerns of STS has been with the ways that science is cultural. This is not only to say that the things that scientists say and do can be understood as cultural practices, but that science, writ large, is constitutive of cultures. It shapes how we understand the world, is called upon to establish pressing concerns, and is brought to bear on the way we build our societies. As science plays such a crucial role in bringing meaning to our lives, science itself is subjected to contested meanings. In these regards, various commentators have spoken of "ideologies of science" (Gieryn 1983, Nelkin 1988; Mulkay 1976). This term is used instead of "philosophies of science" to trade on the connotation of ideology as a kind of supposition – one that relates to cultural and political values. An ideology of science, then, is not a relatively formal account of epistemic rules (though it might involve these), but an expression of one's politics. It is a (taken-for-granted) vision of science as a project with social, cultural, political values and implications.

A central question of this project is how these "ideologies of science" emerge, shape, and are contested in the media sources examined. An overarching argument I support is that media discourses about climate change are not merely contestations about specific interpretations of natural phenomena, but they are debates about the kind of thing that science is, what it can offer, and what its role in public deliberations should be. One of the most pronounced contentions I find in the newspapers I examine is over the right to speak in the name of science. Are scientists presented, as Dorothy Nelkin puts it, as "problem solvers, authorities, the ultimate source of truth" (Nelkin 1991, xiii), or as fallible, corruptible, but convenient witnesses? By extension, what images of sciences are presented? Is science capable of providing authoritative truth, granted that faithful practitioners are doing the work? Or are more reflexive, critical views of science presented? Is scientific truth only the purview of credentialed experts,

or is it available to non-experts? And if so, in what capacity and according to what rules?

1.1.5 Rhetoric of Science

How these cultural images are propagated is intimately tied to the interest in STS with the rhetorical dimensions of science (Hilgartner 1990; Nelkin 1987). These "ideologies of science" are bound to certain narratives, discourses, and forms and styles of argumentation. As these ideologies tend to convey science as authoritative, the authority of science can be largely, if not primarily, as rhetorical (Gieryn 1999; Latour 1987). The normative implications of such views can be variably interpreted. On the one hand, the rhetorical nature of the authority of science has been thought to undermine other supposed sources of that authority – for example, the application of scientific methods which bestows objectivity on the resulting knowledge (Baert 2005). In this way, rhetoric might be employed to make certain knowledge claims appear more certain than they actually are (an extreme extension of this view is that there is no real scientific objectivity, just competing rhetoric). Latour takes a more meta-analytical view of rhetoric and argues that all forms of scientific argumentation can be understood as rhetorical, since those who employ them are trying to be persuasive, but distinguishes scientific rhetoric as a special type with unique efficacy.

Media studies, in general, have often focused on the rhetorical elements of media discourses (Carter 2013; Entman 2007). Thus, in trying to understand both the ideology and rhetoric of science, especially insofar as these are linked to broader cultural attitudes, media discourses are an apt source for investigation. In this project I do not strive towards a comprehensive or strict definition of rhetoric, at least not as a noun. Instead, similar to Latour's concern with persuasive efficacy, I am in interested in the rhetorical nature of the language, discourses, narratives, and representations found in these newspapers, especially as these constitute forms of argumentation and strategies for advancing and contesting both knowledge-claims about and political responses to climate change. What different discursive strategies appear in these newspapers? If scientific discourses have unique rhetorical properties, how do they fare in the "media arena"? What differences exist in the kinds of language employed by scientists and other actors?

1.1.6 The Authority and Politics of Science

How the authority of science is established, affected, challenged, and undermined through the discourses appearing in the media sources examined here is an analytical thread that works its way through this project. It is here where key answers to the project's over-arching questions are found:

media representations of climate change can be understood as contestations over the authority of science (and the authority to speak on matters of science). And again, there is a reciprocity: these media representations are the outcome of the existing authority of science and the boundary-work that maintains it, while they simultaneously challenge and rework those boundaries.

The question of authority brings together the other lines of inquiry: the coalitions and conflicts between diverse actors in the media often hinge on the authority of science; the media increasingly become sites for scientists' public engagement activities in response to perceived threats to scientific authority – often from the media itself; a key "social factor" in bringing about the authority of science are linkages to systems of power; cultural images of science are in large part a means to authority; and the authority of science is linked to certain kinds of narratives, discourses, representations, and rhetoric. How these all hang together reveals crucial dynamics of the politics of climate change.

A critical question here is the ways these media discourses they bring about or undermine "*the* special cultural authority of science" (Shackley and Wynne 1996). On the one hand, Steven Rayner argues, "we live in an era when science is culturally privileged as the ultimate source of authority in relation to decision-making" (2006, 6). Conversely, many observers have noted an increasing disenchantment and distrust of science amongst the public, conveying a broader "legitimacy crisis" of science (Jasanoff 2003; Wynne 2003). How do the climate change discourses, the representations of scientific knowledge, the articulation of "ideologies of science" in the media sources examined here support and challenge these assessments? Is science an ultimate source or authority, or subject to disenchantment?

Such questions often, if not fundamentally, involve the public – for example, in the ways the authority of science and scientists guides discourses, opinions, policies, practices, and actions in the public realm, and gets enlisted by institutions of governance, legislation, and business, all of which can ultimately have broad public consequences through and to technoscientific systems and infrastructures, the environment, and public health and well-being. Moreover, the authority of science is something that is negotiated with the public. Certain cultural images – or "ideologies" – imbue science with authority because publics find these images appealing, often due to the ways they are linked to larger social and cultural concerns about meaning, order, and purpose. Here the media are again fundamental. Most of the public's knowledge, understanding, and perceptions of technoscientific issues comes from the media (Nelkin 1987). Thus, it stands to reason that the authority of science is also largely affected by the media. Crucially, these processes – as contestations and negotiations of authority – entail politics.

Hence, throughout this project I turn to questions of the "politicisation" of science: How do representations of climate change reflect and affect (and effect) politics?

1.2 Central Arguments

The conclusions that emerge from the broad set of questions above are ambiguous, if not ambivalent. Across the spectrum of newspaper sources examined here, common images of science emerge: traditional notions of objectivity and appeals to "value-free" ideals. Indeed, in much of these discourses one finds classic idioms of positivism and scientism. But such rhetoric is aligned with starkly different discourses and recruited for divisive ends: in the name of "consensus," to bolster a scientific theory of anthropogenic climate change and mobilise social and political action to address the threat it presents; or, in the name of "scepticism," to undermine this theory and protect the social-political-economic status quo. Similarly, those propounding these different positions level reciprocal politicisation accusations against each other. Concerned voices argue that sceptics' claims are politicised in the service of the fossil fuel industry, corporate interests, conservatism, and extreme free-market ideologies. Self-styled sceptics claim that it is environmental radicalism, socialist economic visions, or even the selfish pursuit of funding by climate scientists that corrupts science.

While diverse claims-makers in these newspapers employ similar rhetorical tropes of "sound" versus "politicised" science to bolster science as a source of authoritative knowledge, that authority has different grounds and different consequences. In the *Toronto Star* and the *Globe and Mail*, which typically promote the consensus view, it is a community of experts who protects science from political incursions and grants science its authority. In the *National Post*, which promotes climate change scepticism, science is instead valued as an individualistic means to truth; it is science's methods paired with an impartial intellectual temperament that protects against the influence of politics. Thus, "*the* special cultural authority" of science maps onto other contingent and contextual forms of authority and contestations for power, and in this way, politicisation accusations are themselves acts of politicisation of science. Indeed, the more zealous the appeal to apolitical, objective science, the more this politicisation is apparent. Paradoxically, the more claims-makers try to base the authority of science on a separation of science and politics, the less tenable this separation becomes.

The solution is to give up on the prospect of unpoliticised science. The climate change discourses found in these newspapers all involve rhetorical, ideological, authority-seeking, and thoroughly political appeals to science. But contrary to the fears that STS once posed a threat to science by revealing its messy, contingent, and politicised nature, a wider appreciation of these accounts will

give science a more accountable authority and lead to less divisive and obfuscating, and more earnest and reflexive deliberations about how to enlist science to address pressing issues like climate change. The key for reconstructionist projects is to recognise that while all science is political, it can be politicised towards varied and dissimilar social and political objectives. Thus, some forms of politicisation are preferable to others, and STS can play an important role in adjudication.

1.3 The Potential of Reconstructionist STS

In recognising climate change as an urgent problem, this project proceeds from a position of reconstructive STS.[1] This denotes a critically reflexive approach to constructionist analysis that is sympathetic to, or aligned with, political projects. At its most pronounced, reconstructive STS is explicitly normative and interventionist. It does not, in the name of methodological impartiality or scholarly objectivity, shy away from making value judgments about scientific and technological knowledges, practices, controversies, and assemblages. Indeed, it actively seeks to reimagine and reconstruct what is held to be an ethical technoscience – be it more democratic, accountable, or widely socially beneficial. More modestly, it is reflexive about the normative potential of STS analyses – how they might be enrolled for political ends. And reflexively, to do an STS analysis of climate change has political implications, because it requires the recognition that, while all science is political in some sense, the science surrounding climate change has unique political implications. Climate change is arguably an unprecedently "wicked" technoscientific problem with widespread social, political, economic, environmental, and ethical consequences for myriad actors (including, of course, STS scholars) (Prins and Rayner 2007). Thus, to analyse the many ways that climate change has been politicised implies interventions, reveals normative conflicts, and can ultimately create knowledges that can themselves be politicised. This is most conspicuous in the ways that certain actors have sought to "deconstruct" climate change science in order to destabilise responses to the issue.[2] Conversely, understanding how

[1] Woodhouse et al.'s "Science Studies and Activism: Possibilities and Problems for Reconstructivist Agendas" (2002) is required reading here. They offer a deep discussion of the various ways that STS can pursue normative ends, survey the various theoretical tensions, and mount a defense of normative commitments and alignments in STS scholarship. They, like myself, do not advance a definite doctrine of how STS can be reconstructive, but instead argue broadly that STS can (and should) guided by an "intention of conducting forefront scholarship aimed in part at helping to inform and deepen public inquiries, deliberations and negotiations concerning the democratic shaping and reshaping of [science and] technologies" (299).

[2] There are few serious scholarly works that apply constructionist analyses in advancing arguments against climate change action (though there are some, see Boehmer-Christiansen 2003), but it has been observed that concepts and ideas emerging from science studies and the history of science have been employed in climate change debates to advocate against enacting climate change policies (Douglas 2009; Ranalli 2012).

these destabilisations have themselves been constructed – for example, through the media – can generate strategies for mobilising social and political action on climate change.

Thus, it is clear from the outset of this project that I cannot lay claim to some ideal of STS impartiality, at least with regards to certain kinds of knowledge claims about climate change. For all intents and purposes, I assume that the anthropogenic theory of climate change is correct and that predictions about its risks are accurate.[3] However, impartiality here might be a moot point, as these knowledges are not the explicanda of this project. I seek to give an account of the ways climate change science and scientific actors are recruited, enlisted, represented, and contested by and through the media, and what kinds of politicisations affect and emerge from these processes. In doing so, I adopt a tentative symmetry, exploring the different "sides" in climate change debates staked out in the media sources I examine from the same analytical starting points. I ask the same questions of them (how climate change is represented and why these representations emerge), making the same kinds of measurements (of content, framings, and discourses), and examining the same factors and determinants (journalistic norms, ideologies, political alliances). Normatively, my approach is similar to that offered by David Demeritt in his reflexive constructionist analyses of climate change (2001; 2006). I mostly tend towards reflexivity about my political alignments (recognising climate change as a serious problem demanding action), my epistemic assessments (accepting the theory of anthropogenic climate change), and the implications of this project (understanding its potential for informing interventions). But in moments I make overt value judgements about the actors, discourses, and representations of climate change found in these media sources.

As I will show, symmetrical analyses need not lead to symmetrical conclusions. All of the discourses I examine trade in rhetoric and ideology, all of the actors I consider enlist the authority of science, all of the scientific knowledge involved is thoroughly political. But they are not all rhetorical, ideological, authority-seeking, and political in the same ways or for the same purpose. Some function to obfuscate understandings of climate change and obstruct action, either incidentally or intentionally. Others strive to make sense of the complexity of climate change, to take the issue seriously while leaving room for genuine debate, and to sincerely participate in these discussions. Thus, some

[3] While this assumption is common in media studies of climate change, it is relatively uncommon in STS scholarship, where commitments to epistemic impartiality are still predominant. A prominent exception is Oreskes and Conway's *Merchants of Doubt* (2010), which has been the subject of much discussion as to whether or not it represents a model for future reconstructive STS work, or if too much has been conceded in the way of STS' analytical distinctiveness (see Collins et al. 2017; Fuller 2017; Sismondo 2017). The theoretical and, indeed, philosophical tensions that are at play in these debates are unlikely to be resolved – and are perhaps irresolvable as Hacking (2001) suggested nearly two decades ago (see following footnote).

representations, some constructions, and some politicisations are preferable to others for responding to climate change.

What are the benefits – and what are the risks – of this kind of openly normative project? STS as a whole is rich and diverse enough that the risks are relatively small – whether to the perceived need of theoretical sanctity or disciplinary identity.[4] The benefit is that STS understandings can be mobilised to confront the pressing issue of climate change. An STS analysis of media representations and discourses about climate change can reveal problems therein, offer insights as how to navigate and interpret these discourses, and suggest paths to "inform and deepen public inquiries, deliberations and negotiations concerning the democratic shaping and reshaping of [science] and technology" (Woodhouse et al. 2002, 299).

1.4 The Project at a Glance

In the following chapter I provide an overview of the research on climate change in the media, which is extensive. My main task here is to further elucidate the overarching methodological, theoretical, and normative commitments of this project; the existing literature can be understood and categorised with reference to the same tensions between normative and impartial analysis found herein. The majority of these works emerge out of science communication and public understanding of science traditions, and as such, a large degree have interventionist orientations. That is to say, like this project, they make the following assumptions: climate change is an urgent problem that requires concerted social and political action; public and political concern is determined in large part by media discourses; the media have undermined action either inadvertently through poor coverage or intentionally through obstructionism; improved media representations, or better public media literacy, is crucial to addressing climate change. In this regard, many of these works are neither impartial with regards to scientific knowledge claims

[4] My position here is that any insistence on some sacrosanct methodological principles of STS (which allegedly rest on a mature and sound philosophy of science) is wrong-headed (and the underlying philosophical positions remain unsettled). Instead, methodological commitments should be shaped by the kinds of questions being asked, the kinds of things being explained, and the kind of analysis one seeks (i.e. descriptive, explanatory, prescriptive, or normative). Put another way, commitments to impartiality and symmetry typically rest on an "epistemographical" view of STS and eschew normative epistemology (Dear 2001). I see no convincing reason that STS cannot be normatively epistemological and make normative epistemic evaluations about the claims of scientists (insofar as these are not the things you are trying to explain). Of course, my point about reflexivity is that STS is *already* (and quite often) epistemically normative – but that typically it has been in a way that challenges the epistemic sanctity of science, and thus yields a means of challenging the knowledge claims of scientific experts (see Fuller 2017). These challenges might run up against reconstructive commitments (for example, in seeking environmental stability and sustainability regarding climate change). Hence the need for reflexivity. I discuss these issues further in section 2.2 below.

about anthropogenic climate change – their legitimacy is assumed as a basis for analysis, nor symmetrical – many present an overt mandate of combatting climate change scepticism. Questions of media bias, misrepresentation, and accuracy loom large. However, as I note above, many of these are also informed by STS concerns, and adopt forms of constructionist analysis, though the precise form these analyses take is varied.

Most assume, either explicitly or implicitly, that media coverage of climate change is distinct from scientific knowledge, so insofar as they take a constructionist approach, they are interested in the way that media representations of climate change are constructed, not the underlying scientific knowledge. Equally diverse to the approaches taken, are the sets of factors and determinants found to influence these representations. The conception of a media-science divide is a core theoretical concern in many of these works; I keep this in view throughout this project. While there are apparent distinctions between the norms, practices, and discourses in these two "arenas," many of the supposed boundaries between them are routinely breached, and these boundary-crossings are not unidirectional, challenging linear, "dominant," or "canonical" accounts of science communication. From an STS perspective concerned with the production of scientific knowledge, questions of "medialization" and "seepage" stand out: in what ways does science become oriented towards the logics of media systems, and to what extent do scientists respond to accounts of climate change that originate in the media?

In chapter three, I offer a broad trend, framing, and critical discourse analysis of three major Canadian newspapers, the *Globe and Mail*, the *National Post*, and the *Toronto Star*, over the time period from 2006-2013. The sample of articles from these sources constitute the core dataset for this project. I also lay out the specific methods employed. Two important findings come out of this analysis, which provide context for the more in-depth critical discourse analyses that follow. First, the peaks in reporting point to "critical discourse moments" – formative events that define coverage and discourses. Two major moments that emerge prominently in these sources are the release of the Intergovernmental Panel on Climate Change's Fourth Assessment Report in 2007, and the 2009 United Nations Climate Change Conference in Copenhagen. Second, a framing analysis reveals a relative scarcity of articles focusing on scientific issues, and a predominance of "political" framings.

The following chapter explores the implications of these framings, and examines in detail the different ways these newspapers are involved in the "politicisation" of climate change. I do not operate with a set definition of politicisation, but instead attend to several senses of this term. In terms of mapping out the growth of "matters of concern," these newspapers offer a record of politicisation, pointing to the contexts and events that expand the range of interests and actors involved with climate

change. From the purview of normative science communication approaches, politicisation is often understood as a process of biasing and misrepresentation; a key question concerns the ways political ideologies shape coverage of climate change. Here the issue of climate change scepticism emerges prominently. Finally, politicisation needs to be understood reflexively, as it shows up as a key motif in these newspaper discourses. Much of the commentary – especially sceptical commentary – revolves around a notion of "sound vs. politicised" science. It is in these discourses that competing images – or ideologies – of science are most conspicuously revealed. I end this chapter with normative reflections on the conflicting epistemic standards ostensibly at play in the climate change debates carried out in these newspapers, and highlight the ways that appeals to scientific ideals can be tactically and strategically employed to bolster specific knowledge claims, again pointing to the issue of climate change scepticism.

In chapter five, I turn to the role of scientists as claims-makers in shaping climate change discourses. The central questions concern the ways the credibility and authority of scientists is bolstered and challenged in and by these newspapers (and the extent to which the authority of scientists can be read as a proxy for the authority of science). While scientists are recruited in traditional ways to serve as "primary validators" of specific knowledge claims about climate change, their role as "authorised speakers" is undermined on several fronts. Journalistic norms like "debate" and "balance" function (or are actively applied) to put scientists in "discursive competition" with not only other scientists, but a wide range of claims-makers. This can be partly understood as an outcome of politicisation: it is not just scientific-knowledge claims that are ostensibly in dispute, but also which aspects of climate change should be prioritised. Of the many claims-makers involved in these discourses, the role of newspaper columnists and editors is unique. In one regard, they serve as "secondary validators" of scientists' knowledge claims, by selecting whose claims are offered. The effect on the authority of scientists is ambiguous here – specific scientists' claims can be reinforced, but in the case of the *National Post*, so-called "sceptical" scientists are recruited disproportionately, thus undermining the "consensus view" on anthropogenic climate change. Moreover, in the media columnists can directly compete with scientists as "primary validators" of scientific knowledge, by offering their own countervailing explanations of climate change.

With these issues in mind, in chapter six I turn to cases of climate scientists who have become especially media-active, and whose claims and credibility have been both bolstered and challenged by these newspaper sources. Both situations can be understood as issues of politicisation. These scientists have become overtly political, actively calling for specific policies and government action. They are often given space in these newspapers to make these claims. Conversely, they are also directly challenged –

especially by the *National Post* – on the grounds that their politicisation has compromised their scientific impartiality and objectivity. Thus, scientists' interactions are subject to pronounced boundary-work, both self-regulated and externally imposed. The enforcement of boundaries can often be vehement and antagonistic, with politically-active scientists facing personal attacks. I conduct interviews with three such scientists, seeking insight on their motivations and experiences in becoming engaged with politics and the media, asking them a set of STS-informed questions about science-media boundaries, value-free science, and political activism. A specific finding is that attacks on activist scientists do not stem from a coherent or consistently held set of epistemic principles, but rather involves a selective and ad-hoc application of scientistic – and indeed, positivistic – standards. A broader conclusion is that the use of politicisation rhetoric in these debates, especially as a means to dismiss the work of politically-active scientists, demands a normative engagement with the meaning and implications of the common STS refrain that "all science is political." In the concluding chapter, I address this question.

2 Literature Review: Between STS and Media Studies

The literature covering the broad topic of climate change in the media is expansive. While this research is diverse, attends to a range of rationales and motivations, and employs varied methodologies, there are common threads connecting much of the work. As I do in outlining my rationale for this project, most of this literature takes two key points for granted: climate change is a pressing issue; and the media are fundamental in shaping how climate change is addressed. A crucial component of this view is that the media systemically shapes discourses, understandings, perceptions, and knowledges about climate change amongst a sundry set of public actors including policy makers and others with political influence. The media are therefore also implicated in the formation of interest groups – coalitions of experts, politicians, policy makers, business actors, activists, advocates, and members of various other publics.

While it is held that media representations have tangible effects on climate change outcomes, especially regarding action, the precise mechanisms of these effects are mapped and modelled in various ways. These assumptions tend to be grounded in core, formative works in media theory (e.g. Hall 1977, Morley 1989). A near-ubiquitously cited work here, especially with regards to the environmental meanings surrounding climate change, is Jacquelin Burgess' theoretical overview and methodological statement, "The Production and Consumption of Environmental Meanings in the Mass Media: A Research Agenda for the 1990s." Burgess calls for research to examine the structural mechanisms by which cultural values and meanings about the environment are coded in a circuit of media consumption and production affecting and affected by social, political, and economic contexts (1990). A core normative concern here is the role of dominant power structures, and Burgess is motivated by political projects of resistance to and reimaginings of systems of power.

The interest in power maps onto concerns about boundary-work and the authority of science, as well as traditional questions of ideology and misrepresentation. As I discuss in some detail below, between these questions a distinction can be found between works grounded in constructionist approaches emerging out of STS – aimed at symmetrical and impartial analyses, and those with an central normative thrust. These latter studies are conducted in increasingly nuanced and reflexive ways, avoiding simplistic measures of reporting accuracy, but nonetheless questions of media bias and legitimate science remain integral. Thus, boundary-work becomes not just an analytical concept, but a reflexive one as well. Following Burgess, the question in many of these studies is not only how the boundaries defining debate and action on climate change are constituted, but how they might be

reconstituted to allow more effective responses.

2.1 The Many Factors Shaping Climate Change in the Media

Early climate change coverage focused primarily on scientific questions pertaining to bio-physical explanations (for example, those related to global mean temperature records and anthropogenic greenhouse gas emissions) (Trumbo 1996). As such, early studies of climate change coverage also focused on representations of scientific knowledge, often shaped by a concern with reporting accuracy (Bell 1994). As climate change expanded in scope into a multifarious social and environmental issue, studies have similarly expanded in scope. Most studies of climate in the media conducted in the past twenty years reflexively problematise the definition of climate change as "essentially" a scientific issue (e.g. Boykoff 2009). For example, DiFrancesco and Young argue, "While climate change is certainly a real-world phenomenon that can and must be investigated and addressed by the natural sciences, it is also clear that the climate change issue has a 'social and cultural life' that is influenced by competing claims, values, priorities, and narratives" (2010, 518-519). Such perspectives emerge in part from empirical work that shows that over time media framings of climate change have shifted from predominantly attending to scientific questions to a broader set of social, political, economic, cultural, environmental, and ethical concerns (Boykoff 2011; Carvalho and Burgess 2005; Weingart et al. 2000; also see sections 3.4 and 4.2 below).[5]

Here the work of Maxwell Boykoff stands out in terms of its thematic scope and analytical depth.[6] His book *Who Speaks for the Climate? Making Sense of Media Reporting on Climate Change* (2011) is a requisite source. This work surveys the broad scope of research on coverage of climate change with attention the various social, political, and cultural contexts in which media representations are produced. While the range of the work is extensive, Boykoff is motivated by the titular question of the book as it pertains to the "cultural politics of climate change": the role the media play in contestations and collaborations of actors who strive to "speak for the climate." The media are thus seen as a means to authority and power in these "cultural politics." Influence over the content, framings, discourses, and representations of climate change in the media is crucial to shaping public engagement and policy responses, and ultimately effecting the political arrangements that fulfill specific

[5] It is important to be doubly reflexive here, especially about the ways that media representations can be interpreted to reinforce STS readings of "technoscientific" issues, which would undoubtedly reject the notion that any issue is "fundamentally" scientific. The definitional work that the media do loops through the definitional work that (even symmetrical and impartial) analyses do.

[6] See works cited for a complete list.

tangible interests – whether those be protecting vulnerable peoples and habitats from the consequences of changing climates, or guarding the economic power and concentrated wealth of individuals, corporations, and nation-states from the perceived threat of the measures proposed to mitigate or adapt to climate change. Like Burgess, Boykoff is fundamentally interested in the power of language – especially the ways that rhetoric, narratives, and discourses have systemic and dynamic effects, as these effects then loop back onto and reinforce other forms of power: "Emanating from these processes, public perceptions, attitudes, intentions and behaviours, in turn, often link back through mass media into ongoing formulations of climate governance" (2011, 21).

In an article characteristic of this kind of work, Boykoff presents a comprehensive framing analysis of climate change reporting in the top four American newspapers (by circulation) and the top six television newscasts (by viewership) during the period 1995-2006 (Boykoff 2007b). A key explanandum of his work is the disconnect between the consensus amongst the community of climate scientists concerning the anthropogenic contribution to climate change, and the presentation of conflict and controversy in the media and in policy worlds. Boykoff argues that media is so integral to the relationship between science and politics, that it is useful to conceive of the climate change debates taking place within a tripartite "media-science-policy interface." He then accounts for the factors converging at this interface that contribute to the discordant narratives of consensus and controversy underlying climate change debates. He attributes the preponderance of media stories with uncertainty framings – those that highlight conflict and doubt within climate science – to a systemic journalistic norm of "balanced reporting" in which the goal of presenting competing viewpoints contributes to the appearance of conflict, though he also acknowledges the role that a "controversy norm" might play – stories about conflict attract more readership and viewership than calm and sombre assessments (also see Boykoff 2007a; Boykoff and Boykoff 2007). Boykoff holds this research to be important in that it reveals how media representations have political effects: contentious framings stressing uncertainty and controversy can "create spaces for US federal policy actors to defray responsibility and delay action regarding climate change" (2007b, 486).

Again, while the research on climate change in the media is diverse, Boykoff's work exhibits several common methodological and analytical concerns in the literature. The focus on underlying or structural factors shaping systemic framings, discourses, and representations is standard. In some regards, this is implied by framing analyses – to examine framings in the media is to look at the "selection and salience" of particular facets or interpretations of an issue over large scales of volume and time (see section 3.1.4 in the following chapter). While framings are constituted intra-textually

through use language, rhetoric, and argumentation, their overall presence in the *mass* media are only discernible by examining large samples of media content. This is also important in terms of the effects of the media in influencing public perceptions (and responses) to climate change, as these views are shaped through exposure to tropes and narratives that are reinforced through repetition on a large-scale across a range of media sources over time.

Other studies have, like Boykoff, examined the role of "journalistic norms" (the formal and informal rules governing the work of journalists) as an explanation for systemic framings – especially the disproportionate amount of media stories covering dissenting or "sceptical" views about climate change (compared with the ratio of scientific literature expressing consensus and dissenting views) (Adger, Benjaminsen, Brown, & Svarstad 2001; Antilla 2010a; Boykoff and Boykoff 2004; Carvalho 2007). Many works have found that the American media has a significantly greater tendency to present stories presenting climate change science as controversial as compared to media reporting in other countries (Boykoff 2007b; Brossard et al. 2004; Gordon, Deines, and Havice 2010). Different national journalistic cultures have been hypothesised as one reason for these inter-country differences (Dirikx and Gelders 2010; Olausson 2009; Sampei and Aoyagi-Usui 2009).

In general, regional or national context becomes a key factor in accounting for reporting outcomes, as various studies find tight linkages between the discourses prevalent in geographically-situated political cultures and the media. However, again, the precise mechanism by which these contexts affect climate change coverage have been variably theorised (Billett 2010; Gordon, Deines, and Havice 2010; Painter and Ashe 2012; Ryghaug et al. 2011; Weingart et al. 2000). Olausson (2009) points to the ways that the media respond to other signals from national contexts in which they operate. For example, the US media's inclination towards uncertainty framings is associated with a governmental structure and national policy culture that is also oriented towards contestation rather than consensus-building, which tends to be more prevalent in a European culture. Antilla (2010b) speculates that the specific corporate-political connections that exist in the American context have engendered a set of media sensitivities that leads to selective "self-censorship" about the risks of climate change. It is, again, crucial to keep in view Boykoff's and others' non-linear conception of these power relationships: political and media cultures are mutually-reinforcing and co-constituted.

2.1.1 Climate Change in the Canadian Media

On this note, here it is necessary to address the Canadian context and media sources that this study examines. In general, studies examining the relationships between climate change and the media are

common, and most frequently explore an American geo-political context. This partly results from the locale of scholars conducting these studies (and the English-speaking journals in which these studies are published), but also reflects the importance granted to the American media as "agenda-setting" and globalised (at least in English-speaking countries), as well as the impact of US interests in determining international climate change agreements. Data from different countries has been frequently included in analyses of broad reporting trends in recent years (Boykoff 2011; Boykoff 2014), but more focused discourse analyses still tend towards examining American media sources. From the narrow scope of a Canadian perspective there are relatively few studies, though some very good analyses exist.

Ungar (1992) is one of the earlier works to consider newspaper coverage of climate change and perhaps the only from this time period which samples a Canadian source, the *Globe and Mail*. His paper pays attention to the specifics of the Canadian political context, in particular, the role of the Toronto Conference on the Changing Atmosphere in 1988 – which pre-empted claims to reduce emissions by then Prime Minister Brian Mulroney – in shaping media coverage and concern for climate change. Ungar highlights 1988 as a key year in which climate change gained currency as a political issue, and then decline thereafter – making this a useful source for evaluating long-term trends and comparing specific historical contexts of media coverage.

Davidsen and Graham (2014) examine the most extensive range of Canadian newspaper sources, both geographically and temporally. They sample 15 regional newspapers covering the period 1999-2009, with at least one newspaper represented each province or territory in Canada, and one national newspaper, the *Globe and Mail*. They conduct a keyword content analysis to measure the presence of three core themes related to C02 reduction strategies: renewable energy, carbon management, and economic policy. They find that overall, newspaper content was oriented towards growth-and-technology solutions to climate change. This chiefly entails technological developments like improved batteries, solar panels, fuel efficient vehicles, etc. that can be voluntarily adopted through markets and made possible through economic growth. Davidsen and Graham conclude that the predominance of these kinds of themes indicates a public and political tendency towards "narrow" ecological modernisation, where climate change is addressed through short-term approaches that can be easily integrated into status-quo economic models. A valuable point of analysis in this work is regional fluctuation in media content. For example, keywords related to "carbon-neutral" technological and economic solutions were most prominent in the *Calgary Herald* from Alberta, the provincial centre of the Canadian fossil fuel industry (on this note, the *Herald* was among the newspapers with the highest degree of climate change content in general – leading on topics like "emissions" and

"greenhouse gases" – indicating a public and political preoccupation with the issue in the province). Davidsen and Graham thus view these associations as further support for the hypothesis that media representations reflect geographical milieus.

Young and Dugas (2012) also examine a wide geographical range of Canadian newspaper sources, sampling six English-speaking as well as two French-speaking newspapers from 2007-2008. They explore the question of geographical influence on climate change coverage on an intra-national but inter-regional level, selecting newspapers published in different Canadian provinces and regions. They find that the French-speaking newspapers are more likely to mention ecological issues and manifest "green" economic framings, as well as have a greater diversity in framings. Amongst both English-speaking and French-speaking newspapers, economic framings predominate. Young and Dugas hypothesise that the higher degree of environmental framings as well as the more frequent portrayal of the consensus view in French-speaking newspapers stems from the different "environmental cultures" (revealed by public opinion surveys) found across Canada, with French-speaking Canadians being the most environmentally aware.

Examining the same set of Canadian newspapers, Young (2013) makes an important contribution to an underexplored area of climate change media coverage – the role of letters to the editor. He finds that one of the functions of these letters is to create space within the media for perspectives or opinions that do not meet the regular standards of journalistic or editorial scrutiny. While these letters express a range of "fringe" views, Young suggests that they are most often mobilised to promote and legitimise sceptical viewpoints.

Ahchong and Dodds (2012) offer a content analysis of the *Toronto Star* and *Globe and Mail* from 1988-2007 examining a range of thematic and actor indicators, making this work of important value for broad comparative purposes. They find a predominance of articles concerning international policy and political actors. Total volume of coverage appears linked to such policy issues (with spikes in 1997 and 2002 following the signing and ratification of the Kyoto Protocol), as does discussion of mitigation, which features more prominently than adaptation.

Ford and King (2015) conduct a framing analysis of the same Canadian newspapers alongside the American *New York Times* and *Washington Post* in a cross-country comparison over a twenty-year period from 1993-2013. Following the work of Ahchong and Dodds, they take a more focused look at coverage of climate change adaptation, finding that the topic becomes more prevalent over time (whereas earlier media coverage tended to focus on mitigation), with adaptation discourses spiking in conjunction with extreme weather events. They find a greater prevalence of adaptation discourses in

the Canadian newspapers, although the specific reasons for this difference is unclear. In another cross-country, North American study, Liisa Antilla compared the reporting of climate "tipping points" in various geographical regions (2010). The primary focus of her analysis was on US reporting, and Canadian data is used of comparing reporting frequency; she finds that US media systematically underreported on the potential risks associated with climate tipping points. She considers the particular American journalistic context, especially the norm of "balance" in explaining this result, but the question of whether Canadian media norms differ is open-ended.

DiFrancesco and Young (2011) add another layer to examinations of climate change converge by looking specifically how the inclusion of photographs shape or contribute to the framing of news articles found in *Globe and Mail* and the *National Post* in 2008. They too pay special attention to the effects of the Canadian political context, which is shaped by concerns about "obstructionism" by the Conservative government to the aims of the Kyoto Protocol. They find that in the visual representation of actors, politicians are most frequently shown, reinforcing the discursive dominance of political framings of climate change. However, amongst these political framings, climate change is frequently found as a background topic in articles primarily focused on political or business issues, and the visual images of political actors appear only "marginally connected" to climate change problems. Notably, they find that the visual imagery they expected to be associated with Canadian climate change representations – polar bears, glaciers, sea ice – were rarely seen; visual representations of the environmental aspects of climate change were uncommon in general.

In their investigation of the role of public-relations firms in shaping climate change debates, Greenberg, Knight, and Westersund (2011) examine the ways these firms navigate and enroll the media in promoting their viewpoints, typically in opinion pieces written under the guise of scientific impartiality (see chapter 7). They briefly consider pieces published in the *Globe and Mail.* While these PR firms often operate at the behest of corporations, Greenberg et al. find that a range of groups, including environmental NGOs and citizens advocacy associations also employ PR tactics and strategies. Newspapers, then, are found to be a site and means of bringing about coalitions of like-interested actors, and public deliberation about climate change has been profoundly shaped by these "promotional" discourses.

Representative of one of the reflexive issues with which this project engages, one of the broadest surveys of climate change reporting in Canada stems from climatologist Andrew Weaver's *Keeping Our Cool: Canada in a Warming World* (2008), dedicating an entire chapter to the issue of climate change in the media. Weaver samples the *Calgary Herald*, the *Globe and Mail*, and the *Montreal*

Gazette from 1985-2007, examining reporting trends and linking them to specific events like the adoption and ratification of the Kyoto Protocol and Hurricane Katrina, and placing himself amongst these reporting peaks, reflecting on the increases in his own media activities. Overall, the book is intended to be a popular science primer on the potential impacts of climate change in Canada, supplemented with reflections on the politics of climate change, Thus, while Weaver exhibits sensitivity to the themes and concerns of the studies surveyed above (Boykoff's work is found in the works cited list), the analysis is first and foremost a climate scientist's assessment of the inadequacies of media reporting on climate change. In this regard, the book can be viewed as source material for this analysis. But, as I have stated, these normative concerns are shared by many of the works surveyed here; Weaver's public engagement activities and popular accounts of climate change thus function as intriguing boundary objects, the implications of which I explore in detail in chapter 7.

Outside of the specific context of climate change, Edna Einsiedel has published one of the only available broad analyses of science and technology reporting in Canadian newspapers (1992). Her analysis provides some fruitful insights on reporting frequency according to types of stories (medical and environmental stories outnumber all others) as well as generalisations about the overall optimistic tone with which science is presented in the Canadian media, making the work generally theoretically useful.

2.1.2 Ideologies and/in the News Media

The attention to regional and national contexts is supplemented with a widespread concern with ideologies. Ideologies are identified in numerous studies as a key factor associated with reporting outcomes. Ideological scope can be relatively large, associated with national differences in climate change coverage (Ereaut and Segnit 2006), or narrower, linked to differences between specific publications (Carvalho 2007; Takahashi 2011). Again, here the relationship is not linearly-causal. While some studies postulate that ideologies have an effect on reporting (Dirikx and Gelders 2010), others are concerned with the ways that media representations of climate change promote or portray ideological positions. This links to the "political parallelism" thesis – that media outlets have discernible ideological alignments that match those found in the broader public and political realm, and that the framings, discourses, and viewpoints presented by these media will, overall, promote these ideological agendas (Entman 2010; Hallin and Mancini 2004; Iyengar and Hahn 2009; Levendusky 2013).

The concern with the effect of ideologies on climate change coverage is often linked to a focus on discourses promoting climate change scepticism. Here a wide variety of ideological connections have been identified, including conservativism (Boussalis and Coan 2016; Elsasser and Dunlap 2013; Hoggan

and Littlemore 2009; Jacques, Dunlap, and Freeman 2008; McCright and Dunlap 2003; Young 2013) or common tropes of a left vs. right political divide (Dirikx and Gelders 2010; Takahashi 2011), economic liberalism and "individualism" (Carvalho 2007); pro-corporate bias (Dispensa and Brulle 2003), neo-liberalism (Boykoff 2014; Brulle 2014; Brossard, Shanahan, and McComas 2004; Carvalho and Burgess 2005; Lahsen 2005), anti-environmentalism (Antilla 2010), technocentrism (Guedes 2000), and various others.

Here there are clear linkages to critical theory and cultural studies, fields also overtly concerned with ideology (Jameson 1981; Eagleton 1991). While there is great variance in application of the term, ideologies tend to connote a system of values and norms that have efficacy in constructing and maintaining social and political structures, governing power relations, and determining behaviours.[7] As the list of ideologies above reveals, these systems are often codified into a sort of latent philosophical position.

Analytically, there is a risk that the ideological characterisations interpreted in climate change coverage will be contested by the actors purportedly expressing those ideologies. This, in itself, is not fundamentally problematic: the social sciences necessarily use terms to describe human activities, beliefs, and ideas are not those that would be used by the actors themselves to describe their own ways of life. But ideologies not only carry the simple meaning of a set of values (otherwise one would just speak of values), but a connotation of distortion, emerging from Marxist traditions (Seliger 1979). In studies of climate change in the media this connotation persists (Douglas 2015; Goebbert et al. 2012; Zia and Todd 2010). Thus, a concern with ideology in these studies – and the linkage to climate scepticism – carries another normative dimension.

2.2 Constructionism, Symmetry, and Normativity

These normative implications can be expanded by exploring them through the lens of STS methodologies. Many of the studies of climate change coverage in the media adopt a constructionist methodological and theoretical framework (Antilla 2005; Carvalho 2005; DiFrancesco and Young 2011;

[7] Carvalho offers as useful a definition as any: "I understand ideology as a system of values, norms and political preferences, linked to a program of action vis-à-vis a given social and political order. People relate to each other and to the world on the basis of value judgments, ideas about how things should be, and preferred forms of governance of the world. In other words, ideologies are axiological, normative and political. Besides government and society, the referents of ideologies may include, for example, the economy and the relations between humans and the environment. Ideologies always involve a vision of an ideal world with which lived existence is confronted." (2007, 225)

Olausson 2009; Zehr 2000).[8] Boykoff, for example, explicitly eschews "positivist" epistemologies and adopts a "social constructivist" position to examine "how power and scale constructs, reflects and reveals heterogeneous and complex phenomena such as language, knowledge and discourse" (2007b, 479). However, while accounting for the complex, systemic, socially and culturally situated "construction" of different framings and discourses surrounding climate change, his analysis is not "symmetrical" nor "impartial" as a traditional social constructionist account might demand (Bloor 1991).[9] He makes a clear and firm normative commitment to upholding the consensus view on anthropogenic climate change, maintaining that this signifies "clear understanding." Subsequently, the analysis he produces is asymmetrical in that he looks specifically at the factors that lead to contentious uncertainty framings and subsequently obfuscate the consensus view. A thoroughly symmetrical approach would attempt offer accounts of "bias" in news sources that affirm the consensus view and those that challenge it.

In this regard, there are very few studies of climate change in that adopt impartiality and symmetry are as core methodological starting points.[10] The normative commitments involved are conspicuous given the prevalence of studies examining climate change scepticism (e.g. Antilla 2005; Koteyko et al. 2013; Malka et al. 2009). Such studies, while not symmetrical, may be considered constructionist in the sense that they seek to understand the high degree of sceptical discourses in the media in terms of a variety of social, economic, political, and ideological factors. Perhaps the most well-known example is Oreskes and Conway (2010), who link organised scepticism campaigns to both corporate interests and free-market ideologies; there many are other such studies (e.g. Freudenberg and Muselli 2010; McCright and Dunlap 2000; Lahsen 2005a; Zehr 2000). In turn, these studies often

[8] Here I treat "constructivist" and "constructionist" as synonyms, but following Hacking (2001) I use the latter term. "Social constructivist" may also be treated as a synonym; I omit the "social" in general, as not all of the various intersecting factors coming together to "construct" climate change media discourses can usefully be thought of as social.

[9] While this might appear to be a fairly minute (and perhaps outdated) theoretical issue, it continues to define and distinguish two approaches in the literature. Leaving aside the topic of media for the moment, there are works that strive for a thorough-going constructionist analysis of climate change science (e.g. Besel 2011; Demeritt 2001; Lahsen 2005a; Ryghaug and Skjolsvold 2010; Shackley and Wynne 1994, Wynne 1996). That is to say, that in the vein of traditional of British SSK, they try to remain impartial to the scientific categories being discussed and attempt to symmetrically account for different "social factors" explaining different interpretations or approaches to scientific questions, say, how to best handle uncertainty in climate models.

[10] There are exceptions, of course Dirikx and Gelders (2010a and 2010b) produce what is essentially a symmetrical and impartial analysis, looking at both "sides" of the climate change debate and the effects of ideology on reporting outcomes in differently ideologically oriented news sources (i.e. comparing so-called left-wing and right-wing press), and making no overt epistemic commitments to the validity of theories of anthropogenic climate change.

explain the persistent semblance of controversy, uncertainty, and "unsettled science" in public and policy debates in terms of sceptical media discourses. Indeed, even in studies that do not primarily focus on the media, it is typical to find the media mentioned as a contributing factor to the construction of the public debate about climate change (McCright and Dunlap 2003; Lahsen 2005b).

Studies that examine climate change scepticism in the media are often predicated on overt assessments of reporting accuracy, completely eschewing any thorough-going impartiality about scientific knowledge claims. In such studies, the validity of climate change science is (more or less) taken for granted and climate change scepticism is linked to discourses that misreport, obfuscate, or misrepresent specific scientific knowledge claims. These kinds of media studies are widespread (Antilla 2010; Billet 2010; Boykoff 2007a; Boykoff 2007c; Boykoff and Boykoff 2004; Brossard, Shanahan, and McComas 2004; Carpenter 2001; Carvalho 2005; Corbett and Durfee 2004; Gordon, Deines, and Havice 2010; Nissani 1999; Wilkins 1993; Shanahan and Good 2000).[11] Like explanations for reporting outcomes in general, these studies explain inaccurate coverage and the presence of sceptical discourses in terms of a range of factors, including journalistic norms, policy contexts, the financial interests of powerful individuals or corporations, and ideologies. Most of these works theorise that these factors come together through systemic associations of interacting and mutually reinforcing discourses, practices, institutions, and actors, which affect and are affected by media representations. Robert Brulle conceives of these associations as creating a discernible interest coalition which he terms the "climate change countermovement" (2014).

Of course, many of these studies are reflexive about the normative commitments they make. Boykoff, for example, does not ignore the "epistemological challenges" presented by constructionist understandings of science. He accounts for the insights emerging from STS that point to the "unavoidably politicised science illustrated by that of the IPCC" and avoids simplistic conceptions of scientific truth (2007b). He argues that the "facts" (which he puts in quotations) underlying the consensus view "are also influenced by values and perspectives at the human-environment interface" (2007b, 479). Similarly, Carvalho (2007) argues that, "in the media, as in other arenas, there is no such thing as 'pure facts.' Instead, 'truth claims' are embedded with certain worldviews, judgments and preferences." And in many regards, her study proceeds symmetrically, considering the effects on climate change coverage of both the "social democratic ideology" of the leftist British newspaper, the *Guardian*, and the "neo-liberal capitalist" ideology of the *Times*. However, she still offers the normative judgement

[11] Similar studies examining the reporting of topics other than climate change are also common (Maille, Saint-Charles, and Lucotte 2010; Singer 1990).

that early British reporting "clearly underestimated the risks associated to climate change" and left unquestioned "the economic and social practices that generate greenhouse gases." She concludes that studying media representations of climate change is fundamentally important for "assessing the responsibility of both governments and the public in addressing climate change" (239).

Boykoff's normative constructionist position can be read as navigating the long-standing anxiety that constructionist analyses can serve to undermine scientific claims by pointing to their underdetermined and contingent character (see Demeritt 2001; Latour 2004b; Wang and Oreskes 2008; Weart 2008).[12] The discomfort emerges from the recognition that the scientific knowledge on climate change is something that should be accepted and affirmed. However, as Boykoff and others acknowledge, addressing questions of inaccuracy, scepticism, and misrepresentation cannot mean returning to an "objective" and "value-free" view of scientific knowledge that could serve as the foil to "biased," sceptical views. Exactly how this tension is navigated in the literature, however, is rarely grounded in a comprehensive theoretical account, and those on offer vary widely (cf. Longino 2002; Latour 2004b; and Bloor 2007). The most prevalent form of response to this tension is that while, as Boykoff notes, consensus climate science is value-laden and socially-constructed, it is constructed well and according to good epistemic values. In a similar vein, Spencer Weart produces a work that is nearly symmetrical – in that he examines both successful and unsuccessful theories of climate change through a historical constructionist analysis, but is not impartial, concluding that the consensus view is the well-produced account of climate change (2008). Indeed, in Weart's view, it is precisely this historical constructionist work that allows one to arrive at this normative judgement. Given that constructionism abandons the ideals of "pure" or "value-free" science and holds that all scientific knowledge is socially constructed, the constructed nature of scientific knowledge cannot inherently be seen as a mark of corruption from such ideals. Rather than constructionism being a means to undermine scientific knowledge-claims, it can equally be a means to bolster them by revealing and appreciating the rigour of the scientific work that has been done to arrive at a theory.[13]

My study is aligned with these approaches in that it too recognises the complex constructed nature of scientific knowledge, and it examines the associations between various social, political, economic, geographical factors and contexts and the representation of climate change in the media. Indeed, as I discuss below, the media themselves play an integral role in shaping scientific practice and

[12] The common response to this kind of charge is that STS should strive for thorough sociological analysis, not the justification of scientific claims, and so the methodological principles of the former should be understood as having no normatively epistemological, or ontological, consequences for the latter (e.g. Dear 2001).
[13] For a philosophical account in a similar vein, see Douglas (2015).

discourse about climate change. I also offer limited symmetrical analyses – for example, in examining the values and images of science shaping media representations on both "sides" of climate change debates. However, I do not make an firm commitment to impartiality; instead, I directly confront the normative concerns outlined above – about better or worse kinds of media representations – and those that specifically emerge from my analysis. Instead of impartiality, I find reflexivity to be the more important methodological commitment, and I try to be cognisant of the normative implications of my work.

2.2.1 Boundaries and Rhetoric

In addition to the kind of reflexive normative constructionism adopted by Boykoff and others, studies of climate change in the media have adopted many other insights from STS. Most notably, this has led to the problematisation of "canonical accounts" and "dominant views" of science communication which theorise the media in terms of flows of scientific information to a larger audience. These accounts are largely concerned with how well science is transmitted to the public and try to identify "distortion" effects of "popularisation" or "sensationalism" (Hilgartner 1990; Bucchi 1996). It has often been supposed that science research and public science communication are two distinct practices, in which the former precedes and defines the possibilities for the latter. Scientific knowledge is produced and published in a properly scientific arena (e.g. laboratories and peer-reviewed journals) and this information is disseminated to the public via a variety of means, most notably mass media. The communication of scientific knowledge is something external and subsequent to scientific practice. Constructionist accounts of science, as well as parallel developments in media studies and inter-related fields like public understanding of science show these views to be simplistic – the relationship between science and the media is not linear, media communication does not necessarily entail distortion, and deficit models do not sufficiently capture public perceptions of scientific knowledge. However, as I've discussed, many studies of climate change in the media still address quite traditional concerns like bias, ideology, and (mis)representation, albeit with a more nuanced understanding of how they operate.

The relative rarity of thorough-going symmetry and impartiality in these studies is mirrored by the relative rarity of the media as a site of exploration in STS work. This may be gleaned by the main journals in which these studies appear, as well as the limited degree to which the media is addressed in overviews of science and technology studies.[14] While the precise reasons for this state of affairs are not

[14] The vast majority of studies cited here are published in public understanding of science or science communication journals. In Sismondo's *Introduction to Science and Technology Studies* the topic of the media is

entirely clear, one can speculate that – in addition to the anormative commitments of STS – it is related to methodological and theoretical traditions exploring "core-sets" of scientific and the "local contexts" of scientific knowledge production. For example, Anne Beaulieu observes that constructionist STS analyses have been dominated by laboratory studies or other relatively discrete sites in which scientists operate (2010). This may have had an unintended consequence of reinforcing science-media boundaries.

There are, of course, significant works that explore the role of the media from the perspective of the "traditional" STS questions, namely: the social factors and contexts that influence the construction of scientific knowledge; boundary-work and the authority of science; and cultural images of science. Here Dorothy Nelkin's *Selling Science: How the Press Covers Science and Technology* is formative. Among this book's chief contributions is establishing the fundamentality of the mass media in shaping public perceptions of science – and by extension, the critical role it plays in bolstering and maintaining the authority of science. Nelkin's analysis thus maps on to STS concerns about boundary-work – the way that scientists uphold a distinction between the "proper" science contained in scientific journals and the "popularised" science portrayed in the media is such a boundary. Much STS work has focused on the rhetorical nature of boundary-work (Fahnestock 1986; Hilgartner 1990; Gieryn 1983, 1999; Latour and Woolgar 1979; Latour 1987; Shackley and Wynne 1987). With regards to media representations of climate change, the issue of rhetoric also features as a prominent analytical concern (Antilla 2005; Brossard 2008; Hoffarth and Hodson 2016; Zehr 2000). However, here there is again a distinction between symmetrical and impartial analyses on the one hand and those with normative aims.

Latour's approach to rhetoric defines the former approach. He adopts a meta-rhetorical view to draw attention to the drawing of boundaries between science and non-science, as well as to undermine certain epistemological conceptions of these boundaries.[15] Rhetoric, in effect, provides an analytical concept to conduct a thorough-going symmetrical analysis of science and non-science – and successful and unsuccessful science; the difference, argues Latour, lies not in some distinction between reason and logic on the one hand and distortion and sophistry on the other, but in the *forms* of rhetoric. What

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treated lightly, mainly in the context of the public understanding of science (2010). Hackett et al.'s *Handbook of Science and Technology Studies* is similarly light on examining the relationship between science and the media; it does contains a chapter on the media (Boczkowski and Lievrouw 2008), but the main analytical focus is on media technologies, and how these technologies and technological systems should serve as a major topic of social construction of technology approaches.

[15] "Meta-rhetorical" in that the very distinction between rhetoric – "so much despised" as distortion – and science – "so much admired" as reason – is itself a rhetorical maneuver (1987, 61).

comes to be called “scientific” refers to a certain kind and quality of rhetoric: “we must eventually come to call scientific the rhetoric able to mobilise on one spot more resources than older ones” (1987, 61).

This view is susceptible to a host of normative concerns and conflicts with the aims of many studies of climate change in the media. Arguably, Latour’s chief point is analytical, not ontological nor epistemological.[16] Latour mainly wants to draw attention to the ways that science can be thoroughly analysed as rhetorical – even its “rational,” “empirical,” or “logical” aspects. This need not imply that science is “essentially” rhetorical, or fundamentally reducible to rhetoric, only that it has thoroughly rhetorical qualities. Latour does not intend these qualities to be a sufficient (though perhaps it is necessary) explanation for the success of specific scientific knowledge claims, or the boundaries that are established between science and other endeavours. As other works have stressed, the boundaries around science can be understood as the consequences of multiple variables, whether they be epistemological, institutional, practical, economic, or otherwise (Boykoff 2011; Rödder et al. 2012).

However, the common connotation of rhetoric persists; rhetoric in a negative sense, as contrasted to the (rational) discourses of science is a key analytical concern in numerous media studies of climate change. Indeed, underlying concerns about popularisation and sensationalism are predicated on the view that these media discourses are defined by rhetoric (or perhaps *too much* rhetoric) (Hoffarth and Hodson 2016; Zehr 2000). For example, Brossard (2008) examines the ways that scientific publications can at times adopt the “unusual rhetoric” of the media. Others point to the ways that the media “often picks up on political rhetoric concerning climate change, rather than on the science itself” (Davidsen and Graham, 2014, 154; see also Bickerstaff et al. 2008, 147; Kurz et al. 2010, 604). Rhetoric is also deeply implicated in concerns about climate change scepticism. Antilla (2005) highlights the ways that sceptics employ "rhetoric emphasising uncertainty and controversy” as do Friedman et al. (1999) while others point to a range of “rhetorical strategies” used to foster doubt about anthropogenic climate change (Douglas 2009; Koteyko, Jaspal, and Nerlich 2013; Lewandowsky 2016; McCright and Dunlap 2010). Woods et al. looks specifically at the metaphors sceptics use to denounce those concerned with climate change – “fundamentalists, fanatics, and zealots,” while Hoffarth and Hodson look at anti-environmentalist rhetoric linking climate change with undesirable groups – communists and

[16] Latour’s intentions were arguably not as benign as all this. While an anormative interpretation is certainly possible, the conception of science as rhetoric can also be read as undermining the authority of science (Hacking 2001). Patrick Baert interprets Latour thus: “Scientists not only employ as much rhetoric in science as people use in daily life; their own empirical research is far messier than was ever acknowledged by neo-positivist philosophers. Research results may look uncontroversial and authoritative when they finally appear in neat articles in prestigious scientific journals, but a detailed ethnography of actual empirical research that led to the 'findings' shows how problematic and fabricated these findings can be” (Baert 2005, 193).

terrorists. Torcello argues that the term "climate scepticism" itself has rhetorical power, in that sceptics seek to elicit the connotation of scepticism as a disciplined intellectual position (2016). Others add some symmetry to these works, noting that strategic language emerges from "both sides" of climate debates – for example, the term "climate denier" has a rhetorical function as a pejorative (Nisbet 2009; O'Neill and Boykoff 2010). Approaching a more thorough-going view, Ungar (1998) points to the rhetorical qualities of the very phrase "global warming" is rhetorical, with deep connotative meanings; others have examined the difference in connotation between "global warming" and "climate change" (Whitmarsh 2009).

Several works have tried to reconcile normative conceptions of rhetoric with the more meta-rhetorical view emerging from STS. Putting a normative gloss on Latour's conception of the scientific as particularly successful rhetoric leads to questions about how to employ "targeted or nuanced rhetoric" to facilitate climate change action, and how to demarcate between useful and productive rhetoric and that which is misleading and obfuscatory (Zhou 2016, 17; see also Demeritt 2006). But the term "rhetoric," after all, has rhetorical force. Losing this meaning in the name of symmetrical analysis could be seen to undermine interventionist goals – to improve climate change communication, for example – or even give way to a means-ends logic where rhetorical manoeuvres are evaluated mainly in their tactical or strategic effects. Even if the ends are desirable or ethically sound, it seems that certain rhetoric should be avoided – sarcasm, exaggeration, ad hominem attacks, etc. (Young 2013). Others would argue that employing rhetoric as a meta-concept makes less sense than simply viewing rhetoric as a subset of communication strategies (Rödder et al. 2012)

Here, I do not seek a precise solution to these issues, nor a well-defined taxonomy of different types of communication, language, discourses, and rhetoric. I pay heed to the STS insights that thinking about the role of rhetoric in science points to the connotative meanings of scientific discourse that often goes unexamined. As Nelkin and others point out, when science is communicated in the media, there is much extra-scientific (for lack of a better term) work being done – information is not merely being transmitted, but larger images of science are being presented and boundaries are being constructed through the use of language (Gieryn 1999, Zehr 2000). Insofar as these images and boundaries function to persuade the broader public to accept the authority of science – as an "arcane activity outside of, indeed, above the sphere of normal human understanding, and therefore beyond serious criticism" – rhetoric presents an apt concept for analysis (Nelkin, 1991: xiii). Here, rhetoric is not meant as a meta-concept, but intentionally draws on its pejorative connotation. Speaking of the "rhetorical authority" of

science is meant to imply that this authority is not based on the substantive grounds usually supposed – for example, its epistemic superiority.

On the other hand, I do not take the expansion of rhetoric – to describe both sophistry and rationality – as adequate to describe the different kinds of language, discourses, and argumentation at play in media representations of climate change. Persuasiveness is at the core of conceptions of rhetoric, but of a certain kind and degree. Rhetoric connotes a sort of fundamentally instrumental argumentation – to persuade at all costs. What ultimately challenges a meta-rhetorical view is the possibility that in the name of some standard – be it epistemic, or linguistic, or ethical – a *less persuasive* argument would be intentionally and knowingly put forth. It is easy to understand how rhetoric can be disingenuous, but can it be sincere? And if being sincere is not as persuasive as being disingenuous, why be sincere? This is an concern – an ethical one – that permeates media discourses on climate change and whose significance should be kept in view.

2.3 Scientists in the Media

I take the representation of scientists in the media as a somewhat distinct question from the representation of science in general. There are several reasons for this. STS has done much to conceptualise science in terms of practice – what scientists do – and situate scientific knowledge within those practices, thus undermining notions of science as a free-floating body of facts and theories. However, whether these traditional, "canonical," or "dominant" models of science – and attending notions of objectivity and scientific truth – persist in the media is an open question that I seek to investigate. Nelkin, in surveying the status of scientists in the media in 1991, finds that scientists are routinely presented as "problem solvers, authorities, the ultimate source of truth" (1991, xiii).

Is this still the case? There is evidence that such a view is waning. Early media coverage depicted climate change as primarily scientific, recruiting authoritative experts to bolster this view. But several studies find that as the scope of the issue expanded, scientists were presented as one of many competing actors vying to define the issue (Trumbo 1996; Weingart 2000; Brossard, Shanahan, and McComas 2004). So, returning to Boykoff's question – who speaks for climate change? – scientists, even represented as authoritative sources of knowledge, were not sufficiently able to maintain "definitional control" over the issue (Carvalho and Burgess 2005). But Boykoff's question can be modified thus: who speaks for climate *science*? Even in this narrower scope, scientists seem to have lost some of their unique authority. In contrast to Nelkin, Carvalho finds that scientists are not presented as being able to "ultimately" answer questions of climate science; instead, they are often presented as a contentious

group, unable to reach agreement. Moreover, the extent of the ostensibly scientific disagreement has not only been defined by scientists, but an increasing range of actors. In the context of climate change scepticism, various non-scientists in the media have been presented as holding valid views on even narrowly defined "scientific" issues – the bio-physical explanations for climate change (Lewandowsky et al. 2015; Painter and Gavin 2016; Stocking and Holstein 2009; Zehr 2000). The image of scientists presented in the media seems to have shifted. Scientists are still represented as authorities, what is the extent of this authority? If they are not held to be uniquely able to speak on matters of science, what image of science is being presented? And how does this map onto the ideal of scientists suggested by Nelkin? Does it still linger? And if not, does this represent a move to the kind of reflexive critique of science that Nelkin felt was sorely missing? Or something else?

2.3.1 The Media as a Site of Science

Most relevant to this project is Nelkin's explorations of the way scientists interact with the media. While wary, scientists do not eschew the media entirely, but instead develop ambivalent relationships with it. Moreover, Nelkin traces how scientists' media attitudes have shifted over time. While scientists would once interact with the media rarely and reluctantly, if at all, many scientists now accept (though perhaps still a bit reluctantly) that the promotion of their work in the media is a professional responsibility (Peters 2013). Massimo Bucchi – another scholar who prominently looks at scientists' interactions with the media – shows that scientists navigate this responsibility in a variety of ways. Most still harbour scepticism of the media, and prefer to have (or acquiesce to, at the urging of their research institutions) their work publicised through a set of standard stages, typically starting with the publication of peer-reviewed research and proceeding through press-releases to media sources. Bucchi complicates traditional models of popularisation and turns to a "continuity model" that holds there are many levels of communication that respond to the different public audiences involved, from the intra-specialist to the inter-specialist to the learning-to-be-a-specialist to the lay public.[17] While publics do not occupy discrete positions on this spectrum, such a model has communicative effects; Bucchi points out that science communication needs to be understood in the ways that it is oriented towards different (real or imagined) audiences. However, Bucchi takes care to point out that the implied linear progression of this model does not always, or even typically, hold. Science communication can start at different stages or oriented towards different audiences without fulfilling the proceeding stage or by skipping others. For

[17] In developing this model, Bucchi draws on the work of Shinn and Whitley (1985) and Hilgartner (1990).

example, Bucchi points to situations where scientists deviate from regular routes of communication and bring their scientific findings directly to the media, sometimes before it is even published or reviewed in a scientific journal. Thus, scientists' media interactions also fall on a spectrum from reluctance to active engagement depending on a variety of circumstances; Bucchi links the latter to "crisis situations" – either "within" science when theoretical paradigms appear at risk of breaking down, or due to some pressing social, political, or environmental concern (Bucchi 1996; Bucchi 1998; Bucchi and Trench 2008).

The broadly important theoretical implication of these works is that they conceive of the media as an important site of scientific practice and knowledge production. Given the work that has been done in STS to challenge the internalist-externalist distinctions that are themselves (partly) constructed through scientific boundary work, it is somewhat curious that more attention has not been given to the context of the media. A "canonical account" of science communication have been mainly challenged from a PUS perspective – by showing that the deficits models upon which it is predicated are faulty; the public is not a mere receiver of pre-made scientific facts. But it is equally challenged from the other side – scientists are not mere transmitters.

Probably the most important recent work in this regard is Simone Rödder, Martina Franzen, and Peter Weingart's edited volume, *The Sciences' Media Connection: Public Communication and its Repercussions*. In this work they elucidate the concept of "medialization": the ways science and scientists have been oriented to or by the institutions, routines, forms, discourses, and logics of the media. It is clear that scientists have adopted a variety of strategies to engage with the media: "the staging of media events, the pre-publication of research results in the mass media prior to their scientific publication, the media orientation of scholarly journals and the appearance of visible scientists" (2012, 5). The question of boundaries reappears: it is clear that the supposed science-media distinction has been blurred in many regards – but exactly in which ways and to what effect? This demarcates a set of actor and analyst questions: in the case that scientists themselves see media activities as "external" to their scientific work, to what extent is this revealed or challenged in practice? How integral have media strategies become to scientists' regular activities? Rödder et al. suggest that a key question here is the degree to which a media orientation affects the practices and outcomes supposedly "internal" or unique to science: does it "remain limited to activities on the front stage produced just for public view or does it extend to the backstage, thus affecting the criteria of relevance in knowledge production?" In the context of climate change, a recent study has answered in the affirmative. Lewandowsky et al. find that sceptical discourses in the media about a supposed "hiatus" or "pause" in global mean temperature increases during the first decade of the 21st century "seeped" back

into scientific research. Scientists responded to these claims made in the media by both columnists and other "sceptical" voices by conducting and publishing peer-reviewed studies. This is significant because the notion of a "pause" did not originate in other peer-reviewed literature, but in the media. Thus, the blurring of science-media boundaries happens in both directions; science becomes oriented towards media norms, but the media frequently give voice to non-scientists to weigh-in on scientific knowledge claims (Weingart and Pansegrau 1999).

A variety of works explore the relationships and interactions between scientists and the media, from a range of theoretical perspectives. Climate scientists in particular receive only a small degree of attention; most of the studies discussed here consider scientists from a range of disciplinary backgrounds. Regarding the latter, Boykoff conducts interviews with climate scientists in which he asks them to reflect on their experiences with the media; his core questions concern their assessment of the accuracy of climate change reporting. From these interviews Boykoff reflects on how media-scientist interactions are shaped by conflicting norms – for example, scientists and journalists will handle questions of uncertainty differently – which accounts for and results from media-science boundaries and communicative difficulties. A concern with reporting accuracy – both on behalf of the scientists and the analysts – has been and continues to be prevalent in similar studies (Ladle, Jepson, and Whittaker 2005; McGowan 1985; Maille, Saint-Charles, and Lucotte 2010; Post 2016; Wilson 2000).

Many scientists view media activities as part of their overall professional duties, though specific factors shape these interactions: scientists might be more extroverted and enthusiastic than others in sharing their work, others might find the experience rewarding, some are motivated by their personal views on science pedagogy (Bauer and Jensen 2011; Besley, Oh, and Nisbet 2013). A scientist's institutional milieu is also a determining factor in these interactions (Dunwoody, Brossard, and Dudo 2009; Tsfati, Cohen, and Gunther 2011). Private sector researchers are more likely to be motivated by financial reward or career prospects than university or government scientists, while the latter are more likely to view media interactions as a responsibility to the public (DiBella, Ferri, and Padderud 1991). Amongst government scientists, specific political contexts greatly shaped willingness or reluctance to engage the media; in some cases, government directives expressly discouraged such interactions (Fahy and Nisbet 2011). Within universities, different levels of media-interaction are expected or encouraged depending on the type, size, and status of the institution, but in general scientists' media responsibilities are related to broader public relations strategies. Finally, some scientists feel compelled by a moral duty, particularly in cases of where their knowledge pertains to societal risks like climate change; research

suggests that scientists are more likely to engage the media if they believe they can create a positive effect in doing so (Besley et al. 2018, Nisbet and Mooney 2007; Sharman and Howarth 2016).

Peters et al. produce some of the most thorough and in-depth examinations of these interactions, focusing specifically on the conditions and motivations for scientists to become media-active (Peters et al. 2008a, 2008b; Peters 2013). They find that scientists of all stripes frequently engage with the media, but these interactions are framed or governed according to a set of boundary-setting norms. While deviations of the kind Bucchi describes occur, most scientists subscribe to something like a continuity model; for example, most scientists believe that research findings should be communicated to the public only after they have been published in a scientific journal. Thus, one of the chief norms governing these interactions is epistemic – different standards of knowledge are at play in science and media realms, and the kinds of statements scientists make should reflect the realm in which they are made. Indeed, concern about epistemic breaches is one of the reasons scientists may interact with the media – to ensure that their scientific work is not "sensationalised" or "politicised" – or, similarly, to guard against encroachments or "seepage" of the media into what are viewed as scientific matters. Scientists' media interactions can be seen as a Catch-22. Media discourses are often thought to "politicise" scientific knowledge, reiterating concerns about inaccuracies (Antilla 2005, 2010; Bell 1994; Ladle et al. 2005; Maille, Saint-Charles, and Lucotte 2010). In terms of boundaries, scientists are frequently worried about being perceived as political advocates, as this would signify a lapse in their scientific impartiality, and thus threaten their credibility (Lysaght and Kerridge 2012). Scientists thus often engage the media to mitigate the politicisation science, crossing one media-science boundary in order to maintain others.

These perspectives are most valuable to this study in that I also seek to explore how boundary-work shapes ways that the media affect – or are constitutive of – scientific practice and knowledge. Lewandowsky et al. (2015) and Rödder et al. (2012) are especially important as they examine these complex boundary-workings not merely out of analytical interest, but also normatively. Boundaries – even rhetorical ones – have tangible consequences, and thus they advocate that certain boundaries – demarcating epistemic norms, for example – *should* be maintained (see also Lahsen 2005). I confront these normative concerns frequently throughout this project.

3 Trends, Framings, and Critical Discourse Moments in Canadian Climate Change Newspaper Coverage

This chapter explores reporting trends and framings of climate change in the *Toronto Star*, *Globe and Mail*, and *National Post* from 2006-2013. The chief purpose of this chapter is to offer a view of the broader media landscape, with reference to which the analyses in the following chapters can be contextualised. To this end, I address a set of overarching questions common to major media analyses of climate change: With what frequency is climate change reported? What accounts for rises and declines in coverage? What framings are predominant, and what accounts for this predominance? How do reporting trends, framings, and discourses relate to one another? And what explains differences (and similarities) in reporting between newspapers?

Research reveals that a multitude of factors ultimately bear on any issue's framing, representation, and lifespan in the media. With regards to climate change, studies have identified a diversity of social, geographical, political, cultural, and historical influences on coverage. An assortment includes extreme weather events (Ford and King 2015; Ungar 2014); postcolonialism (Billett 2010); cultural norms (Brossard, Shanahan, and McComas 2004); international relations (Schäfer, Ivanova, and Schmidt 2014); economic cycles (Davidsen and Graham 2014); and unique local environmental vulnerabilities (Takahashi and Meisner 2013), among many others. Some only have a limited range, shaping reporting in local newspapers, while other factors have near-global influence. The commingling of these different factors, in part, accounts for the shared large-scale global trends in climate change reporting across different regions and newspapers, as well as small-scale fluctuations and differences (Boykoff 2011).

Here I examine a specific set of influences on coverage, which Anabela Carvalho calls "critical discourse moments" (2007). These moments are formative, discourse defining, and media agenda-setting events. Four major critical discourse moments define coverage in the period under study: the release of Al Gore's documentary film *An Inconvenient Truth*; the publication of the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (AR4) in the spring of 2007; the Copenhagen Climate Change Conference in fall 2009; and coinciding with the conference, the theft of e-mails from researchers at the University of East Anglia's Climate Research Unit. Each of these events are linked to mutually consistent spikes in coverage in each of the newspapers, which follow trends in international climate change reporting. Several minor critical discourse moments present themselves which are relevant to understanding the localised reporting of the newspapers, most notably Canadian

federal elections. A key question here is how the different geographical and temporal scales of critical discourse moments shape Canadian climate change coverage. How do international political events like the Copenhagen Summit "compete" for media attention with more local political concerns? And how does the situatedness of these newspaper sources interact with geographies of climate change?

In conjunction with this examination of critical discourse moments, I offer a framing analysis. While the frequency of coverage and the events covered appear relatively uniform across all three newspapers, marked differences in framings are revealed. Despite this, all three newspapers exhibit a prevalence of framings that make explicit linkages between climate change and "politics" – governmental actors, parliamentary and legislative proceedings, and regulatory concerns. This finding dovetails with a closer consideration of critical discourse moments, especially the Copenhagen conference. The conference coincides with the highest monthly rate of climate change coverage over the study period. Why was this the case? Existing research suggests that while a confluence of events led to this outcome, Copenhagen attracted such pronounced media attention because of its potential to be represented as a "political drama."

Examining such critical discourse moments reveals how the formative events that shape climate change into a far-reaching concern are also those that determine media coverage. There is a reciprocity here: the news media in turn shapes those events through its representative and communicative practices. This is especially so in terms of political concerns and the public understanding of science. To reiterate a central argument of the overall thesis, this is not to be understood chiefly as an issue of communication. The news media does not (merely) offer representations of already-made science, or report on pre-defined technoscientific issues. Rather, this study suggest that these newspapers are major actors that participate in defining climate change as a social, political, and scientific issue. In this regard, this chapter sets the stage for the analyses in the following chapters, in which overt "politicisations" are examined, first through a critical discourse analysis of climate change debates in these newspapers, and then through an engagement with "activist" scientists participating directly in these debates.

3.1 Methods

3.1.1 Overview of Newspapers

This chapter examines a set of framings and discourses of climate change in three major Canadian newspapers, the *Toronto Star*, the *Globe and Mail*, and the *National Post*, from 2006-2013.[18] These represent the three largest English broadsheet newspapers in Canada by print and online weekly circulation.[19] While both the *Globe and Mail* and the *National Post* are national newspapers, the *Toronto Star* is technically a regional paper, despite boasting the largest circulation in Canada. However, as online readership grows and expands geographical distribution, this distinction is becoming less important (though it is still necessary to take into account).

These three newspapers fall somewhat stereotypically on a traditional left-right political spectrum (Hackett and Uzelman 2003). The *Toronto Star* has established a reputation as a progressive news source, with a liberal editorial stance. The *Globe and Mail* is typically seen as a centrist paper, at least in a Canadian sense, which translates to left-leaning on social issues, but more conservative about fiscal and economic issues. The *National Post*, a relatively recent newspaper, founded in 1998, has been characterised by the prominent conservative stance of its editorial board and columnists (Hackett and Gruneau 2000; Uzelman et al. 2005).[20] These orientations are most relevant in the following chapter, when I consider theories of "political parallelism," which hold that framings and discourses will be shaped by the political leanings of media sources.

3.1.2 Sampling

These sources were searched via the Factiva database for either "climate change" or "global warming."[21] The article needed to contain the search terms anywhere in the title or body of the article. Each year in

[18] This includes all unique print and online articles from the three newspapers. The *National Post* also includes the newspaper's semi-autonomous business section, the *Financial Post*.

[19] "Daily Newspaper Circulation Data," *News Media Canada* (blog), accessed May 10, 2016, https://nmc-mic.ca/about-newspapers/circulation/daily-newspapers/.

[20] The *National Post* was created by Conrad Black, a Canadian media magnate, in 1998, as an outcropping of the *Financial Post*, which he purchased as year earlier. Black's vision for the *National Post* was a national newspaper with a distinctive conservative editorial stance, which would compete with the *Globe and Mail*, which Black saw as promoting liberal viewpoints. Early after its inception, the *National Post*'s official editorial position supported the "Unite the Right" movement to create a unified conservative party from the Reform Party (later the Canadian Alliance), and the Progressive Conservative Party. This was eventually accomplished in 2003, when the Conservative Party of Canada was created (Jones 1998; Taras 2008)

[21] For a similar method see Boykoff and Boykoff, 2004; Fisher et al., 2013b; Painter and Gavin, 2015; Schmid-Petri et al. 2015. The Factiva database was chosen partly because it has been used as a standard in other studies. It also provides access to all three newspapers under study. The interface allows all three newspapers to easily be searched at once. It allows for the filtering out of duplicate articles so that the search only yields unique articles. It

the time frame was searched separately.[22] From these yearly sets, a random sample of approximately 100 articles were selected for each newspaper.[23,24] This thus produced a disproportionate stratified sample with each year from each newspaper as a separate stratum.[25] This sampling approach was taken to facilitate various inter-year and inter-newspaper comparative analyses, as well as exhibiting intra-year and intra-newspaper trends. This produced sets of sample stratum that had enough power to reveal a range of themes and discourses (including those with lower prevalence), which was desired for the examination of critical discourse moments and crucial for the subsequent critical discourse analysis which would also be based on this sample.[26] This thus enabled the tracing of a range of themes and discourses across multiple articles, even in years with relatively low total populations of articles. The latter is especially important given the study period, which was in part chosen to examine how climate change has been represented in the years of declining overall coverage following 2009 (see 3.1.6 below).

3.1.3 Measuring Climate Change Reporting

In assessing the nature of these trends two important analytical concerns that must be considered. The first pertains to the timescales employed to assess such trends. While an annual timescale gives a view to the sustained coverage (or lack thereof) of climate change, it masks shorter term fluctuations. Conversely, a monthly timescale is more apt for revealing more acute spikes in coverage, especially

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also provides an interface that allows for easy exporting of data (i.e. spreadsheets). The Proquest database also provides access to these three newspapers and could have also provided the acquired data, but its software requires more elaborate manual searches of the separate sources (whereas Factiva allows different sources to be automatically added to the search) and does not have data exporting functionality.

[22] The total number articles resulting from this initial search are shown in Appendix A.2.

[23] See Appendix A for sample sizes. The number of total articles was divided by 100. Every x article was counted where x was the quotient. E.g. if the results gave 1200 total articles for a given year, every 12th article was taken into the sample. The first article selected was determined by the using the https://www.random.org/ random number generator.

[24] This sample was imported into Zotero (source managing software) for organisation and for easier search-ability, coding and analysis purposes. Zotero allows for reading of text and coding in the same program which expedites the process and reduces potential for errors in transferring data between programs. Within Zotero tags can be added to articles which can then be grouped and searched according to these tags. Tags were assigned to based on the categories in Table 4.1. Tags are non-exclusive, so sub-categories can be tagged as well, and articles can be grouped according to major and sub-categories (e.g. Zotero can group and display the set of articles falling under the "Consequences" framing category, and then create a sub-group of articles falling under the "Effects on Animals" framing category). Similarly, sets of articles with overlapping framings (e.g. "Business" and "Solutions") can be easily identified.

[25] See Appendix A.

[26] A proportionate stratified sample with the same total sample size (i.e. one of equal manageability) would have produced some yearly stratum with sample sizes too small to have enough power to detect enough instances of low prevalence themes for inter-year for the framing and critical discourse analyses. See, e.g. Fugard and Potts (2015). As such, all figures based on aggregate totals from these yearly strata are appropriately weighted.

those related to “critical discourse moments” (see 3.1.7 below). This study employs both timescales in order to reveal different diachronic trends.

Rises in climate change coverage tend to be linked to relatively discrete events (Carvalho 2007; Boykoff 2007). If these events influence climate change coverage, it might be difficult to assess their impact on annual timescales. Moreover, the trends revealed by different timescales require examination of multiple factors, while simultaneously revealing different effects of these factors.

The second analytical issue is whether one chooses to measure climate change reporting according to total number of articles, or as a rate calculated against the total number of all articles for a source. Virtually all major climate change media analyses have utilized the former approach. As with timescales, each approach reveals different trends and highlights different analytical concerns. Examining the total number of articles may be suitable for estimating the potential overall effects of media coverage, especially with regards to the public. Presumably, the more total articles that are being published, the more likely the public is to encounter the issue of climate change in the media. Even if a newspaper or other media sources dedicates increasing amounts of space or time to covering climate change as a percentage of total articles, if the total article output of that source is relatively low, then climate change stories will have less of an impact on the media landscape. This is particularly relevant with regards to online practices of media consumption where much news content is accessed through aggregators, by which multiple sources are presented simultaneously as part of a single feed.

On the other hand, measuring climate change reporting as a rate of total articles of any kind may give better indication of editorial priorities or concerns. Examining the total number of climate change articles might suggest this, but an increase in climate change articles might simply be due to a higher total article output in general. For example, newspapers do not consistently publish the same number of total articles per year. As the figures here include online articles as well as print articles, long-term trends could be skewed by the fact that as newspapers have become more established online, their total article output has increased. For this study, unless otherwise specified, discussions of climate change reporting are in terms of climate change articles as a percentage of total articles for a given source (see Appendices A and B and cf. Figures 3.3 and 3.4 below).

3.1.4 Framing Analysis

Framing analyses are ubiquitous in media studies. Most generally, they examine how media discourse is organized and categorized. Robert Entman influentially defines framing thus: "to frame is to select or highlight some facets of events or issues, and make connections among them so as to promote a

particular interpretation, evaluation, and/or solution" (Entman 1993, 52). The underlying goal of framing analyses is to understand how the media promote certain understandings, perspectives, and values by highlighting particular facets of events, favouring certain discourses, constructing particular arguments (whether explicitly or implicitly), at the relative exclusion of others (Gamson and Modigliani 1989; Entman 1993).

Framing analyses typically proceed from this general analytical concern, rather than a precise set of methodological procedures. A standard methodology does not emerge because framings are established through a diverse set of elements, ranging from "morphological characteristics" of a text such as page number, prominence of headlines, number of words in an article, and use of fonts (Carvalho 2005, 226); traditional topic categorization (appearing in particular sections – "business," "entertainment," "health" – of a newspapers or websites), thematic focus (whether an article focuses on politics, science, environment, etc.); specific discursive formulations and rhetoric (whether a story talks of "climate deniers" or "climate alarmists," or uses optimistic or pessimistic language), and symbolic association and imagery (e.g. polar bears on ice floes) (Entman 1993; DiFrancesco and Young 2011).

Crucially, media stories are not only framed textually and discursively, but also structurally and systemically (Boykoff 2007). The repetition and frequency of different intra-article framing techniques lead to discernible longer-term framing trends (Dirikx and Gelders 2011). For example, a media source may present individual news stories with intentions of journalistic neutrality, but systematically under-report on certain issues relative to other sources, in both frequency and amount of column inches. Thus, over time a particular issue may be effectively framed as relatively important or unimportant depending on the relative attention it is given, regardless of the quality or content of specific stories. In this regard, scholars have pointed to the importance of framing analyses containing a synchronic and diachronic component (Boykoff 2007b; Carvalho 2007). In this study I examine both.

3.1.5 Critical Discourse Analysis

In conjunction with the framing analysis, a critical discourse analysis is also conducted. Like framing analyses, critical discourse analyses do not entail a precise set of methodological principles. Early formulations of critical discourse analysis highlighted the role of social, political, and cultural contexts in bringing about meanings in media sources, in contrast to what was seen as a focus on media practices of reporting frequency and selection in framing analyses (van Dijk 1988). In practice, the distinction between the two approaches have become blurred, as questions of the effects of context are prevalent in framing analyses (e.g. Hackett and Uzelman 2003). Both forms of analysis are interested in the

constructions of meanings and values in media sources. The more substantial distinction between the two approaches is that of analytical scale. Framing analyses tend to look at generalisable trends across large samples of sources, examining the relative frequency of coded and standardised framings. Alternatively, critical discourse analyses take individual sources as the primary component of analysis, and examine more precisely *how* certain meanings are produced in media texts with particular attention to language, rhetoric, and argumentative strategies. Thus, critical discourse analysis reveals some of the means by which framings are established. General framing categories are elucidated by the close critical discourse readings, and the particulars of texts are contextualized in the broader trends revealed by the framing analysis.

3.1.6 Time Frame

The time frame addressed by this analysis is 2006-2013. This period was selected for several reasons. Firstly, it extends the range of previous analyses. Existing studies of climate change in the media have examined three major time periods. The first traces the early emergence of climate change as major scientific and political issue to the point where it gained prominence in the media. This ranges from the late 1980s to the early 2000s (e.g. Carvalho 2007; Trumbo 1996; Zehr 2000). The second examines the emergence of climate change as a major issue to its two major peaks in 2007 and 2009; this period is the most covered in the literature and arguably the most significant in terms of major climate change-related events (see the following section) (e.g. Boykoff 2011; Painter and Gavin 2016). The third includes recent literature which have examined the relative decline in media reporting following the 2009 peak; this period remains the least studied (e.g. Schmid-Petri et al. 2016). There have also been a few studies that have examined long-term trends across two or all three of these time frames (e.g. Boykoff 2007; Bousallis and Coan 2016; Ford and King 2015). In general, Canadian newspaper sources have gone relatively under-explored in any of these time periods.[27] The time frame selected aims to examine how these sources compare to international trends, especially in the important second period, as well as contribute to the under-explored third time frame, which can yield insights into why and how peaks and troughs occur in climate change reporting.

[27] These sources have been included in large data-sets (e.g. Boykoff 2011; Boykoff 2014), or in focused analyses but not in the time period here (e.g. Ahchong and Dodds 2012), or with two of the sources, but not all three (e.g. Ford and King 2015 compare the *Toronto Star* and *Globe and Mail*, but not the *National Post*, as does Ahchong and Dodds 2012).

3.1.7 Critical Discourse Moments

An important factor in defining analytical time frames is the presence of "critical discourse moments" (Carvalho 2007). Such moments play a formative role in media reporting, and subsequent framings, of climate change. For example, the establishment of the Kyoto Protocol in 1997 has been found to be such a moment, as it played a decisive role in subsequent policy discussions (Krosnick, Holbrook, and Visser 2000). The publishing of the IPCC's Third Assessment Report is another, as it asserted with greater confidence the likelihood of climate change being human-caused (Boykoff and Boykoff 2007). One might also consider certain social, political, and economic events that do not specifically relate to climate change institutions or scientific research, as well as natural events such as extreme weather, to be such critical discourse moments. For example, Gavin, Leonard-Milsom, and Montgomery (2011) found that floods in the UK established a juncture that shaped discourse about climate change, while Gordon, Deines, and Havice (2010) surmise that a presidential election played a role in climate change reporting in Mexican newspapers.

During the time range of this study, several potential critical discourse moments present themselves.[28] Firstly, in May 2006, former American Vice-President Al Gore released his documentary *An Inconvenient Truth*, which has been credited for greatly increasing public awareness of the issue. In February of the following year, the IPCC released the first section of its Fourth Assessment Report, the largest-scale scientific and policy document on climate change ever published to that point. The report found climate change to be "unequivocal" and maintained that the majority of the increases in global mean temperatures observed in the 20th century were "very likely" due to anthropogenic greenhouse gas emissions. More broadly, the world experienced a global recession in 2009 stemming from the American financial crisis of 2007-2008, a theme that has be shown to have great salience in climate change reporting. In terms of political junctures in the Canadian context relevant to the sources under study, this period began with the election of a Conservative federal government, and subsequently saw three federal elections. These political changes were also accompanied by a marked shift in federal Canadian climate policy, with Canada's withdrawal from the Kyoto Protocol in December 2012. How these events shape framings and discourses in these newspapers is a central question of the following analyses.

[28] See Boykoff (2011) for a relatively comprehensive overview of major critical discourse moments in the reporting on climate change.

3.1.8 Framings of Climate Change

Many framing analyses of climate change examine a similar set of themes which are partly drawn from the thematic organisation of the newspapers themselves, yielding familiar framings of politics, business, entertainment, automobiles/transportation, regional news of differing scales, and variations on environment, science, and technology sections depending on the publication (e.g. Ahchong and Dodd 2012; Boykoff 2011; Einsedel 1992).

Other predominant framings in the literature stem from grounded analyses that identify generalisable themes and codes in media sources (e.g. Trumbo 1996; Billet 2010). Such studies have identified a wide range of complex framings including construing climate change as a question of responsibility (Semetko and Valkenburg, 2000); conflict (Boykoff 2007); economics (Dunlap and McCright 2011); environmental consequences (Weingart, Pansegrau, and Engels 2000); human drama (McCormas and Shanahan 1999); health risks (Nisbet et al. 2010); the effects on animals (DiFrancesco and Young 2011); morality (Dirikx and Gelders 2011), among others.

Another common approach is to pull concerns out of academic or policy contexts, and to examine how these issues are framed in themselves, and which related framings surround them. For example, concerns about mitigation and adaptation are central to policy discussions on climate change; several studies subsequently examine how these issues are construed in the media (e.g. Billet 2010; Ford and King 2014; Moser 2010, 2014; Nerlich et al. 2010; Schmidt et al. 2013; Schmid-Petri et al. 2015).

Among these varied framings, there are several that have been found to be prominent across an array of media sources from different geographical contexts. Framings of climate change as controversial and uncertain, and discourses that highlight debate and doubt are among the most conspicuous (e.g. Antilla 2005; Boykoff 2007; Brossard 2004; Carvalho and Burgess 2005; Trumbo 1996; Zehr 2000). These framings and discourses are frequently examined in the context of climate scepticism (Bousallis and Coan 2016). These are often found in conjunction with framings of climate change as a problem of governance, policy, and political ideology (Antilla 2010; Boykoff and Boykoff 2007; Boykoff 2008; Brossard, Shanahan, and McComas 2004; Carvalho 2007; Dirikx and Gelders 2010; Schmid-Petri 2016).

3.1.9 Selecting and Categorising Framings

Here, my framing and critical discourse analyses are shaped in part by each of these approaches. An exploratory, iterative approach was used to establish the framing and discourse categories and

themes to be measured and analysed (Paulus, Woodside, and Ziegler 2008). Prominent categories were preliminarily drawn from existing literature (Ahchong and Dodds 2012; Boykoff 2008; Boykoff 2011; Gordon, Deines, and Havice 2010; Hoffman 2011). Those deemed relevant to my STS analysis and normative concerns, namely the politics of climate change, the authority of science and scientific actors, and the related question of climate action and climate scepticism, were highlighted.

In conjunction, a pilot analysis of 100 randomly sampled articles from each newspaper was conducted, which surveyed the relevance of these framing categories. Specific reoccurring sub-themes were also identified. The resulting major categories and constituent subthemes are shown in Table 3.1.[29] The presence of these framing categories was evaluated via a complete, in-depth reading of each article. Only major framings were counted. This means that the framing category was discernible in either the article title, the lede, or was discussed at length within the article over at least two paragraphs. Incidental or subsidiary mentions of categories or sub-themes were not counted. The categories employed here are not discrete and thus were measured in a non-mutually-exclusive manner. As shown in Table 3.1, there are various overlaps of subcategories. For example, *carbon markets* can constitute an economic framing, a policy framing, or a solutions framing. Thus, the same article could contain two different framings which were both counted in the analysis, insofar as they were deemed major.[30]

Table 3.1: Thematic framing analysis categories and sub-themes

Major aggregated category	**Constituent sub-themes**
Business	*banking, capitalism, climate change as business opportunity, corporate responsibility, finance, green business, investing*

[29] This iterative approach yielded slight variations on framing categories employed in the existing literature. For example, Boykoff (2008) includes a framing subcategory of "justice and risk," which would include parts of both my distinct categories of "consequences" and "solutions." In turning to discourses of activism and scepticism in the following chapters, these categories can reveal insights, especially with regards to different types of scepticism (see section 4.4). On this same note, Boykoff employs a major framing category, "Ecology/Meteorology" comprised of two sub-categories, "Biodiversity," and "Weather events," which would include various sub-themes in my "Consequences" category. I am interested in the issue of biodiversity and (extreme) weather events insofar as they connect to discourses about the consequences of climate change, eliciting concern or scepticism.

[30] While I was the only coder on this project, for diagnostic purposes a rough coding consistency test was performed. After each year of each newspaper was coded into framing categories, the first year in the set (2006) was coded again. Rather than measuring percent agreement of coding for specific articles, I measured average percent agreement in the overall tally of framing categorizations (i.e. the percent agreement of total number of articles coded as "Business," "Climate Policy," "Consequences," etc. was measured, and this percent agreement was averaged for all categories). I found a 96%, 98%, and 94% coding consistency between these two independent evaluations for the *Toronto Star*, *Globe and Mail*, and *National Post* respectively.

Climate policy	*cap-and-trade, carbon tax, climate legislation, emissions caps/limits/reductions, government funding, government inaction, Kyoto/climate agreements, regulation*
Consequences	*civil unrest, drought/water security, effects on animals, effects on ecosystems, effects on human health, extreme weather, feedbacks, floods, food security, glaciers, infrastructure, oceans, permafrost, refugees, sea ice, sea level rise*
Economy	*budgets, carbon markets, carbon tax, consumerism/consumption, costs of action/policy, costs of effects of climate change, economic growth, economy vs. environment, low/no carbon economy*
Energy & Fuel	*alternative fuels (e.g. biofuels, hydrogen fuels), alternative energy (e.g. solar, wind, tidal); energy efficiency, energy independence, electric power generation, fossil fuels (e.g. coal, natural gas, oil), fuel efficiency, fuel transportation (e.g. pipelines) gas prices, nuclear, unconventional sources (e.g. fracking, oil sands)*
Environmental Issues	*carbon footprint, carbon offsets, conservation, environmentalism (e.g. Earth Day, Earth Hour), green living, pollution, sustainability*
Industry	*agriculture, auto industry, aviation industry, fossil fuel industry, lobbying, manufacturing, mining*
Politics	*Canadian politics (e.g. Canada-US relations, international relations, municipal politics, provincial politics, provincial vs. federal), climate diplomacy, elections, international politics (e.g. foreign policy, G8/G20), national security, protests, rich vs. poor nations, sovereignty*
Science	*alternative climate change theories (offered by practicing scientists), climate science, climate modeling, new scientific research, study report, research funding*
Solutions	*carbon capture, carbon markets, carbon offsets, energy conservation, geoengineering, individual/personal solutions, market solutions, technological fixes*
Transportation	*air travel, alternative transportation (e.g. cycling), automobiles (electric cars, fuel efficiency, hybrids, infrastructure, road tolls); public transportation (buses, subways, trains)*

A keyword analysis was also performed (Table 3.2). A keyword analysis is more expedient, facilitates reproducibility for other sources, and to some degree eliminates concerns about subjective (i.e. inconsistent) readings as categorizations are more easily standardized. Asides from the issues mentioned above – that standardized framing categories are not necessarily effective for the different research questions and purposes of diverse studies – a major shortcoming of relying on keywords is that it typically overestimates thematic salience. For example, "solar" and "wind" are both sub-categories of *energy*, but they are bound to appear in sources that are not about energy. Similarly, term like "politics" is so expansive that it will appear regularly, but a keyword searched based on "politics" will not indicate the prominence or incidentalness of political themes, and thus cannot be reliably used to evaluate major framings. There is also an issue when thematic categories are aggregates of minor categorizations that

are not easily translated into keywords (e.g. a news story that focuses on technological solutions to climate change is difficult identify using search terms). However, the keyword analysis is also of value in that incidental or minor thematic connections are still relevant to understanding broader framings, and still may effectively indicate the *relative* prominence of different themes to others.

Table 3.2: Keyword analysis search terms[31]

Major aggregated category	**Search Terms**
Business	*banking, business, capitalism, corporate responsibility, finance, investing*
Climate policy	*cap-and-trade, carbon tax, climate change policy, climate policy, legislation, emission (+ caps/limits/reductions/targets), funding, inaction, Kyoto, regulation*
Consequences	*civil unrest, drought (water security, water shortage), animals (extinction, polar bear), ecosystem, effects on human health, extreme weather, feedback mechanism, floods, food security (famine, food price, food production, food shortage, food supply), forest fires, glacier, infrastructure, ocean, permafrost, refugee, sea ice, sea level*
Economy	*budget, carbon market, carbon tax, carbon trading, consumer, economy (economic cost, economic growth), emissions trading, green economy, low-carbon economy*
Energy & Fuel	*alternative energy (solar, wind energy, wind turbine), alternative fuel (biofuel, fuel cell), clean energy, energy conservation, energy efficiency, energy independence, electricity, fossil fuel (coal, fracking, natural gas, oil, tar sands), fuel efficiency, gas price, green energy, nuclear, pipeline*
Environmental Issues	*activism, activist, carbon footprint, carbon offsets, conservation, environmentalism (Earth Day, Earth Hour), green living, pollution, sustainability*
Industry	*agribusiness, agriculture, airline, auto company, auto industry, automaker, car company, carmaker, car manufacturer, industry, lobby, mining, oil sands, oil spills, pipeline, tar sands*
Politics	*diplomacy, election, First Nations, foreign affairs, foreign policy, G8, G20, international affair, national security, politics, protest, provincial, sovereignty*
Science/Research	*climate science, climate model, new research, new study, science, scientific, study* (vetted for only "scientific" studies)*
Solutions	*carbon capture, carbon markets, carbon offsets, conservation, energy conservation, geoengineering, local food, solutions*
Transportation	*airline, airport, air travel, auto*, automobile, bicycle, bike, cars, electric car, fly*, hybrid, public transport, transit, transportation *(title only)*

[31] The major aggregated category was comprised of the number of articles containing any of the search terms. Thus, for the business category, the keyword search sought articles that contained "banking" OR "business" OR "capitalism" OR "corporate responsibility" OR "finance" OR "investing."

3.1.10 Actors

How actors and spokespeople are represented in news sources is an important question in media studies of climate change (e.g. Carvalho 2007; Boykoff 2011). Similar to themes, the various actors and spokespeople appearing in news sources on climate change were placed in general categories (Table 3.3). This formed the basis for a broad analysis of the prevalence of different kinds of actors in the newspaper articles. Similar to the thematic analysis, both an in-depth and keyword analysis was performed.

This is coupled with critical discourse analysis. Who exactly is selected to speak on matters of climate change, and from what perspective, is a means of establishing thematic framing, as well as imbuing certain kinds of knowledge with import and authority. Of particular concern here is the inclusion or exclusion of expert voices. In this way, broader images of scientific authority are established: do the media present scientific experts as trustworthy arbiters of truth, or merely one of many legitimate (or illegitimate) opinions? Who competes with climate scientists for legitimacy on the issue of climate change? Do the different newspapers treat scientific experts differently? Who and to what end do they recruit as sources for articles?

Table 3.3: Actor Categories and Sub-categories

Major actor category	**Constituent actor categories/search terms**
Businesses	*banks, businesses, business elites, companies, corporations, financial institutions, investment groups*
Citizens	*Activists, protesters*
Environmentalists/Environmental Groups	*Sierra Club, WWF, David Suzuki, David Suzuki Foundation*
Government/Government Institution	*Government, DOE, Environment Canada, EPA, G8/G20, UN*
Industry	*agribusiness, agriculture, airline, auto company, auto industry, automaker, car company, carmaker, car manufacturer, industry, lobby, mining, oil sands, oil spills, pipeline, tar sands*
Scientific Institution	*IPCC, WMO, WHO, NOAA, CRU*
Other experts	*Economists, engineers, legal experts, political scientists, psychologists, sociologists*
Politicians	*Obama, Harper, Trudeau, Ignatieff, Layton, Mulcair*
Scientists	*biologists, chemists, climate scientists, ecologists, environmental scientists, epidemiologists, geographers, geologists (oil geologists), life scientists, meteorologists, paleontologists, physicists, zoologists (ornithologists, marine biologists, entomologists)*

3.1.11 Editorials, Opinion Pieces, and Comment Columns

Editorials, opinion pieces, and comment columns are prominent features in virtually all news media. Such sources pose unique analytical concerns in that they present overt argumentative positions. These arguments function as a framing device in a sense but operate differently than other means of framing precisely because of their overtness. Many media studies of climate change are motivated by uncovering latent ideologies or values at work in the media, and thus exclude editorial, opinion, and comment columns from their analysis to draw attention to the implicit positions established by ostensibly neutral news reporting (e.g. Billet 2010). Here such sources are included for analysis for several reasons. The overt editorial stances of the different news sources can serve as useful context for understanding broader reporting trends of the newspapers. For example, do editorial positions predict news framings? Furthermore, the nature of public debates about climate change have not only been shaped by news framings, but the media have in large part established the terms of those debates and subsequently participated in them (Boykoff and Boykoff 2004; Carvalho and Burgess 2005). Editorials, opinion pieces, and comment columns have been one of the major forums for climate change debates.

Such sources also connect to questions of the role of scientific experts, scientific authority, and science communication in public scientific controversies. It is chiefly through such columns that scientists actively engage in public debates about climate change. While studies have examined scientists' media activities with regards to interactions with journalists (e.g. Boykoff 2011; Ladle 2005; Peters 2013), scientists' own engaged commentary in the form of guest columns, have gone relatively underexplored with regards to climate change debates (some studies have examined this issue outside of the realm of climate change, e.g. Bucchi 1997; Weingart and Pansegrau 1999).

3.2 Coverage Trends

On an annual timescale, 2007 marks the year with the greatest amount of annual climate change reporting, globally and across a range of regional contexts, as measured by total number of published articles (Boykoff et al. 2016; Boykoff 2011, 22). It is striking how closely the climate change coverage of the Canadian newspapers examined here follows global trends, as well as each other (Figures 3.1 and 3.6). One major notable difference is that the Canadian newspapers examined here produced a much more pronounced signal in early 2007 (see section 3.4 below). All three newspapers reach their peak annual article output in 2007, for which the total number of published articles is significantly greater than any other year (Figure 3.3). This is also the year with the highest frequency of climate change reporting, as measured as a percentage of articles of any kind (Figure 3.4). However, between

newspapers there are some slight but noteworthy variations. After the peak in 2007, the *Star*'s annual article output steadily declines until 2012, with reporting increasing again in 2013. While the *Globe* and *Post* broadly follows these same trends, they exhibit a slight increase in reporting frequency in 2009 over 2008 (Figure 3.4).

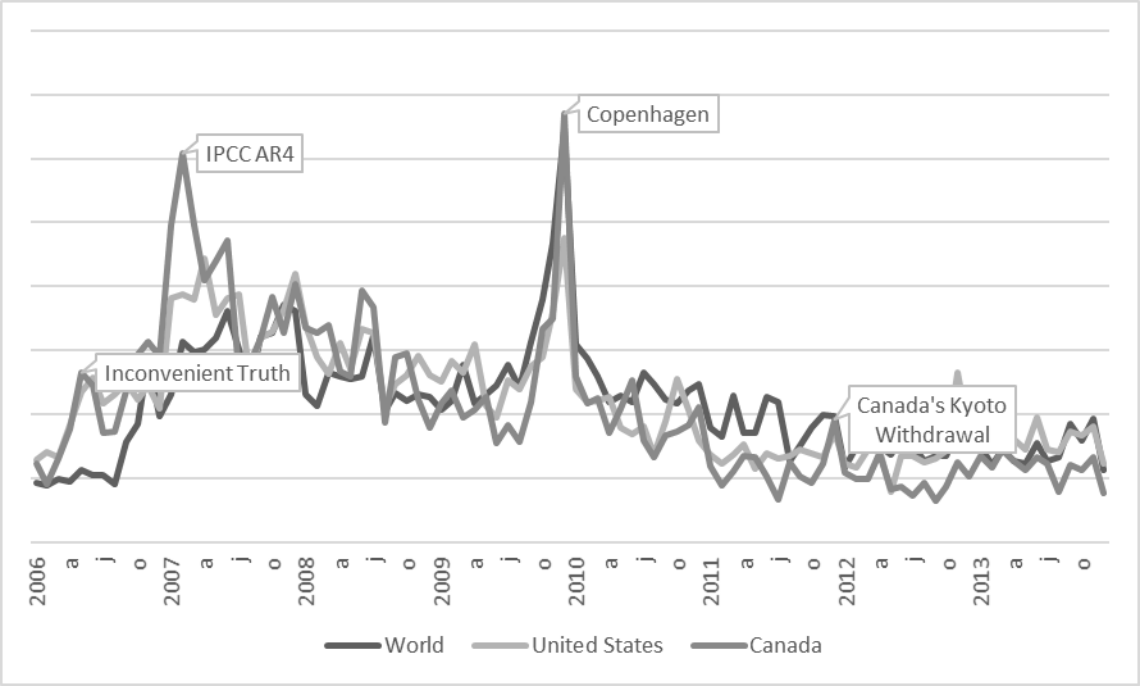

Figure 3.1: Relative monthly frequency of global, American, and Canadian climate change coverage, 2006-2013[32]

A monthly timescale reveals that after an initial spike in February 2007 and a relatively high level of reporting in the following months (accounting for the annual peak output in 2007), article output declines steadily through 2008 and most of 2009, reaching a monthly peak in December 2009 (Cf. Figure 3.3 and Figure 3.5).[33] Globally, this remains up until the present the month with the greatest media coverage of climate change, as well as in most regional contexts (Figures 3.2 and 3.5). The *Globe* and the *Post* both reach their peak monthly article output in this month, with the *Star* publishing just slightly

[32] The figures for world coverage has been scaled down to more closely compare the relative trend patterns in different regions. World figures exclude American and Canadian coverage. World and American data sourced from World Newspaper Coverage of Climate Change or Global Warming, 2004-2016. Center for Science and Technology Policy Research, Cooperative Institute for Research in Environmental Sciences, University of Colorado, Web. Accessed February 2, 2016. http://sciencepolicy.colorado.edu/media_coverage.

[33] An annual timescale appears to be employed most commonly (Ahchong and Dodds 2012; Brossard et al. 2004; Carvalho 2007; Davidsen and Graham 2014; Ford and King 2015), while other major studies of climate change reporting in newspapers use monthly timescales (Boykoff 2011).

fewer articles than in February 2007 (Figure 3.5). The prominent peaks revealed by a monthly timescale in February 2007 and December 2009 suggests decisive events at these points, but an annual timescale prompts an inquiry as to why coverage was sustained through 2007 while dropping off sharply in 2010.

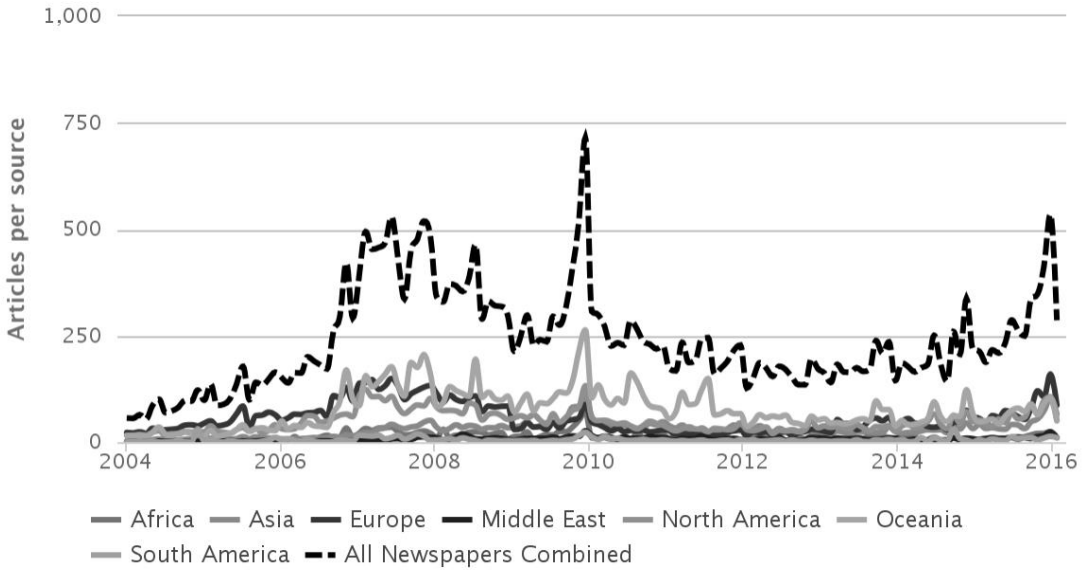

Figure 3.2: 2004-2016 World Newspaper Coverage of Climate Change or Global Warming[34]

Figures 3.3 and 3.5, which show the total number of articles in the newspapers mentioning "climate change" or "global warming," suggest that the *Globe and Mail* consistently produces a higher total number of climate change articles than the *Toronto Star* and the *National Post*. This might be interpreted as revealing an editorial priority at the *Globe* to cover climate change, one that is relatively lacking at the *Post*. But the *Globe* produces a significantly higher number of articles in general.[35] Thus, when calculating output as a rate – the articles about climate change as a percentage of all articles published – we get a different picture, and see that all three newspapers publish articles about climate change at a similar rate over the long term (cf. Figure 3.3 and 3.4; cf. Figure 3.5 and 3.6). This meshes with media theories that hold that "issue salience" (the degree of importance and prioritisation of reporting assigned to a particular topic) tends to be consistent across media sources. This stems from the centralisation of media (whereby most news sources are part of a few large conglomerates) and the

[34] World Newspaper Coverage of Climate Change or Global Warming, 2004-2016. Center for Science and Technology Policy Research, Cooperative Institute for Research in Environmental Sciences, University of Colorado, Web. Accessed February 2, 2016. http://sciencepolicy.colorado.edu/media_coverage.
[35] See Appendix B.

widespread use of newswire services, whose stories are effectively shared and repeated across newspapers (Bennett and Entman 2001).[36]

For the peak annual output year of 2007, the *Globe* produces the largest number of total articles, while the *Star* dedicates the greatest amount of reporting space to climate change, as a percentage of all reporting. According to the latter method of assessing output, the *Star* committed 26.5% more space to covering climate change than the *Post* and 15.7% more than the *Globe* in 2007. This may indicate a specific concern for specific climate change issues that emerged in that year amongst *Toronto Star* editors. Furthermore, Figure 3.4 (percentage of articles) reveals a more prominent upswing in 2009 at the *Globe* than does Figure 3.3 (total articles), and as such a closer match in trends to the *Post*'s coverage, as compared to the steep decline at the *Star*.[37]

On monthly timescales the peak total article output for the *Star* occurs in February 2007, whereas as a percentage of total articles, the *Star*'s climate change reporting peak comes in December 2009, as does the *Globe*'s and the *Post*'s, with articles about climate change making up over 5% of total articles for the latter two newspapers (Figures 3.5 and 3.6).[38]

[36] See Boykoff and Boykoff (2004) on the "prestige press."
[37] This reveals the importance in distinguishing between the absolute number of climate change articles, and climate change articles as a percentage of total articles of any kind. The effects of critical discourse moments in 2009 might be more pronounced (and potentially more prioritized) at the *Globe* than a consideration of total articles published suggests.
[38] Again, this sizeable ratio of coverage, and presumably the editorial prioritization of such coverage, is not clearly conveyed by examining total climate change article output alone.

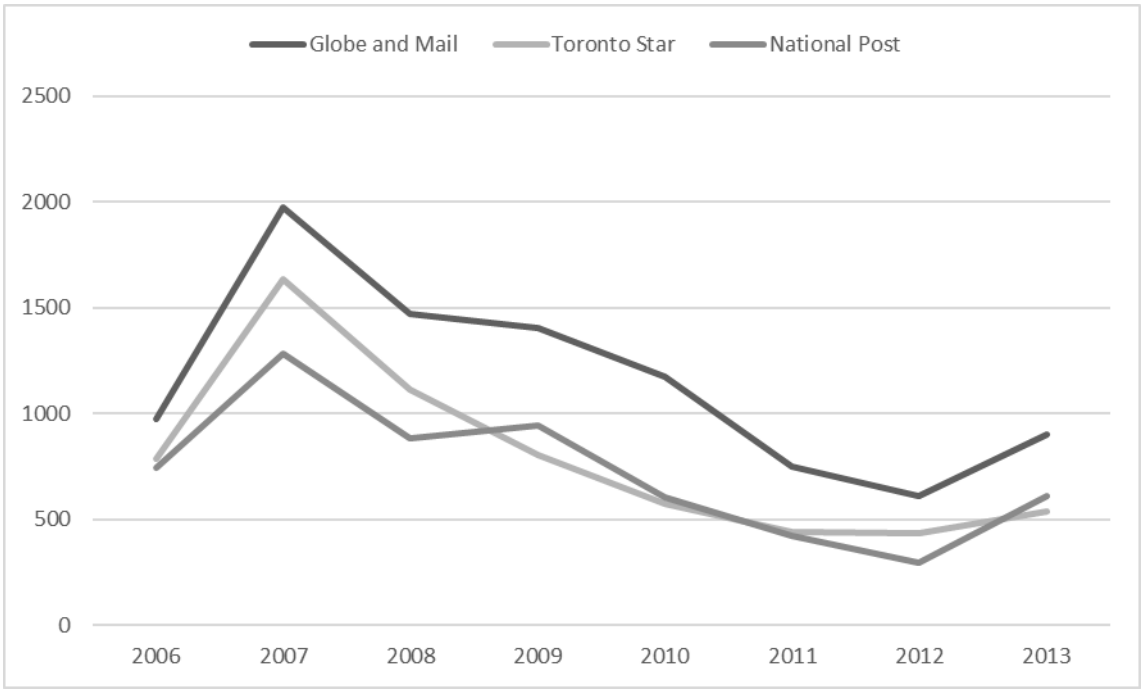

Figure 3.3: Total number of articles mentioning "climate change" or "global warming" per year, 2006-2013

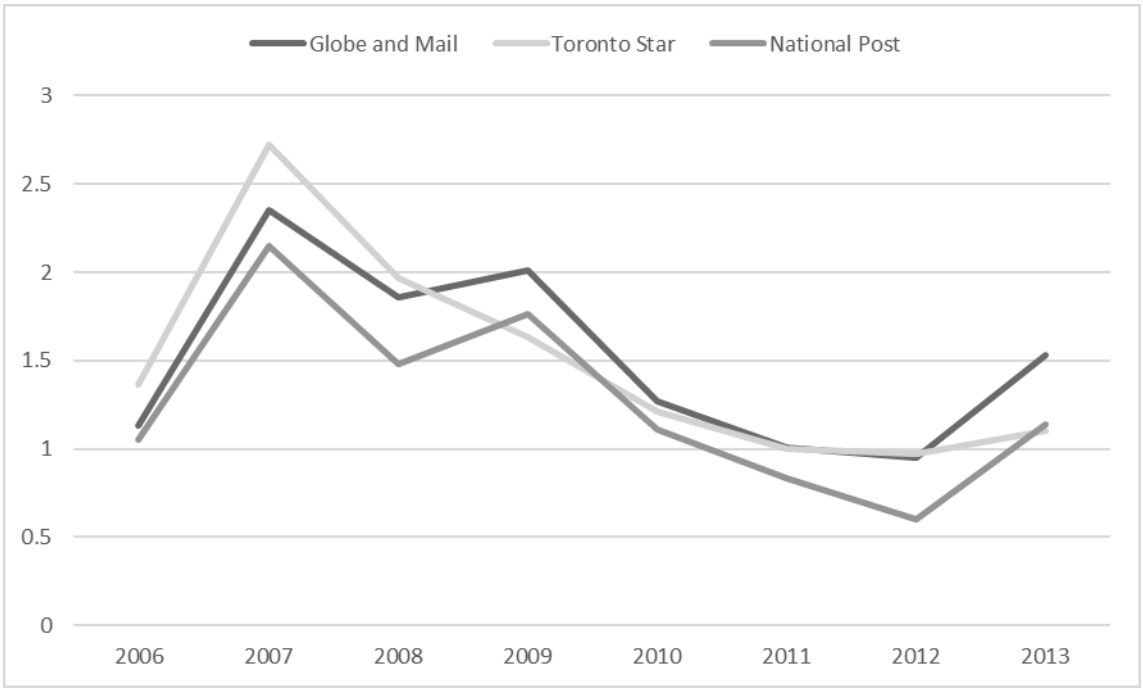

Figure 3.4: Frequency of articles mentioning "climate change" or "global warming" as a percentage of all articles, per year, 2006-2013

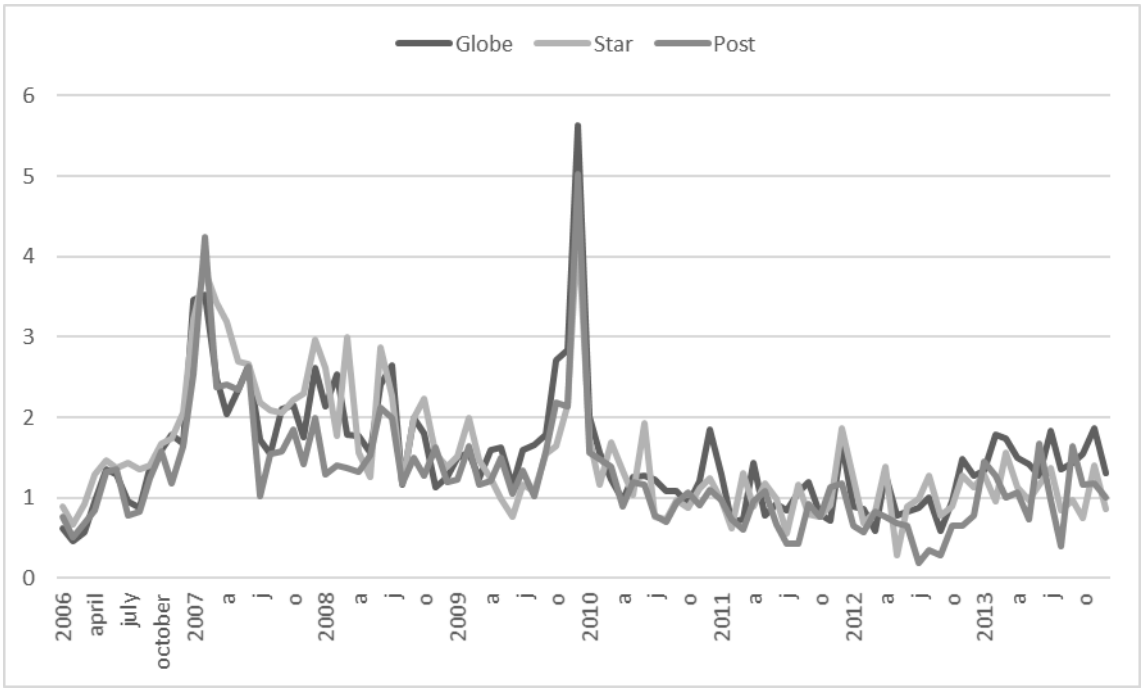

Figure 3.5: Total number of articles mentioning "climate change" or "global warming" per month, 2006-2013[39]

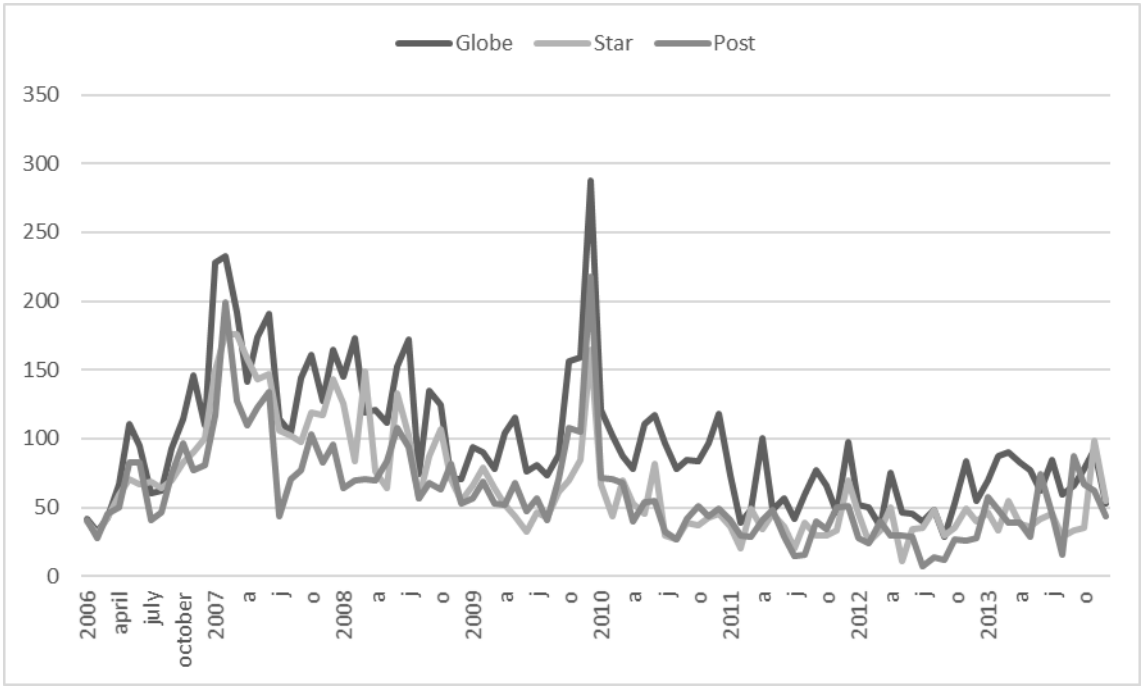

Figure 3.6: Frequency of articles mentioning "climate change" or "global warming" as a percentage of all articles, per month, 2006-2013

[39] Due to space constraints, X-axis label only shows four months (Year = January, a = April, j = July, and o = October), but each month of the year is plotted as an individual data point in the figure.

3.3 Reporting Cycles

What accounts for these peaks and troughs in climate change coverage? Attempts to explain reporting patterns are varied, with a multitude of factors ultimately bearing on any issue's media lifespan. With regards to climate change, studies have identified a diversity of social, geographical, political, cultural, and historical influences on coverage. An assortment includes extreme weather events (Ford and King 2015; Ungar 2014); postcolonialism (Billett 2010); cultural norms (Brossard, Shanahan, and McComas 2004); international relations (Schäfer, Ivanova, and Schmidt 2014); economic cycles (Davidsen and Graham 2014); and unique local environmental vulnerabilities (Takahashi and Meisner 2013), among many others. Some only have a limited range, shaping reporting in local newspapers, while other factors have near-global influence. The commingling of these different factors, in part, accounts for the shared large-scale global trends in climate change reporting across different regions and newspapers, as well as small-scale fluctuations and differences (Boykoff 2011; see Figures 3.1 and 3.2).

Craig Trumbo wonders if climate change reporting exhibits a standard pattern (Trumbo 1996). He interprets coverage in five major US newspapers from 1985-1995 through the lens of Anthony Downs' "issue attention cycle" (Downs 1976). Downs argues that the rise and decline of public interest about environmental issues follows a predictable pattern, progressing through five distinct stages: 1) The "pre-problem stage" where experts are aware of some potential or existing risk, but the public is not; 2) "Alarmed discovery and euphoric enthusiasm," where by the public becomes suddenly aware of the risk, coupled with optimism about societal solutions; 3) "Realizing the cost, ambivalence about the problem," by which the public realises that solutions are not immediately at hand, and moreover, that competing interests begin to emerge distinguishing different proposed solutions; 4) "Gradual decline of intense public interest," with the realisation that solutions are not forthcoming the public loses motivation and concern; 5) "Post-problem stage," in which new issues emerge as the chief public concern and the problem only receives "lesser attention or spasmodic recurrence of interest." Most relevantly for this study, Downs' argues that these stages also reflect a rise and decline in media coverage. In his study, Trumbo identifies three distinct phases of newspaper coverage – pre-controversy, controversy, and post-controversy – and argues these can be usefully mapped onto to Downs' first three stages.

The newspaper coverage examined here exhibits some of the trends surmised by Downs and Trumbo. There is an general pattern of rise and decline and, as I will discuss later, an inflection of controversy. Overall, however, this and other studies suggests that climate change in many ways defies Downs' issue-attention cycle. Most notably, climate change has exhibited considerable longevity as a

topic of both media and public attention. Trumbo's analysis attends to a time-frame which, in retrospect, represents an early, fledgling phase of climate change coverage. The scope and nature of the issue were relatively limited: the core scientific and institutional work that comes to define climate change had not yet been done, which in turn enrolled a far greater range of actors than were present during the period of Trumbo's study. In hindsight, Sheldon Ungar's subsequent analysis of the "decline of climate change" as a social problem seems a bit premature.

Later studies have pointed to different patterns and contexts of climate change coverage. For example, Carvalho and Burgess also find three distinct phases of early climate change reporting in the British press, but points to the sustained interest in the problem: 1985–1990, "when media attention to climate change rises significantly;" 1991–1996, "a period of recession in the volume of coverage;" and 1997–2003, "a second sharp rise (although marked by some fluctuation)" (2005, 1461). But as numerous studies since these early analyses have revealed, public and media interest in climate change had not yet peaked. Relative to the intense media coverage examined here, the attention of the late 1980s and early 1990s is minimal.

Part of the difficulty in looking for broad trends in climate change coverage is that climate change does not denote a narrowly defined issue, but rather, a set of interrelated issues. Thus, it might be surmised that reoccurring (or overlapping) trends of increasing and declining reporting reflect coverage of distinct issues or new developments pertaining to climate change. Here, Carvalho's discussion of "critical discourse moments" is instructive (2007). These moments have different geographical ranges, some affecting local or national coverage, with others defining international media agendas. Thus, one can expect broad reporting trends common across different newspapers and geographical contexts to have links to major, wide-reaching, critical discourse moments while the unique trends of the Canadian newspapers examined here might relate to local or national events.

3.4 An Inconvenient Truth, AR4, Copenhagen, and "Climategate," as Critical Discourse Moments

The pattern of climate change coverage from 2006-2013 in the *Globe*, *Post*, and *Star* can be understood with a view of several critical discourse moments (Figure 3.1). The pronounced upswing in starting in late 2006 and peaking in early 2007 can be linked to two intersecting and mutually reinforcing events. First, in mid-2006 Al Gore's climate change documentary *An Inconvenient Truth* was released in theatres. Interest in the film is greatly boosted by the film's nomination and subsequent winning of an Academy Award. In February 2007, the *Toronto Star* reports that demand to see a talk by Gore at the University of Toronto was so high that the website for the event crashed after it received 23,000 hits

from people trying to purchase tickets in the first few minutes of them going on sale (Goddard 2007). In Canadian newspapers, Al Gore became a major point of reference for stories on climate change; approximately 10% of all climate change articles published in 2007 in the *Globe*, *Post*, and *Star* mention Gore.

Coinciding with the intense attention given to *An Inconvenient Truth* came the release of the Intergovernmental Panel on Climate Change's (IPCC) *Summary for Policy Makers* of the Fourth Assessment Report (AR4) on February 2, 2007. This was a major focus of attention in the *Globe*, *Star*, and *Post*, and served as a formative critical discourse moment. The report represented the largest-scale scientific and policy report on climate change ever published to that point. The IPCC concluded that evidence for climate change was "unequivocal" and maintained that the majority of the increases in global mean temperatures observed in the 20th century were "very likely" due to anthropogenic greenhouse gas emissions, both higher degrees of confidence than established in the previous report released in 2001 (IPCC 2007a, 5,10). The report also refined and expanded on findings from previous iterations, with more detailed analyses of the potential consequences of climate change, ranging from increased droughts, floods, various forms of extreme weather, in both scale and frequency.

SOLE PATROL
Is an $800 Louboutin really worth that much more than a $150 knockoff?
SHOPPING, M1

THE CULTURE WARS
Book sheds light on art world's greatest losers
A&E, H13

FIGHT OF THEIR LIVES
Leafs' GM helps legendary dad battle cancer
SPORTS, E1

SATURDAY STAR

HIGH -9C, MOSTLY CLOUDY (NORMAL IS -1.5C) ★ FEBRUARY 3, 2007 ★ thestar.com

CANADA'S RESPONSE TO LANDMARK WARNING ON CLIMATE CHANGE

Getting warmer...

Stephen Harper's environmental conversion continues as he recognizes the 'enormous' threat of global warming. But emission cuts? Not so fast

PETER GORRIE
ENVIRONMENT WRITER

OTTAWA—Faced with the most overwhelming proof yet that the world faces a severe threat from greenhouse gas emissions, the Conservative government says it won't change course on climate change.

While acknowledging the problem is "enormous," Prime Minister Stephen Harper said yesterday that for the time being, Canada can only hope to stabilize its emissions rather than aim for cuts.

"You can't just snap your fingers and reduce emissions by one-third, reduce Canadians' energy use by one-third, in the space of a couple of years," he said. "We have to talk about facts, not about fantasy."

Harper spoke to reporters in Ottawa following the release of a major report — the consensus of 2,500 top scientists from Canada and 129 other countries — that concludes evidence of climate change is "unequivocal" and human activity is "very likely" to blame.

"The science is clear that these changes are occurring, they're serious and we must act," Harper said. "It's large; it's long term; there are no quick fixes."

Liberal Leader Stéphane Dion said last night he was pleased that the report took aim at the human role in causing climate change — "yes, indeed," he said — and argued that this meant humans, through their governments, had to shoulder the burden.

"This is the challenge of the century," Dion said. "Canada will be a leader to face this challenge with a convinced prime minister. We don't have one today, but if Canadians want to embrace my vision, we will have one tomorrow."

Environment Minister John Baird also appeared impressed by the 21-page document, commissioned by the United Nations and leaked in various forms over the past couple of weeks, which describes the strong prospect of heat waves, droughts, flooding, severe storms and rising sea level.

"Scientists are a pretty skeptical lot ... for them to say unequivocally that (climate change) is happening is a pretty strong statement," Baird said from Paris, where the report was officially made public.

"The findings are as strong as you can get ... The stakes are high, especially for Canada."

Despite the new sense of urgency, however, the report won't alter the government's approach to cutting the emissions from burning oil, coal, natural gas and other fossil fuels, Baird said.

Ottawa still won't aim to achieve Canada's Kyoto Protocol target — to cut emissions to 6 per cent below 1990 levels by 2012. Nor will it impose "green" taxes on fossil fuels.

Most disturbing to environmentalists, it also won't set a national cap on emissions, at least in the short term. Instead, it's negotiating "intensity targets" with the country's large industrial polluters, which account for about half of Canada's greenhouse gases.

These targets, to be announced within a few weeks, will require companies to reduce their emissions per unit of output. That means if their production expands, their total emissions could still increase. They'd just rise more slowly than before.

The response from other countries was mixed.

The U.S. government played down the American contribution to the problem and suggested a "global discussion."

In Paris, French President Jacques Chirac issued a dramatic warning. "We are on the historic threshold of the irreversible," he said, and he called for an economic and political "revolution" to save the planet.

In contrast to that tone, Harper told reporters in Ottawa that his government would try in the

➤ Please see Climate, A13

INSIDE

JOHN RADUX/AP

A deadly tornado tears through popular retirement community in Florida. Paula Countryman, above, surveys the damage. A3

JO YONG-HAK/REUTERS

A smokestack burns in Seoul as a groundbreaking report, released yesterday, says humans are "very likely" to blame for climate change.

Sex with client sinks top lawyer

He apologizes to family and former lover

TRACEY TYLER
LEGAL AFFAIRS REPORTER

The former head of the governing body for Ontario lawyers has been suspended from practising for 60 days after admitting to a sexual affair with a client.

George Hunter, 59, offered an emotional apology to his colleagues, family and ex-lover yesterday after pleading guilty to professional misconduct.

"My conduct has profoundly hurt those closest to me — my partners, my friends and, most importantly, my family," he said. "I'm very sorry."

Hunter, who stepped down as the treasurer of the Law Society of Upper Canada in December 2005, acknowledged his 2½-year affair with a woman he represented in a family law case had placed him in a conflict of interest.

The relationship began almost three years after the client, known only as X.Y., retained

➤ Please see Affair, A23

U.S. colonel plans Khadr trial

Gitmo prosecutor hopes to open murder case this summer against young Canadian facing charges of murder, attempted murder, conspiring and providing support to Al Qaeda. A4

Complete Index, A2

Store and Box Price $2.00 including GST (higher outside the GTA)

Paging Dr. Hope

In one of Canada's poorest districts, maverick pediatrician leads a revolution

SEAN GORDON
QUEBEC BUREAU CHIEF

MONTREAL—The brightly lit waiting room, with its frayed, garish couches, stuffed toys and a shopworn Fisher-Price farm, is a maelstrom of activity.

Doors open and close, and Sylvie, a vivacious receptionist, is joshing with a steady stream of adults and children in between making phone calls to confirm medical appointments with Dr. Gilles Julien, a gentle, grandfatherly pediatrician who is quietly leading a medical revolution. But this is not your typical medical practice.

To give just one example, Sylvie is having a hard time getting hold of people; in this neighbourhood, paying the phone bill tends to be far down the list of priorities.

"Oh well," she smiles, "the phone may be disconnected, but I'm sure they'll show up; they always do."

It's nearing closing time on clinic day at Aide aux Enfants en Difficulté (AED), a multi-disciplinary centre housed in a dowdy building on a bleak corner in the east-end Montreal neighbourhood of Hochelaga-Maisonneuve.

The surroundings may be humble, but this is a success story in a place where there are all too few triumphs, an oasis of hope in a converted red brick walk-up.

Next door is a greasy spoon, and the building across the street is a former crack house. The centre stands out, not least because of the garish rainbow painted on the outside, but mostly because of the solace it

➤ Please see Doctor, A26

Figure 3.7: Toronto Star *front page for February 3, 2007*

Several other studies have found the Fourth Assessment Report to have been a major factor in maintaining media salience for a range of climate change issues throughout 2007 (Boykoff 2011, 21; Ford and King 2015, 143; Davidsen and Graham 2014; 157). The report consists of three major sections based on the work of different working groups: *The Physical Science Basis; Impact, Adaptation, and Vulnerability;* and *The Mitigation of Climate Change*. The full report is not released at once; rather, each section is published a few months a part. Moreover, each of the full sections were preceded by shorter, *Summary for Policymakers* and a *Frequently Asked Questions* section. These summaries garnered more media attention than the full sections, as they were shorter, written in language that was less technical, and, importantly, were promoted proactively by the IPCC's media relations units. The publishing of sections was preceded by press releases, and the media was granted access to drafts prior to official publication. As each section was published, a rise in media attention followed. In the month after the publication of the first section of AR4, all three newspapers saw substantial increases in coverage on climate change, but the *Post* experienced the greatest increase, providing four times more coverage than the average rate in 2006 (the *Globe* and *Star's* coverage increased by 3.2 and 2.8 times, respectively) (Figure 3.7). The *Post's* coverage of climate change in February 2007 was greater than either the *Globe* or the *Star*. However, for 2007 overall, the *Post* had the lowest rate of reporting between the three newspapers, highlighting the importance of time frame and scale (Figure 3.4).

The release of the *Summary for Policymakers* for the second and third sections of the report in April and May, respectively, sustained coverage through the summer of 2007. The second section, which concerned impacts, adaptation, and vulnerability, prompted concerted news coverage from the *Star* and the *Globe*, which published four stories each in the week following its release explicitly addressing the details of the report. Overall, the *Star* published 15 total articles (including 5 editorials) about the second section of AR4, while the *Globe* published six. Notably, the *National Post* published no news stories on this section of the report. The *Post* did, however, publish four lengthy editorials explicitly dismissing the report's findings (see section 4.4 in the following chapter).[40,41]

[40] Terence Corcoran, "The Ethanol Food Crisis," *National Post*, April 10, 2007, sec. FP Comment; "Cooler Climate = Dirtier Air?," *National Post*, April 20, 2007, sec. Editorials; *National Post*. 2007b. "Dear Terry: Earth Day E- Mails," *National Post*, April 21, 2007, sec. News; Lawrence Solomon, "Science, Not Politics," *National Post*, April 13, 2007, sec. FP Comment.

[41] Here and throughout this study I supply a full footnote citation for newspaper articles (rather than the author-date in-text citation used for secondary literature). For understanding the discourses and framings in these articles and columns, this information is relevant, especially in terms of column titles (which give a good indication of framings), authors (showing the importance of certain columnists, particular relevant in the following chapters), and dates (showing links to critical discourse moments).

Another noticeable spike in coverage came in May following the publication of the third section of the report, which outlined different mitigation options, stipulating the limits of atmospheric CO2 concentrations required to avoid dangerous climate change (IPCC 2007b). While the *Star* and *Globe* ran several news stories specifically covering this publication, the *Post* only addressed it in a single, sceptical column, again dismissing its findings.[42] Tangential coverage – that is, stories covering similar themes to those covered in the report sections – was more substantial in the *Star* following the second section on impacts, but noticeably more pronounced in the *Post* and *Globe* after the release of the third section (Figure 3.6). This is consistent with long-term trends, with the *Star* more predominantly publishing stories framed in terms of consequences, with the *Post* and *Globe* favouring policy framings (Figure 3.9).[43]

The overall trend from early 2007 to late 2009 was a steady decline in media coverage, albeit with intermittent spikes of attention. Each of these can be linked to specific events. For example, in late 2007, coverage increased following the awarding of the Nobel Peace Prize to the IPCC and Al Gore on October 12, and again in December in the lead-up to the United Nations Climate Change Conference in Bali, Indonesia. However, different events received different degrees and kinds of coverage from each newspaper. For example, on March 29, the World Wildlife Fund organized its annual "Earth Hour," an environmental awareness event during which participants are encouraged to reduce their energy consumption and symbolically turning off their lights. The *Star* partnered with the WWF as an official media sponsor in publicising this event. From the beginning of 2008 until the event, the *Star* ran a weekly "Earth Hour Challenge," in which readers were encouraged to make environmentally-conscious behaviour changes, such as replacing incandescent lightbulbs with energy efficient alternatives, hang-drying washed clothing, and eating less meat. Each of these challenges was accompanied with an article outlining the environmental benefits of such changes. From January until April, the *Star* published 191 articles, op-eds, and letters on Earth Hour, a third of which explicitly addressed climate change. In March, the *Star* dedicated a special additional weekly section exclusively to Earth Hour and environmental issues, publishing 150 articles on the topic in the month alone. As a result, the *Star*'s climate change coverage for March was substantially greater than the other newspapers. This suggests that the editorial goals and priorities of the newspapers have a strong influence on climate change coverage, an issue that will be examined in depth in the following chapter (see section 4.3).

[42] Lawrence Solomon, "Some Restraint in Rome," *National Post*, May 11, 2007, sec. FP Comment.
[43] In general, mitigation has been the dominant policy concern, with adaptation policies receiving far less impetus. In recent years, adaptation has become a greater priority, but mitigation is still the key focus of major climate change policies (Ford and King 2015).

An important point to reiterate here is that coverage depends on a confluence of events. Moreover, while there may be a basis to expect that certain kinds of events will prompt concerted media coverage of climate change, which specific events function as critical discourse moments depends on how the various influences on reporting commingle with each other. For example, Ungar finds that the similar extreme weather conditions in the United States in 1988 and 2012 did not result in the same level of climate change coverage. He argues that the differences can be accounted for in terms of changing scientific, social, political, and media contexts, attitudes, and practices (2014, 233).

Similarly, the reporting patterns of the three newspapers show differences in coverage of similar events. June and July of 2008 saw a relative increase in coverage of climate change, which can be attributed to two intersecting events, the G8 Summit and the Liberal Party of Canada's (the official opposition in parliament at the time) unveiling of a proposal for a national carbon tax. The two topics were sometimes covered in a single article focusing on climate policy.[44] Both issues also prompted concerted editorial and opinion pieces from each newspaper.[45] The G8 Summit provides a useful point of reference for assessing climate change reporting patterns. It is held annually at approximately the same time each year and involves many of the same actors. As such, it may be assumed that its general effect on climate change reporting should remain fairly consistent. However, the G8 Summit the preceding year, in June 2007, was linked to more overall discussion of climate change than in 2008. The G8 in July of 2009 generated fewer articles than in 2008, and the 2010 summit fewer still.

There are several potential explanations for these differences in coverage. Again, this decline follows an overall trend of diminished of coverage throughout 2008 and 2009. Such a pattern is seen as typical in reporting on any issue; the news follows predictable short-term cycles reflecting demands for topicality, novelty, and attention-grabbing headlines – and these have become more pronounced with 24-hour, international news coverage (Downs 1972; Trumbo 2006; Silvia 2001). Any topic can be expected to receive prominent coverage for only a relatively brief period. Thus, the level of reporting throughout 2008 and most of 2009 can perhaps be seen as a return to normal from the relatively intense interest produced by *An Inconvenient Truth* and AR4. In this regard, it is important to keep in mind that in general climate change articles comprise only a very small fraction of total newspaper

[44] E.g. Caroline Alphonso, "Dion Ramps up Greenhouse Gas Attacks," *The Globe and Mail (Breaking News)*, July 9, 2008, sec. National

[45] E.g. Maureen Bader, "Revenue Neutral? Not This Tax," *National Post*, June 3, 2008, National edition, sec. Issues & Ideas; "Not so Crazy Economics," *The Toronto Star*, June 22, 2008, ONT edition, sec. Editorial; Norman Spector, "Mr. Dion Might Want to Look beyond B.C. for an Eco-Tax Model," *The Globe and Mail*, June 3, 2008, sec. Comment Column.

output – on average less than 2% for the three newspapers studied here. At any time, climate change is competing with a host of other social concerns – political happenings, military strife, economic concerns, natural disasters, public health issues – for media attention and resources. For example, 2008 saw the federal election of the Conservative government in Canada and the presidential election of Barack Obama in the United States. While these elections influenced framings of climate change (see Figure 3.9; more on this in the following chapter), they correspond with a general drop in climate change reporting. Similarly, following the stock market crashes and the subsequent financial crisis of 2008 and recession, economic framings increased, but overall coverage decreased. The global financial crisis has been identified as one of the key factors leading to a decrease in climate change coverage (Boykoff 2011, 21; Brulle, Carmichael, and Jenkins 2012).

The sharp jump to the peak monthly climate change reporting in December of 2009 can be attributed to two intersecting events: the 2009 United Nations Climate Change Conference in Copenhagen, and the hacking of e-mails of climate scientists working at the University of East Anglia's Climate Research Unit (CRU). The UN climate change conferences, like the G8 Summits, are another useful marker due to their regularity. The conference in Copenhagen generated more coverage than any UN climate conference before or after it, and over twice as many articles than the Bali conference in 2007. The precise reasons for the intense coverage of the Copenhagen conference are not fully clear, but numerous intersecting factors can be identified. James Painter documented the unprecedented number of journalists in Copenhagen, which he estimated to be approximately 4000, including the 3221 with official press accreditation, as well as those registered on other lists, and accompanying official state delegations (Painter 2010, 26). This number was over twice as many that had attended the 2007 Bali meeting. Moreover, Copenhagen had, by a considerable margin, the largest number of media organisations represented – over 1200 – compared to any other climate conference (Bali, the second most attended, had 531).

67 days to go: Christine Nesbitt skates to long-track gold – and she's not stopping there

OLYMPICS SPECIAL SECTION VANCOUVER 2010

ONTARIO EDITION » MONDAY, DECEMBER 7, 2009 TORONTO, HIGH 2 LOW -4

THE GLOBE AND MAIL

CANADA'S NATIONAL NEWSPAPER

OFFICIAL NATIONAL NEWSPAPER PUBLISHER OF THE 2010 OLYMPIC WINTER GAMES

ENVIRONMENT » THE COPENHAGEN SUMMIT BEGINS

THE WORLD IS COMING TO COPENHAGEN

BUT CANADA IS COMING WITH A TARRED IMAGE

Canada enters the climate talks as a global laggard. With the oil sands and Ottawa's response to Kyoto under heavy scrutiny, the country's reputation is on the line

BY ERIC REGULY AND NATHAN VANDERKLIPPE CALGARY

The country "is the dirty old man of the climate world," according to a recent Guardian article. Another prominent article published ahead of the Copenhagen climate-change summit called it a "corrupt petro-state." Various diplomats and scientists have rallied for its expulsion from international organizations.

China? Venezuela or an oil-stained African state?

Try Canada.

Almost 200 countries will attend the Copenhagen conference, which starts today, but few of them will roll in with a more blackened image.

Among the international carbon-reduction negotiators, Canada is seen as part of the problem, not part of the solution, partly because its greenhouse emissions under the soon-to-expire Kyoto Protocol soared when they were supposed to go in the opposite direction, and because the proposed new cuts are relatively small.

But it was the turbo-charged expansion of the Alberta oil sands, one of the single biggest sources of planet-warming carbon dioxide emissions, that truly vilified Canada.

Climate-change scientists and negotiators think Canada's desire to protect the oil sands more than offsets any desire to push hard for success in Copenhagen.

» SEE 'CANADA' PAGE 12

Globes are installed around Copenhagen to welcome 192 nations for the UN climate-change summit starting today. PAWEL KOPCZYNSKI/REUTERS

UN CLIMATE CHIEF SEES HOPE FOR A GLOBAL DEAL. NEWS, PAGE 11 »

THE AFGHAN MISSION

Proof of detainee abuse exists despite MacKay's denials

Affidavit confirms severe beating of an Afghan prisoner

BY PAUL KORING

Sworn testimony by senior Canadian officers and rare uncensored documentary evidence contradict Defence Minister Peter MacKay's repeated assertions that no proof exists of even a single case of a Canadian-transferred detainee abused by Afghan security forces.

In one well-documented case in the summer of 2006, Canadian soldiers captured and handed over a detainee who was so severely beaten by Afghan police that the Canadians intervened and took the detainee back. Canadian medics then treated the man's injuries. The incident is documented in the field notes of Canadian troops, recounted in a sworn affidavit by a senior officer and confirmed in cross-examination by a general.

The incident, which was previously known, takes on new and greater significance given the chorus of denials from Mr. MacKay.

He has repeatedly insisted, both to the House of Commons and elsewhere, that there is no proof even a single such instance of post-transfer abuse exists.

"Not a single Taliban prisoner turned over by Canadian Forces can be proven to have been abused. That is the crux of the issue." Mr. MacKay said in Halifax on Nov. 22.

The minister's spokesman said yesterday that Mr. MacKay was standing by his repeated denials.

"He has said what he has said based on the advice of generals and senior officials in the department," said Dan Dugas, spokesman for the minister.

» SEE 'DETAINEE' PAGE 13

POSTSECONDARY EDUCATION

Who's in the know: Women surge, men sink in education's gender gap

Female students are dominating campuses, a shift that will change 'who does what.' But leaving men behind has its costs

BY ELIZABETH CHURCH EDUCATION REPORTER

In a red-brick building at the University of Guelph, where veterinarians have been schooled for the better part of a century, a demographic shift is taking place that offers a window into the future of human behaviour.

In the past decade, Ontario Veterinary College has seen its student numbers turned on their head: Women account for more than 80 per cent of its students during that time, and now make up more than half of the province's practising vets.

It's an extreme example of a story that is playing out on campuses in Canada and around the world – and a trend that could have profound social implications. There are now three female undergraduates for every two male students on Canadian campuses, and more women than men graduated with higher education degrees in 75 of 98 countries examined in a recent UNESCO study.

Women are expected to gain more power in public and corporate life and more financial independence.

» SEE 'GENDER' PAGE 5

Students walk to class at the University of Alberta. Women outnumber men 3-2 on campuses. IAN JACKSON FOR THE GLOBE AND MAIL

HEALTH-CARE RESEARCH

Diabetes: A brewing 'economic tsunami'

BY ANDRÉ PICARD PUBLIC HEALTH REPORTER

The number of Canadians living with diabetes will rise dramatically over the next decade, spurring an "economic tsunami" that will be felt well beyond the health system, new research predicts.

By 2020, there will be 3.7 million Canadians with diabetes, up from 2.5 million today, and from 1.3 million a decade ago, according to projections prepared by Robin Somerville of the Centre for Spatial Economics in Milton, Ont.

Stated simply, more than 20 people will be diagnosed with diabetes every hour for the foreseeable future. The numbers are soaring because of Canada's changing ethnic makeup (diabetes rates vary by ethnicity), the population is aging (the risk of diabetes increases with age) and due to poor health habits of Canadians (obesity and inactivity raise the risk).

» SEE 'DIABETES' PAGE 9

THE GROWING COST

2.5 million
Canadians with diabetes today

3.7 million
Diabetics by 2020

$12.2-billion
The economic burden of the disease today

$16.9-billion
Projected cost of the disease in the next decade

INSIDE TODAY'S GLOBE

The Wright stuff
Robin Wright had no qualms with aging up to play Pippa Lee, the role that could change her career. GLOBE REVIEW »

The big time
Flaherty plans to push Canada's financial interests on a global scale, aiming for more international influence. REPORT ON BUSINESS »

iPhone 3G S

The iPhone has landed at TELUS.

Now you can get the fastest, most powerful iPhone on Canada's largest 3G+ network.

TELUS

Figure 3.8: Globe and Mail *front page for December 7, 2009*

But what led to this intense media interest in the first place? Why did news organisations from all over the world place such a high priority and commit considerable resources to reporting on this event? And of course, it was not just the media who made Copenhagen a priority. Painter muses, "It is very doubtful that any single event outside of the Olympics or the World Cup has ever attracted so many politicians, journalists, scientists and academics to attend it together" (2010, 3).[46] To this, one should also add thousands of protesters, citizens, members of NGOs, and other private organizations and businesses. Certainly, the Copenhagen conference was an extremely significant, if not pivotal, event. It had been agreed two years earlier in Bali that the negotiations at Copenhagen would establish a binding agreement for climate change mitigation, establishing international policies that would extend from 2012 onward, following the end of the first commitment period of the Kyoto Accord. It was optimistically hoped that an agreement at the conference would set legally-binding, international emissions targets, and moreover, legal mechanisms for compliance and enforcement of these targets. The global political landscape had also changed in the two years following Bali.

Most significant of these political developments was the election of Barack Obama, who had been inaugurated in January of 2009. The climate policies and international commitments of the preceding Bush administration had been widely viewed at inadequate, if not obstructionist (Christoff 2006). The US had not been considered a serious player in international climate change negotiations, and had not taken a strong leadership role that was viewed as necessary to ensure participation of other major greenhouse gas emitters, particularly China and India. The EU had established itself as the global leader in climate policy, but up until that point there was little pretence that even an ambitious European plan would be sufficient to address the problem. The disposition and stated policy goals of the new Obama administration appeared to signal a promising shift in international climate policy (Bäckstrand 2010). The optimistic view was that the United States would become an active participant in new binding emissions targets; an American commitment would ensure similar commitments from more reticent countries. This is especially true of Canadian policy positions. The Canadian and American economies are intimately connected, with governments striving for policy coordination across a variety of sectors. The Copenhagen conference would be a major event in defining the climate change policies of the Conservative Canadian government elected a year prior. The Conservatives had campaigned in favour of further developing the Canadian Tar Sands and against the Liberal Party's proposed carbon tax; they were generally opposed to any climate policy that would stifle economic growth. Crucially, they

[46] Over 30,000 people had officially registered for the conference, but an estimated 47,000 travelled to Copenhagen for the conference (Lever-Tracy 2010, xxv).

maintained that it would not implement any carbon regulations that were not similarly adopted by the United States.[47] Thus, the political import of Copenhagen on an international scale intimately intersected with Canadian political concerns. Suffice it to say, the expectations of a wide range of political, citizen, NGO, and media actors for Copenhagen were higher than they had been for the decade of preceding conferences.

The coinciding – deliberately, it seems – CRU e-mail theft also garnered significant attention, at least from certain news sources. The e-mails belonged to prominent climate scientists – most notably Phil Jones – and purportedly revealed less-than-ethical behaviour on behalf of the researchers in their scientific conduct, or worse, deliberate collusion to undermine scientific research that might challenge the ACC theory. The timing of the release of these e-mails suggested a deliberate attempt to cast doubt on the scientific basis for the Copenhagen conference. Overall, the conference itself had a much stronger effect on media coverage of climate change, but the stolen e-mails also had a noticeable influence. However, there are substantial differences in how the different newspapers reported the story. The *National Post* reported on the story – dubbed (most unimaginatively – but effectively, as a trope of media controversy framings) "climategate" by some media sources – four times more frequently than the *Globe and Mail* and the *Star.* The specific term "climategate" appeared in four times as many articles as in the *Globe* and ten times more than in the *Star.*[48]

The perceived political import of the Copenhagen conference can explain, in part, the priority placed on covering the event by news organisations. There were widespread expectations that whatever deal was reached would have major international political implications. Moreover, as Painter notes, the sheer number of political actors (governmental or otherwise) together at once promised enticing stories (2010, 8). In this regard, Painter finds that the predominant framing of the event was that of a social and political drama. While news articles covering the details of the policy negotiations were relatively common (and greatly outweighed those concerning climate science) the bulk of the reporting focused on the politics of the event – the various tensions between the different politicians, governments, activists, NGOs, business and industrial interests, and so on. In this regard, there appears to be a relationship between frequency of coverage and framings: "political" events like Copenhagen garner significant media attention and "political" framings predominate climate change coverage across all three newspapers. The implications of these framings are discussed below and in the following chapters.

[47] Peter O'Neil, "Canada Snubs G8 Emissions Target; Summit Sets 80%; 70% Reduction by 2050 'Realistic,' Prentice Says," *National Post*, July 10, 2009, National edition, sec. News.
[48] See Appendix C.

3.5 Scientific Framings

All three newspapers in this study broadly cover climate change at similar rates – thus no simplistic comparative conclusions about "under-reporting" can be made (Figure 3.6). However, an examination of framings reveals important differences. These differences establish a basis for a critical discourse analysis in the following chapters which examines how specific language and discourses constitute framings.

Each of the newspapers frames stories in terms of science – new scientific research and reports, concerned with biophysical explanations of the causes and effects of climate change – with relatively equal frequency (Figure 3.9). Overall, such framings are uncommon, present in approximately 5% of total articles mentioning climate change or global warming. Despite roughly equal presence of such framings in all three newspapers, the precise nature of this coverage varies significantly.

One type of science reporting that appears in all three newspapers are short authorless news-briefs that summarise the findings of recent research – usually published in a peer-reviewed scientific journal, or as a report from a research institution. These often include quotations from lead researchers, and likely originate as press releases from universities or research institutions. Virtually all of these news briefs explicitly or implicitly affirm the consensus view on anthropogenic climate change, regardless of newspaper and show deference to the authority of scientific experts (with a few notable exceptions). This consistency appears to be partly the product of the employment of wire services like Reuters, the Associated Press, and Canadian Press for these types of articles. Often, the same stories are picked up by different newspapers from wire services.[49]

However, each newspaper does not employ these kinds of stories with equal frequency. They are most prevalent in the *Star.* Early in the study period, the *Star* ran a weekly science section entitled "Microscope," in which various science news stories were amalgamated.[50] The *Globe* ran a similar series called "Social Studies" (though it often reported on natural science research).[51] Many of these stories in these series originated from wire services. The *Star* discontinued their weekly science section towards the end of the study period, but continued the regular use of wire services for brief articles reporting on

[49] Seth Borenstein, "Global Warming Making World More Humid, Too," *The Toronto Star*, October 11, 2007, sec. News; Seth Borenstein, "Humans Get the Blame for Sticky Situation," *The Globe and Mail*, October 11, 2007, sec. International News; Randolph E. Schmid, "Arctic's Warming Hits Chilling Record Highs; Impact Felt as Weather in Fall 5C above Normal," *The Toronto Star*, October 17, 2008, MET edition, sec. News; Randolph E. Schmid, "Arctic Fall Temperatures at Record Five Degrees above Normal; Scientific Report Card Shows That Sensitive Area Reflects Changes Fast and Dramatically," *The Globe and Mail*, October 18, 2008, National edition, sec. Science.

[50] E.g. Peter Calamai, "A Week's Worth of Science News, By; Microscope," *The Toronto Star*, June 4, 2006, ONT edition, sec. Ideas.

[51] E.g. Michael Kesterton, "Social Studies," *The Globe and Mail*, July 10, 2012, sec. Globe Life.

scientific research. Such articles comprised the majority of stories in the *Star* with an overt scientific framing. Conversely, the *National Post* published news agency articles on scientific research pertaining to climate change with the least frequency, and this declined significantly over the study period. In 2007 more than half of articles with an overt scientific framing came in the form of news briefs reporting on research. In 2012 and 2013, there were none.

A noteworthy finding in this regard is that the *Post*'s infrequent use of news agency articles appears linked to relatively little news coverage of climate change research in general. The only exception to this trend was in 2007, when the *National Post* picked up a September 2007 Reuters story that covered a report from the United States Geological Survey which estimated that polar bear populations could decline by as much as two-thirds by 2050 due to a greater-than-predicted decline in sea ice. This story was also covered by the *Globe*. However, following this, virtually all major studies reported by the *Globe* and *Star* were not covered by the *Post*.

For example, in May 2007, both the *Star* and the *Globe* picked up a story from Reuters that reported on a new study about the rate of the decline in Arctic sea ice, which found it to be substantially faster than previous estimates, including those from previous IPCC Assessment Reports.[52] In October of 2008, the *Star* and *Globe* published a story from the Associated Press that covered a research report that found that Arctic fall temperatures had reached record highs.[53] Both newspapers covered findings that 2010 tied 2005 as the years with the highest global mean surface temperatures on record.[54] Several more examples illustrate this trend. In 2012, researchers at the U.S. National Oceanic and Atmospheric Administration found evidence for rising ocean acidification.[55] The following October, a scientists found that arctic sea ice had reached an all-time low.[56] The next year, a study published in *Nature* predicted

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[52] "Arctic Cap Melting 30 Years Faster than Dire Forecast," *The Globe and Mail*, May 2, 2007, sec. International News; Deborah Zabarenko, "Arctic Thawing Faster than Forecast; Melting of Ice Cap Is Three Decades ahead of International Science Panel's Gloomiest Prediction with Experts Saying the Problem Could Further Accelerate Global Warming," *The Toronto Star*, May 2, 2007, sec. News.

[53] Randolph E. Schmid, "Arctic Fall Temperatures at Record Five Degrees above Normal; Scientific Report Card Shows That Sensitive Area Reflects Changes Fast and Dramatically," *The Globe and Mail*, October 18, 2008, National edition, sec. Science; Randolph E. Schmid, "Arctic's Warming Hits Chilling Record Highs; Impact Felt as Weather in Fall 5C above Normal," *The Toronto Star*, October 17, 2008, MET edition, sec. News.

[54] RANDOLPH E. SCHMID, "2010 Ties 2005 as Warmest Year on Record Worldwide," *The Globe and Mail (Breaking News)*, January 12, 2011, sec. Technology; "United States 2010 Ties for Warmest Year since 1880," *The Toronto Star*, January 13, 2011, ONT edition, sec. News.

[55] Kristen Gelineau, "Rising Acid Levels Threaten Reefs; 'Osteoporosis of the Sea' Causing Critical Damage to Coral, Scientists Say," *The Toronto Star*, July 10, 2012, ONT edition, sec. News; Michael Kesterton, "Social Studies," *The Globe and Mail*, July 10, 2012, sec. Globe Life.

[56] Seth Borenstein, "Climate Change Blamed as Arctic Sea Ice Melts to All-Time Low," *The Globe and Mail*, September 20, 2012, sec. National News; The Canadian Press, "Arctic Ice Melt Fastest and Widest in Recent Years," *The Toronto Star*, September 20, 2012, ONT edition, sec. News.

that by mid 21st-century, global temperature anomalies will permanently and consistently exceed historical averages for the 20th-century.[57] The *Star* and *Globe* published news articles on all of these research findings, while the *Post* did not report on any of them.

Arguably, these are all major research findings in regard to the chief predictors and measures of anthropogenic climate change; they are published in major scientific journals and are relevant according to the criteria used in the work of the IPCC. The goal of this study is not to evaluate these newspaper's reliability in reporting on what can be deemed to be important scientific research, but a point can be made that the *Post's* decision not to cover these stories has relevance beyond mere inter-newspaper consistency.

This is not to say that the *Post* ignored climate change research entirely, but that it does not report on it in the manner of a standard news article as is common in both the *Globe* and *Star.* Rather, compared to the other newspapers, the *Post* commits a disproportionate amount of commentary and editorials to addressing – almost always challenging or rejecting – scientific research related to climate change. The distinction between news reporting and commentary is not altogether unproblematic. The conceptual and practical implications of this distinction and how they relate to different standards of journalistic objectivity and public debate will be discussed at length in the following chapters (also see Brossard, Shanahan, and McComas 2004 and Nisbet and Fahy 2015).

3.6 Framing Groupings: Policy, Business, and Industry

There are notable differences in the frequency of other framings. Stories dealing with climate change that are framed predominantly as matters of business or industry are over one and half times more likely to appear in the *Post* or *Globe* than in the *Star*. A potential explanation for this is that, in general, the *Post* and *Globe* are oriented towards business reporting in purpose and design. The *National Post* is an offshoot of the *Financial Post*; the latter was folded into the former and still retains unique identity as the *National Post*'s business section. The *Globe* publishes a prominent and sizeable daily business section entitled "Report on Business." In contrast, as a technically local paper committing more resources to Toronto-based reporting, the *Star*'s business section makes up fewer column-inches of the paper's total reporting.

[57] Seth Borenstein, "Scientists Pinpointing the Year That Global Warming Will Become Unbearable," *The Toronto Star*, October 10, 2013, ONT edition, sec. News; Ivan Semeniuk, "Profound Change Predicted for Tropics; Dalhousie-Trained Researcher Crunches Data Numbers to Forecast a Global Warming Turning Point – in the Year 2047," *The Globe and Mail*, October 10, 2013, sec. International News.

As mentioned above, the *Star* framed stories in terms of the consequences of climate change – e.g. effects on ecosystems, extreme weather, sea-level rise – one and half times more often than the *Globe* and over twice as often as the *National Post*. As will be discussed in the following chapters, this may be accounted for in the differing editorial positions of the papers. The *Star*'s editorials frequently express concern about the prospective threats of climate change and often take an activist tone urging both government and personal action.[58] The *Post* on the other hand, predominantly promotes sceptical viewpoints either casting doubt or downplaying the potential risks of climate change.[59] The *Globe* tends towards concern, but periodically offers sceptical viewpoints (see section 4.4 below for more on concern and scepticism).[60] Overall reporting about consequences (that is, in non-editorials) appears to coincide with these editorial tendencies.

Despite its more concerned editorial position, the *Star* employs climate policy framings significantly less often than the *Globe* or *Post*. One might expect a concern with government action to be linked to policy framings, and conversely, a sceptical viewpoint to discount policy. On the contrary, the *Globe* and *Post* appear to be overtly concerned with climate policy because it bears directly on the newspapers' other major concerns, namely their inclination to business, industry, and energy framings. It is important to reiterate that the framings shown here do not represent exclusive categories; articles will often have more than one prominent framing, and this analysis suggests that certain framings are generally grouped together. A key finding in this regard is that not only do the *Globe* and *Post* frame articles in terms of policy more frequently, they are much more likely to be critical of policy in editorials – especially that which demands regulation of businesses, industry, or energy sectors, or which might be perceived to have negative economic effects.

Relatedly, it might also appear curious that the *National Post* makes linkages between climate change and broader environmental issues more often than either the *Star* or *Globe*. Like its pronounced policy framings, the *Post*'s environmental framings are linked to its critical and sceptical editorial positions. Thus, a prevalence of environmental framings does not imply an concerned environmentalist

[58] E.g. "A Chance to Help Save the Earth," *The Toronto Star*, January 19, 2008, ONT edition, sec. Editorial.
[59] E.g. Lorne Gunter, "Unsettling Science; New Research Suggests Mankind's Effects on Climate Have Been Vastly Overblown," *National Post*, September 2, 2011, National edition, sec. Editorials.
[60] E.g. John Ibbitson, "Kyoto Withdrawal Shames Us All; Canada Gave Its Word to the World. Canada Broke Its Word. The Final Confession Was as Shameful as It Was Inevitable," *The Globe and Mail (Breaking News)*, December 13, 2011, sec. Other. Cf. Margaret Wente, "The Science Isn't Settled. Now What? The Climate Debate Is Usually Portrayed as a Fight between People Who Think Global Warming Is a Hoax and People Who Think Catastrophe Is Imminent. But There's a Third Position," *The Globe and Mail (Breaking News)*, February 16, 2010, sec. Other.

framing. In the *Post*, the converse is the case. It frequently frames climate change in terms of environmental issues because it frequently undermines environmentalism.[61]

3.7 Predominance of "Political" Framings[62]

Across all three newspapers, the most predominant framings emphasised the political aspects or implications of climate change, or indeed, construed climate change principally as a political issue. In such articles, politicians were the dominant social actors addressing climate change, and the topic of climate change was framed in an overtly political context. Examples include stories about election campaigns,[63] government policies (and challenges to these policies by competing political parties),[64] broader political debates (about the economy or government regulation, for example),[65] international relations or negotiations,[66] and the details of parliamentary activities.[67]

Over the period under study, political themes have characterised at least 24% of climate change articles in each of the three newspapers, and as much as 45% (Figure 3.9 and 3.11). In each year under study, politics was more prominent than any other framing. Each of the newspapers have consistently exhibited predominantly political framings of climate change. While each of the newspapers experiences a different peak and base year for political framings, some inter-newspaper patterns emerge.

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[61] It is noteworthy that one of the *Post*'s columnists, Lawrence Solomon, is a self-described "environmentalist" (and that the *Post* often features guest columns from self-described "skeptical environmentalist" Bjorn Lomborg) (see chapter 5, especially section 5.7). This can be interpreted as an attempt to redefine environmentalism, especially given Solomon's and the *Post's* frequent critiques of environmental activism. Whether or not this is sincere is an open question, but various climate change sceptics have tried to appropriate environmentalist language to cast doubt on anthropogenic climate change (see section 4.8 below).

[62] Such a categorization is not without analytical and normative implications, to be considered at length in the following chapter.

[63] Joan Bryden, "Liberals Hope for Green Tweak; With Election Call Looming, Some MPs Are Lobbying Dion for Changes to Party's Carbon-Tax Proposals," *The Toronto Star*, August 29, 2008, ONT edition, sec. News.

[64] The Canadian Press, "Ottawa to Force More Greenhouse Gas Curbs; Critics Say Government Efforts Are Too Slow," *The Toronto Star*, August 9, 2012, ONT edition, sec. News.

[65] Bruce Anderson, "Why Michael Ignatieff Should Start Thinking Green; Linking Environmental Sustainability and Economic Growth Would Challenge Tory Notion That Path to Success Lies in Smaller Government," *The Globe and Mail (Breaking News)*, February 28, 2010, sec. Other.

[66] Mike De Souza, "G20 Leaders Push Harper on Climate Change; 'Sideshow,' Says PM," *National Post*, June 14, 2010, All But Toronto edition, sec. News.

[67] Andrew Mayeda, "Climate Talk Dominates Parliament: 'Take Real Action': Dion Presses PM to Confirm Support for Environment," *National Post*, January 30, 2007, sec. Canada.

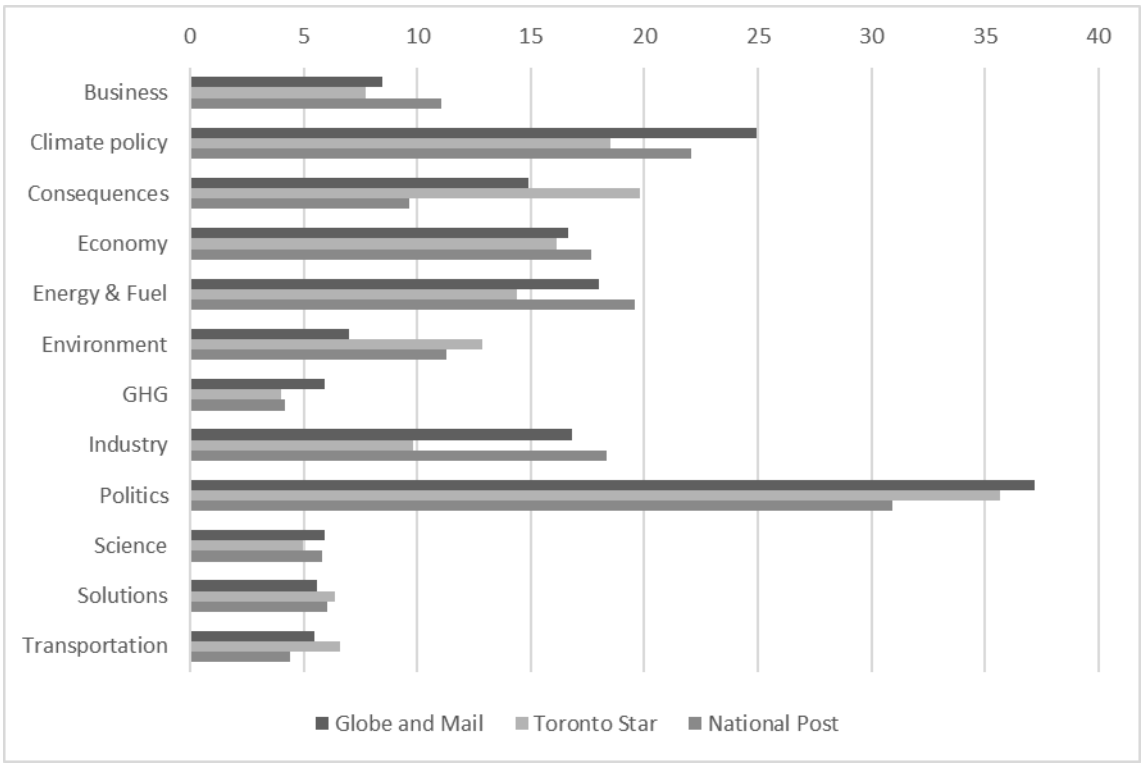

Figure 3.9: Framing frequencies, 2006-2013 (As a percentage of sample articles, N, Globe = 826; N, Star = 845; N, Post = 797)[68]

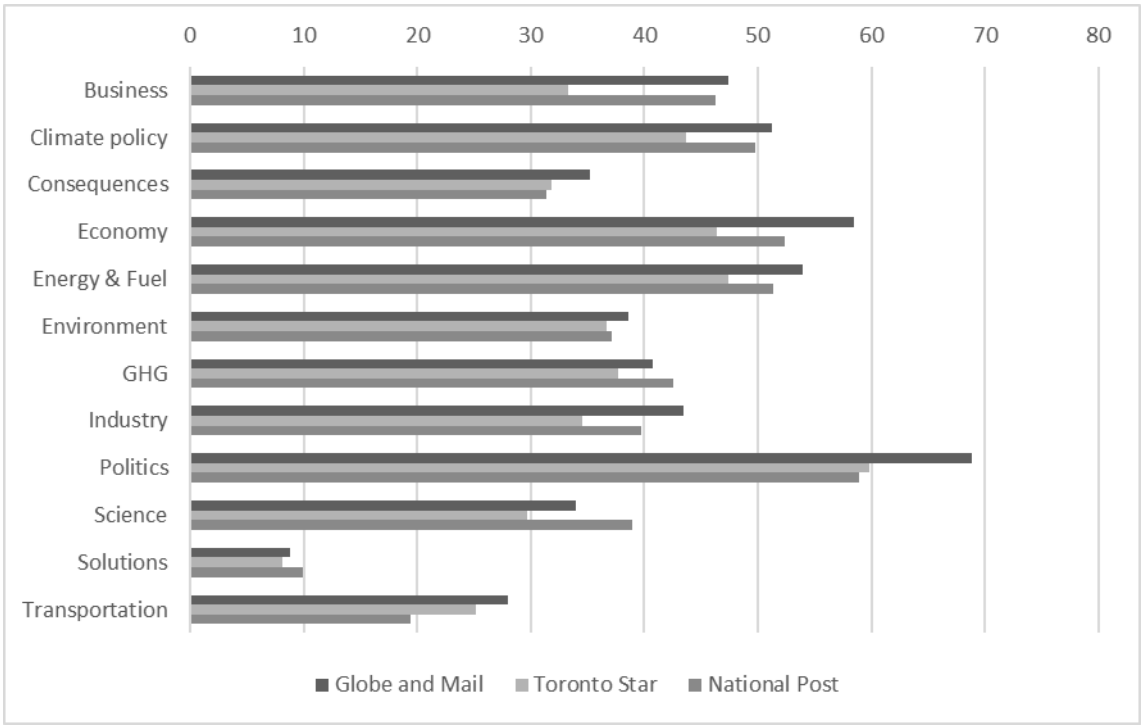

Figure 3.10: Keyword frequencies, 2006-2013 (As a percentage of sample articles, N, Globe = 826; N, Star = 845; N, Post = 797)

[68] Here and all similar figures showing totals for 2006-2013 are weighted averages. See 3.1.2 and Appendix A.

All three newspapers exhibit a prominent increase in political framings from 2007 to 2008, which appears to be related to coverage of the 2008 Canadian federal election, as well as the US presidential election. Elections coverage and an increase in political framings continued into 2009. Similarly, the *Globe* and *Post* both experience an upswing in political frames in 2011, another election year – and also the year in which Canada announced its withdrawal from the Kyoto protocol. However, in 2011 the *Star* experiences a decline in political framings while demonstrating a sharp increase in articles that focus on the consequences of climate change; the precise nature of this difference is unclear. What is noteworthy is that trends in political framings do not closely resemble overall coverage trends (cf. Figures 3.4 and 3.11). As the upswings in political framings correspond to Canadian political events, while overall trends are linked to internationally-covered critical discourse moments, this suggests that coverage and framings respond to different signals – or critical discourse moments of different scales.

An objection could be made that such a characterisation of "political" framings is somewhat narrow, in that it delineates politics mainly as the formal activities associated with various levels of state governance. Needless to say, in STS and the disciplines which inform it, the political encompasses a much broader set of practices, and indeed, inflects virtually all human relationships regardless of the scale of power, effects, or networks involved. This is a legitimate criticism.

There are several reasons for employing a limited definition of "political" here. First, this analysis seeks to identify overt and conspicuous thematic framings – those that are clearly intonated and demonstrable in the texts. Put another way, the goal is to identify framings in terms of the discourses employed by the news media. The sources examined here denote and define the political as predominantly concerning the actions of politicians in the context of governments and related institutions. Thus, the categorisations I use to characterise framings reflect those employed by the newspaper sources – they identify an actor category. This is not to say that the media are not capable of nuance or reflexivity on this issue – they may point to, or discuss, "micropolitics" as well as other senses of politics – but this is not prevalent, nor employed as an overt categorisation. In the following chapter, I explicitly address how to reconcile this sense of "political" framings with broader understandings of politicisation.

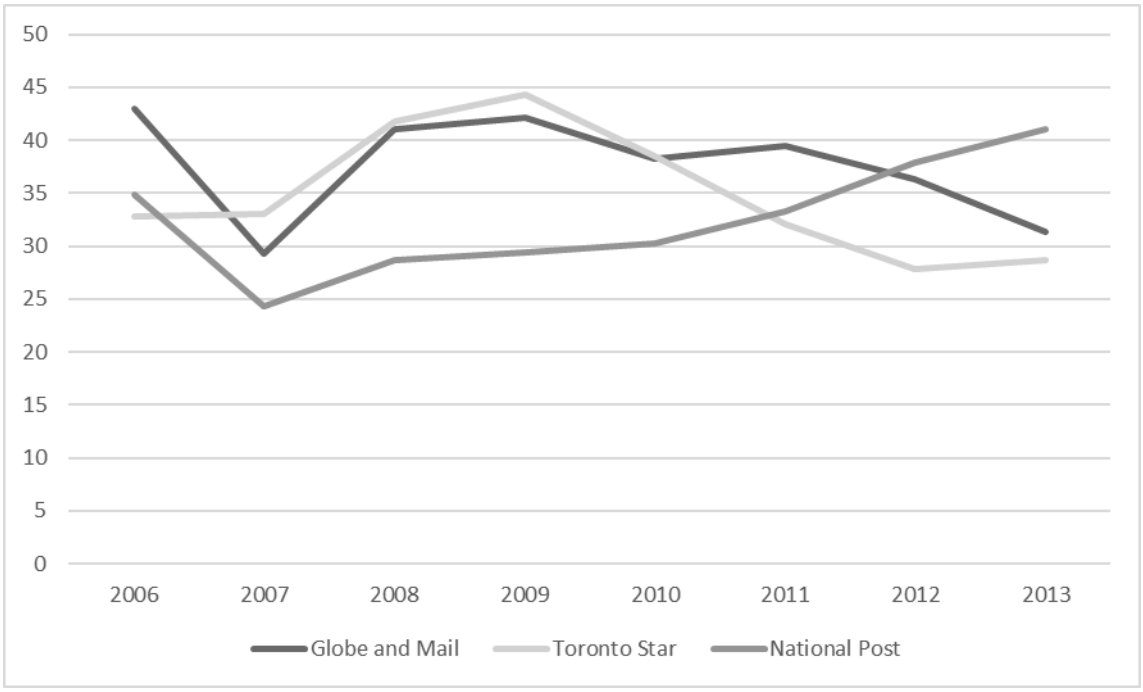

Figure 3.11: Frequency of political framings, 2006-2013 (As a percentage of sample articles, per year, see Appendix A for Ns)

3.8 Conclusions: Politicised Coverage?

The mechanisms influencing climate change coverage are multifarious, complex, and mutually constitutive. This leads to a host of methodological and conceptual issues in attempting to assess the causes and effects of media coverage of climate change.[69] For example, the "issue salience" – the perceived import and interest among the public – of climate change is a major contributing factor to media coverage (Zhao 2009). In other words, the media tend to report on the issues in which the public appears to be interested. Here this can partially account for the high degree of climate change coverage surrounding the June 2007 G8 Summits (Andrews and Caren 2010; Brulle, Carmichael, and Jenkins 2012). But issue salience is itself the product of intersecting and mutually-reinforcing factors, among which is media coverage – which was also at a peak in early 2007 following the IPCC reports and the release of *An Inconvenient Truth* (Mazur 2009). To this one would also add, among other things, the political import placed on the issue. The declining media association of climate change and the G8 Summits, for example, can be interpreted as indicative of a decreasing political concern for climate change as an international issue from 2007 onwards, with the notable exception of the Copenhagen conference. But political import is itself reinforced by newspaper framings. Thus, public salience, political import, and media coverage operate as a set of mutually reinforcing factors.

[69] See Brulle, Carmichael, and Jenkins 2012 for issues in testing predictive models.

On this relationship, coverage of Copenhagen is instructive, and I will end this chapter with some considerations on this event that will preface the next. The Copenhagen conference reveals a reciprocal relationship between politics – or what might tentatively be called "politicisation" – and media coverage. This is to say that media organisations have an underlying impetus to cover events of perceived political importance. Painter finds that amongst journalists this was identified as a chief reason for attending the conference (2008, 10). Thus, it is somewhat unsurprising that "political" framings of Copenhagen are predominant. But the predominance of these framings is not merely an issue of representation – the idea that climate change is "made political" by the media. As evidenced by the Copenhagen conference, climate change is a thoroughly political ordeal. It involves and is defined by political actors.

Nonetheless, concerns about the relationship between representation and politicisation persist. The media highlight certain aspects of climate change and downplays others. Different media sources cover climate change with different framings and frequency. How are these differences to be understood, in particular with regards to concerns about accuracy and misrepresentation (or, *over* and *under*representation)? The issue of politicisation complicates concerns about representation further. Climate change, as a broadly construed problem, is political in myriad ways. After all, climate science is political. Thus, the issue is not that political framings dominate coverage of what is assumed to be fundamentally a scientific issue. Rather, I ask, in what ways do these newspapers represent climate change as political, and to what end?

What is especially crucial here is the way that different scales of coverage and politics intersect with one another. While Copenhagen spurred widespread international coverage, in these newspapers the political framings of this event are intimately linked to Canadian politics. Articles trace the movements and claims of Canadian politicians and other actors operating in local contexts. Thus, the processes of politicisation need to be understood as what these actors say and do in specific contexts, rather than as an abstract normative problem about the way that climate change should be represented. And as and I show in the following chapters, these newspapers and the journalists and columnists that work for them do not merely provide context and report on the actions and claims of actors, but they are themselves a context of and active participants in the politicisation of climate change. What this means is that there are many different ways of politicising climate change, which present different consequences and normative concerns. What *kinds* of politicisations do the newspapers engage in and what are the consequences – for the public, for scientists, and for policy?

4 The Politicisation of Climate Change in the Canadian News Media

This chapter offers a focused critical discourse analysis of newspaper articles in the *Toronto Star*, *Globe and Mail*, and *National Post* connected to the various critical discourse moments examined in the previous chapter. It complements the preceding analysis in several ways. It offers a glimpse of the specific discourses associated with spikes in coverage linked to critical discourse moments. In this regard, it illustrates how different framings are constituted. In particular, I examine more closely the finding of a prevalence of "political" framings. This finding prompts a set of critical questions. To forefront the following analysis, I find it necessary to reiterate the point that the characterisation of certain media framings and discourses as "political" is not without issue. What constitutes the "political," how it is constituted in the media, and the various conceptions of how politics and science are linked and represented are the key questions with which I am concerned. Thus, the political is not an assumptive starting point, but something to be analysed.

I consider these questions with regards to concepts of "politicisation" of science. I wonder how looking at questions of politicisation, as manifested in the media, and with the insights of STS in mind, clarifies and complicates matters with regards to the relationships between, media, science, and politics. Analytically, politicisation offers a challenging starting point, as different conceptions of politicisation operate in different studies and disciplines, as well as in academic and media discourses. Rather than narrowly defining a preferred definition, I consider these various connotations.

The "politicisation of science" can be understood in many ways, each with unique normative and analytical implications. The most common usage connotes an idealised distinction between "objective" (i.e. non-politicised) science and that which has been corrupted in some way by "subjective" political values and interests. For example, in *The Republican War on Science,* a popular book about the relationship between science and American politics in the George W. Bush era, Chris Mooney describes politicisation as the process by which "scientific information becomes merely something to be manipulated to achieve a political end" (2006, 11). Under Mooney's conception, the process of politicisation is defined especially by deliberate "distortions" of scientific knowledge to fit "political agendas." Thus, politicisation is not simply the recruitment of scientific knowledge to inform some policy decision, but occurs when ostensibly scientifically-informed policies go against the consensus of scientific experts.

In STS, the notion that "politicised" science is necessarily a distortion has been challenged on several grounds. For example, in the work of Latour and Callon, politicisation (what Callon calls the "*mise en politique*") denotes the process by which technoscientific issues are formed and brought into

the realm of public and political discourse (Latour 2004a; Callon 2004). As Latour puts its, this can be understood as a move from "matters of fact," which concern primarily scientific and other technical experts, to "matters of concern," which concern a broader range of public actors (2004a; 2004b). This does not necessarily entail any distortion of scientific knowledge, but rather an expansion in interest about the implications of scientific knowledge. Politicisation may entail controversy if technoscientific issues converge with conflicting interests, but the controversy need not surround scientific research *per se*; it may revolve around disagreements about suitable policy measures, for example.

On a more fundamental level, various scholars have highlighted the idealised nature of supposed boundaries between scientific and political realms that define notions of politicisation like Mooney's. These idealisations are often appealed to rhetorically but are not reflective of the actual practice of science (Hilgartner 1990; Jasanoff 1990; Demerrit 2006). The very nature of science – as a social and cultural endeavour – precludes the possibility of any such boundary functioning in practice. In this regard, all science is "politicised" in some sense. It always has linkages to politics, challenging notions of so-called "pure" science. It is not merely the move away from "matters of fact" that leads to politicisation; there are innumerable processes, actions, and relationships that can be understood as political at play in the development of those facts. In this regard, the "micro-politics" of science is the focus of much STS work. Insofar as politics involves the pursuit of interests, negotiations, power differentials, enactments of authority, and the recruitment of allies, then political phenomena inflect virtually all realms of human life, including science. However, such a view can run the risk of reducing science to politics, or being so meta-generalising – "*everything* is political" – as to lose analytical usefulness.

Not in spite of these normative and philosophical issues, but because of them, such "boundary-making" presents a useful concept for understanding politicisation. If demarcations between "scientific" and "political" realms are chiefly rhetorical, the media's role in creating these distinctions presents a crucial point of inquiry. How are such boundaries constituted by these newspapers, and how are they transgressed? This question operates on several levels. First, through its framings and discourses, how is climate change "politicised" in these newspapers? That is to say, when and how is climate change presented as a "scientific" issue, and when and how is it presented as a "political" issue? Secondly, Dorothy Nelkin notes that media representations of science often serve an authority-bolstering function, which tend to be predicated on "ideologies of science" which reinforce science vs. politics boundaries (Nelkin 1987). Here I examine how the authority of scientific knowledge about climate change is either bolstered or undermined through the framings and discourses found in these

newspapers. In this regard, I find that the notion of "politicisation" is itself a major topic of discussion. The discourses in these newspapers thus illustrate an overlap in actor and analyst concepts – they do not passively establish boundaries, but support or reject scientific knowledge claims about climate change based on explicitly defined conceptions of "politicised science."

While nuanced understandings of the diverse senses of politicisation of science are immensely valuable, the underlying thrust of Mooney's concern remains important and pressing. Numerous studies have argued that the media play a crucial role in the politicisation of climate change, by mobilising, appropriating, and (mis)representing scientific knowledge in particular ways for some political or "ideological" end (Boykoff 2007; Boykoff and Goodman 2009; Carvalho 2005; Dispensa and Brulle 2003; Trumbo 1996; Zhou 2016). But in the context of these media studies, as elsewhere, what constitutes politicisation and how precisely it occurs is varied. For instance, Boykoff (2007) identifies "politicised interpretations" of climate science presented in the media, influenced by socio-political and economic factors, systems of power, and geographical contexts. He also speaks of "politicised landscapes" within which both the media and scientific institutions like the IPCC operate, and the "politicised arenas" in which science, media, and policy intersect. And he simply identifies "politicised science." These all have slightly different connotations, but the overarching conception of the interactions between science and the media is one that is "unavoidably" politicised, though by various means and on various levels – through communication, interpretation, practice, institutionalisation, and knowledge production.

Here I do not wish to offer some clean resolution to these methodological and philosophical tensions, but rather try to navigate a position between them. I do not forego the insights of STS and abandon a critical perspective on politicisation; on the other hand, I do not wish to evade the normative concerns – about accuracy, distortion, and misunderstanding – from media studies, science communication, and public understanding of science. So, rather than assuming some comprehensive and conclusive theoretical account of politicisation – and "politicised" and "unpoliticised" science – as a starting point, I operate with the working assumptions that clear demarcations between science and politics do not exist, that "politicisation" encompasses both "accurate" and "distorted" science, and that politicisation occurs in many ways. But, I also assume that concerns about accuracy and distortion are nonetheless still valid, and indeed, crucial. This is to say that some politics are amenable to engaged projects concerned broadly concerned about climate change, while others are obstructions. So, the key task for this analysis is not to ask whether climate science *is* or *is not* politicised through these newspapers, but rather to examine *in which specific ways* climate change is politicised, and with what consequences.

In addressing these questions, I find that the role and function of editorials in the newspapers is paramount. The debates found in these editorials constitute political – or politicised – discourses in several important ways: they seek to mobilise various actors, including but not limited to those in government, industry, and the broader public, thereby influencing mechanisms of political power, namely policy and legislation. And crucially, they concern the authority of science on cultural, institutional, and epistemic grounds. Debates about climate change are not simply political because they overtly concern traditional political issues like governance. The very construction of the debate – the terms that define it, its parameters, what it is ultimately about – is itself meant to bring about political goals. Here, the issue of climate scepticism is unavoidable. Examining its role in the discourses found in these newspapers is critical to understanding their politicised nature.

4.1 Misrepresentation and Politicisation

One major sense of politicisation that emerges in studies of climate science in the media is defined in terms of misrepresentation. In general, the issue of misrepresentation is a frequent basis of analysis in science communication, in which the content of a scientific paper is compared to the way it was reported in the media and examined for factual omissions or inaccuracies. In such analyses, scientists are often recruited to evaluate the accuracy of media representations (e.g. Friedman, Dunwoody, and Rogers 1999). Such concerns do not always emerge with regards to politicisation; many causes are offered for inaccurate reporting, ranging from the scientific competency of journalists, to the media-ineptness of scientists interviewed for stories, to the demand for sensationalist stories. But politicisation is frequently identified as a cause of misrepresentation of climate science – or conversely, misrepresentation is regarded as a means of politicisation (Antilla 2005, 2010; Bell 1994; Ladle et al. 2005; Maille, Saint-Charles, and Lucotte 2010). Inaccurate representations of climate science in the media – especially insofar as they diverge from the prevailing scientific consensus – are linked to specific political agendas. This sense of politicisation is often linked to a thesis of "political parallelism" – that media outlets have discernible political alignments that match those found in the broader public and political realm, and that the framings, discourses, and viewpoints presented by these media will, overall, promote these political agendas (Hallin and Mancini 2004; Iyengar and Hahn, 2009; Levendusky, 2013). The nature of these agendas is complex and not reducible to a single political outlook; however, there are key actors and interests at play.

Robert Brulle has characterised the conglomerate of these actors and interests as an "climate change countermovement" (2013). Central to this movement's political agenda are free-market

principles and opposition to government economic regulation. Government intervention into the economy is construed quite broadly, and any sort of climate change policy or legislation is expansively resisted. Through various organised efforts, in particular that of conservative think tanks, this movement is able to influence media representations of climate change, promoting interpretations that undermine regulatory or legislative approaches to climate change, and more broadly, any view of climate change that appears to imply negative economic consequences (Boussalis and Coan 2016). It is in this context that concerns of climate change scepticism, contrarianism, and denial emerge – views that undermine the scientific research underlying the anthropogenic theory of climate change. In the *National Post* especially, issues of accurate reporting linked to political agendas present themselves.

A few caveats are required here. First, it is important to reiterate that politicisation through misrepresentation does not necessarily map neatly onto other forms of politicisation. This is to say, there are many senses in which science can be understood to be politicised (in the media or otherwise) that does not entail misrepresentation or inaccuracies. For example, the "political parallelism" thesis can be understood symmetrically. In other words, there is an expectation that both accurate and inaccurate reporting on climate science will be related to the political orientation of a news outlet – it does not assume a news source presenting accurate scientific information to be "apolitical."

Furthermore, I do not operate with the assumption that the media *necessarily* distort scientific knowledge. Such a view – especially as it relates to the media's role in "popularising" science – has been critiqued on various grounds, particularly that it promotes deficit models that do not accurately convey either the media's role in science communication or the public understanding of science (e.g. Bucchi 1996). But nuanced understandings of the processes by which science is represented in these newspapers need not displace concerns about accurate reporting.

However, as I will show, evaluating accuracy or misrepresentations is not a straightforward affair. Climate change discourses in these newspapers are constructed in complex, often subtle, ways. [70] News articles seldom make starkly false or erroneous claims about climate change. Rather, sources will ostensibly present accurate information, usually directly attributed to an expert source, but may omit certain qualifiers or contexts which may be important for interpreting this information such as relevant time frames, margins of error, or the relative weight of competing theories (e.g. Antilla 2005; Ladle et a. 2005).

[70] And newspapers operate with different epistemic standards than scientific research (Boykoff 2007; Gelbspan 1999; Stocking and Holstein 2009).

4.1.1 "Balance" as Bias

A critical theoretical perspective that shapes media studies of climate change is that framing (and thus misrepresentation) is systemic, and not necessarily detectable in discrete sources. For example, Boykoff and Boykoff argue that by regularly presenting "two sides" or multiple interpretations of climate change research, this systematically yields a "debate framing," which consequently conveys dispute about climate change, despite a consensus among practicing climate scientists (2004). Other studies have found similar patterns (Antilla 2005; 2010; Boussalis and Coan 2016; Wilson 2000). Such framings have multiple causes, and crucial among them is the journalistic norm of "balance" – ostensibly linked to an ideal of journalistic objectivity. Thus, Boykoff and Boykoff argue that in the pursuit of this ideal, news coverage of climate change is systematically "biased" towards highlighting disagreement (the issue also arises with regards to other sciences (Dixon and Clarke 2012)). Boykoff and Boykoff point to the work of environmentalist Ross Gelbspan, who notes that with regards to journalistic goals of political neutrality, balance is an important professional standard. By presenting "both sides" of a political debate, a journalist demonstrates that they are unbiased, and offering a fair assessment of some issue. But Gelbspan argues that this ideal does not successfully carry over into the scientific realm: "This canon causes problems when it is applied to issues of science. It seems to demand that journalists present competing points of views on a scientific question as though they had equal scientific weight, when actually they do not" (1998, 58). This leads to what McCright and Dunlap refer to as an image of "dueling-scientists" (2003, 366).

Part of the challenge of analysing issues of balance is that the "debates" surrounding climate change are multifarious. Indeed, there is no *the* climate change debate, but many different debates. For analytical purposes, one most suppose relatively tidy propositions about which "balanced" statements can be measured. Boykoff and Boykoff are specifically interested in media framings that cast doubt on the scientific theory of anthropogenic climate change. They found that between 1988 and 2002, the majority of coverage of climate change in prominent US newspapers favoured accounts in which roughly equal amount of space was given to supporting the theory of anthropogenic climate change as was given to opposing viewpoints (2004).

In newspapers surveyed here, such an image does not emerge in news articles that specifically report on scientific research about climate change. In the same article, the conflicting views of scientists are rarely presented, regardless of the precise knowledge claim being presented.[71] This is the case

[71] "News articles" excludes editorials, columns, comments, letters, and opinion pieces.

across all three newspapers. Moreover, again focusing on news articles about scientific research, "balance" does not appear to be established across articles *within the same newspaper* (e.g. a roughly equal number of articles highlighting ACC as competing theories). On the specific question of anthropogenic climate change, news articles presenting scientific viewpoints (for example, experts being quoted for the story) challenging ACC are rare in all three newspapers, and virtually non-existent in the *Star* and the *Globe.* These findings support more recent research. Schmid-Petri et al. find no indication of balanced reporting on fundamental scientific issues in a set of articles in major American newspapers from 2012-2013 (2015; see also Hiles and Hinnant 2014; Xie 2015) (see section 5.5 below for more on "balanced" reporting).

4.2 Periodisation and Politicisation: From Matters of Facts to Matters of Concern

The difference in findings between this and Boykoff and Boykoff's earlier study may be partly understood in terms of the different time periods being examined. In earlier studies of climate change in the media, the predominant scientific propositions at issue were the underlying scientific bases for the anthropogenic climate change theory – the radiative forcing effects of greenhouse gases, atmospheric CO2 concentrations, global mean temperature records, and the linkages between them. As the scientific basis of ACC became more accepted among scientists, this led to new research about effects and consequences, which itself was often a response to broader public and political concerns (Marres 2007; Hess 2014). As climate has large-scale effects, this research is expansive.

Thus, during the period under study, articles about fundamental climate science are displaced by a more diverse range of scientific reporting. The three newspapers rarely report on research pertaining to the underlying bases of anthropogenic climate change, for example, temperature records, historical greenhouse gas emissions, radiative forcing, climate models, atmospheric dynamics, and so forth. Rather, the newspapers predominately covered research about the effects of climate change. Here one finds reporting on studies about the effects of climate change on plants and animals, threats to habitats, and the possibility of extinction.[72] This, in turn, is often framed in terms human health risks. Changing climates are linked to epidemiology and communicable diseases, like Lyme, and the West Nile

[72] "Invertebrates under Threat, Study Warns," *The Toronto Star*, September 1, 2012, ONT edition, sec. News; "Poison Ivy Could Double in Size by 2050 If Global Warming Continues, Study Shows," *National Post*, May 30, 2006, National edition, sec. Canada; Alister Doyle, "Species Extinction Rising Rapidly; Global Warming Gets the Blame Frogs, Toads under Siege; Bears Next?," *The Toronto Star*, March 18, 2006, ONT edition, sec. National Report.

Virus.[73] There are articles about the consequences of climate change for agriculture, as scientists predict altered growing seasons and changing weather patterns, with more severe floods in some regions, and droughts in others. Concerns about famine emerge.[74] In the Canadian geographical context, arctic research is prevalent, which examines melting sea ice, the threat to fauna like caribou, arctic foxes, and polar bears.[75] In later years, there is an emergence of coverage of research into geoengineering – attempts to manipulate large scale biophysical processes to mitigate the effects of climate change.[76]

But as discussed in the previous chapter, newspaper articles dealing with any kind of scientific research are relatively rare across the timeframe under study (see section 3.4.1 and fig. 3.9). This too can be understood with a view to periodisation. According to Downs' notion of an "issue-attention-cycle," environmental issues eventually move away from being defined primarily by scientific actors and in scientific terms to encompass a broader set of public and political interests. In STS literature, similar developmental stages are envisioned. As one moves from "matters of fact to matters of concern," (relatively) basic scientific research shifts from focus to background as broader public concerns – about policy, the economy, consumptive behaviours, and so forth – become more pronounced and dictate public discourse. It is important to reiterate that this expansion of issues does not proceed straightforwardly or linearly from basic scientific research onward. As a scientific issue expands to reveal broader implications, incorporates new contexts, and affect new actors, the emerging sub-issues and concerns loop back on each other; they are shaped in mutually constitutive ways. In the case of climate change this accounts for both the varied coverage of scientific research, and the even greater diversity of framings encompassing a broad range of social concerns – about business, the economy, industry, environmental issues, policy, and politics. That this expansion of coverage of scientific topics coincides with a decline in "balanced" reporting suggests that the underlying science of the anthropogenic climate change theory has become more accepted, at least implicitly. Indeed, as I will discuss at length below,

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[73] Brian Laghi, "Health Guru Shifts Focus to Protecting Environment," *The Globe and Mail*, June 16, 2006, sec. National News. Tom Blackwell, "Parasites Put Health Agency on Alert; Tide Of Ticks," *National Post*, February 12, 2008, National edition, sec. Canada; "UN 'Atlas' Links Climate Change to Disease; More Frequent Heat Waves Will Hit Health of Africans, Asians Hardest," *The Toronto Star*, October 30, 2012, ONT edition, sec. News.

[74] Jason Straziuso, "Global Warming Played Role in Somalia Famine," *The Toronto Star*, March 16, 2013, ONT edition, sec. News; Dale Marshall, "Climate, Hunger and Promises," *The Globe and Mail*, October 1, 2009, sec. Letter to the Editor.

[75] Bob Weber, "Warming Adds Challenge to Arctic Sea Drilling, Scientist Says," *The Globe and Mail*, October 9, 2007, sec. National News; Paul Watson, "Canada Adrift in Troubled Arctic Waters," *The Toronto Star*, December 22, 2011, ONT edition, sec. News; "Saving the Polar Bears," *The Toronto Star*, August 8, 2011, ONT edition, sec. Editorial.

[76] "Altering Earth's Temperature; Explainer," *The Toronto Star*, September 14, 2013, ONT edition, sec. World; Mark Hume, "Haida Group Dumps Man behind Ocean Fertilization; Haida Group Had Tested Controversial Theory Involving Using Iron to Promote Plankton Growth," *The Globe and Mail (Breaking News)*, May 23, 2013, sec. Other.

Schmid-Petri et al. and others have found that news articles expressing fundamental forms of scepticism about long-term global mean temperature trends and their attribution to human causes has also declined over this time period.

Following a scientific controversy in the media over time gives a view to one possible sense of politicisation. That is to say, a scientific issue is politicised as its scope expands, and a broader range of interests affect and are affected by it. Thus, in the newspapers here, the low frequency of "scientific" framings can be understood as proportional to the high proportion of "political" framings. Trumbo argues that by the late 1990s scientists had ceased to be the dominant social actors in media coverage of climate change, displaced by politicians and policy makers. Similarly, Carvalho and Burgess find that coverage shifts from defining climate change primarily as a scientific issue in the late 1980s, to one framed in terms of political agendas and ideological standpoints in the early 2000s (2005, 1462). Weingart comes to similar conclusions in his analysis of the German press (2000). In a Canadian context, DiFrancesco and Young find that by 2008 newspaper articles emphasised scientific uncertainty and "political conflict over appropriate responses to climate change." (2010, 520). This study comes to similar findings in that political framings dominate and that scientific framings are relatively rare (Figure 3.9). However, no discernible pattern of increasing politicisation presents itself in the timeframe under study. By 2006 – the beginning of the timeframe being examined – climate change had already been thoroughly politicised, which is to say, the collection of the actors involved and the implications of the issue were expansive.

Another metric that may be indicative in this regard is the degree to which climate change appears as a minor topic in newspaper articles. Across all three newspapers, approximately 40% of all articles that mention climate change do so in a minor or off-hand way, either in news articles or commentary (Fig. 4.1).[77] In these cases, climate change is often a background premise for the major framing of the article. For example, articles with business framings often discuss "green businesses" which either produce "environmentally-friendly" products or strive to make their production less

[77] A categorization as a minor article indicates the prevalence of climate change or global warming as a theme or topic. The first indicator used to classify such articles is if climate change or global warming is mentioned only once in the article (i.e. in all articles deemed minor "climate change" or "global warming" appears only once). Then a judgement of relative prevalence and relevance of climate change/global warming to the overall story topic was made. If the main focus of the article was a topic that was not linked in an explicit and sustained way to climate change and/or climate change was not given sustained attention, but only appeared in the article incidentally, then the article was deemed minor. This does not depend on the length of the article; a minor article could be relatively long. Conversely, many articles in which the phrase "climate change" or "global warming" appears only once were not necessarily deemed minor – they could have been explicitly about climate policy, or greenhouse gas emissions, or rising sea levels. See Appendix D for an example.

polluting and more energy efficient. In most of these cases, the anthropogenic theory of climate change is not explicitly addressed, but instead taken-for-granted.

In a typical example, an article in the *Toronto Star* about Toronto-based solar energy company only mentions climate change once, in passing. But the implicit connection is clear – climate change serves as the rationale for solar energy production (see Appendix D). Likewise, an article in the *National Post* makes an oblique reference to Al Gore's "warnings of global warming" as the drive behind the emergence of "clean-tech" companies.[78] Similarly, in articles about the environment or environmentalism more generally, climate change often appears incidentally alongside other concerns like species extinction, habitat destruction, smog, and other forms of pollution.[79]

The frequency of climate change as a minor topic does not necessarily imply that climate change has become a relatively minor concern. Its role as a background topic, a phenomenon to be mentioned incidentally, suggests that climate change has been taken-for-granted in these newspapers as a major societal concern. There also appears to be no major change from year-to-year in the percentage of news articles mentioning it in a minor way across the study period, even in the years with the most coverage of climate change overall (though there are changes in the ratio of major editorials to major news articles, which I will discuss below). It could be that once a topic like climate change is established as prominent issue, it maintains a relatively constant background presence in the media. However, longer-term data is required to see how this has changed over the lifespan of climate change media coverage; unfortunately, early studies of climate change in the media tended to exclude incidental or minor mentions from their data-sets or did not differentiate between minor and major coverage. A comparison to other major environmental and social issues would also be fruitful.

[78] Tyler Hamilton, "The Buzz over Solar; Who Said It's Not Easy Being Green? *The Toronto Star*, November 13, 2006, sec. Business. Matt Richtel, "Greening of the Valley: In Silicon Valley, High Tech Has given Way to 'Clean Tech,'" *National Post*, March 15, 2007, sec. Financial Post,

[79] "10 Ways Travellers Can Help the Environment; From the Plane You Fly in to the Food You Eat, Conservation Is Important." *The Toronto Star*, June 15, 2013. ONT edition, sec. Travel; Raveena Aulakh, "Ontario Caribou Faring Poorly, Report Finds; Industrial Development Adversely Impacts Animals across the Province," *The Toronto Star*, December 19, 2013, ONT edition, sec. News; Peter Calamai, "Seafood Species Face Extinction," *The Toronto Star*, November 3, 2006, sec. News; Mark Hume, "Ottawa Urged to Curb Impact of Fish Farms," *The Globe and Mail*, November 1, 2012, sec. National News.

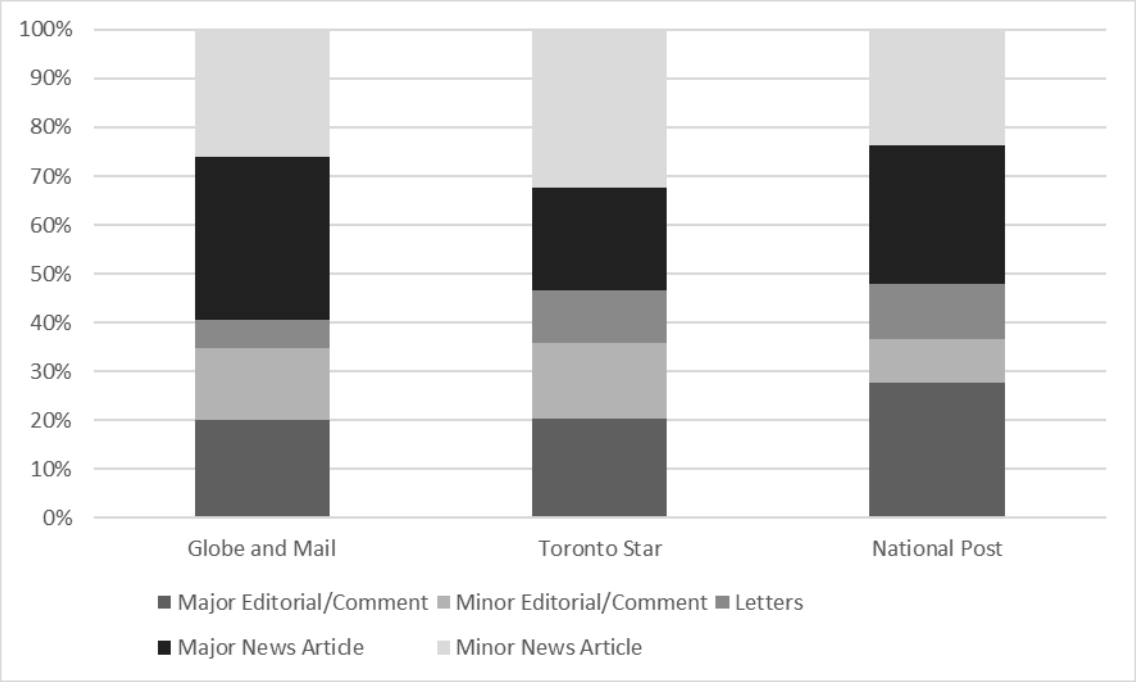

Figure 4.1: Article Distribution by Type, 2006-2013 (N, Globe = 826; N, Star = 845; N, Post = 797)

Likewise, in articles with political framings, climate change routinely appears alongside a list of major political concerns such as crime, poverty, public health, military engagements, and the economy. This is especially salient as overall climate change coverage increases in election years and climate change is but one of many policy issues addressed in campaigns.[80] In this regard, these newspapers represent climate change as a *sine qua non* for political discourses; it has become a necessary political topic. The newspapers both represent and reinforce this form of politicisation of climate change.

A few caveats are required in making sense of this conception of politicisation. If politics, broadly construed, concerns the pursuit of interests and the exercising of power, then an expansion of the actors and networks involved in these processes marks a useful measure of politicisation. To say that earlier phases in the development of climate change – and media representations of it – are "less politicised" is chiefly to say that the range of actors and interests involved were narrower. It does not imply that the less-expansive networks involved did not involve politics, but they involved politics of a different kind. Further, with regards to media framings, the increase in "political" framings can be read

[80] *The Toronto Star*. 2006. "What They Would Do: Highlights of the Party Platforms," January 14, ONT edition, sec. News. Clark, Campbell. 2007. "Harper Reloads with Crime Ultimatum; Government Won't Accept Amendments to Bill, PM Says after Liberals Attempt to Dodge Bullet by Abstaining on Throne Speech." *The Globe and Mail*, October 18, sec. National News; National Post. 2008. "NDP Platform Deconstructed," September 29, National edition, sec. Canada.

as an indicator of the expansion of these networks; it does not imply that "scientific" framings are un-politicised. As I will discuss below, there are many useful ways we can understand scientific framings through notions of politicisation.

In these regards, the role these newspapers play in the politicisation of climate change is a complex one. On the one hand, newspaper articles serve as a sort of documentary record of this move from matters of fact to matters of concern. But these newspapers also actively participate in defining what count as both legitimate facts and legitimate concerns. This points to another sense of politicisation. Here, the role of editorials, op-eds, opinion pieces, and comment columns is crucial. In such pieces, the newspapers outline clear interests and viewpoints. In other words, it is here that the politics of the newspaper are explicitly established.

4.3 Commentary as Politicisation

The broader function of editorials and commentary in media discourses have been variously theorised, and some words in this regard are necessary. Numerous media studies have argued that too simplistic a distinction between "objective" news articles and "subjective" editorials or opinion pieces can downplay the ways that distinct framings – and thus interests, worldviews, and values – are constituted by ostensibly "unbiased" reporting. Nonetheless, ideals of journalistic objectivity are prevalent in most news media, and clear differences in tone, form, and content are evident between news articles and editorials (Mitman, Nikolaev, and Porpora 2012). Specifically, commentaries are intended to be "openly subjective and highly opinionated" and "state views forcefully" by the newspapers who publish them (Sommer and Maycroft 2010, 588). Thus, as Andrew Hoffman argues, through their explicitly expressed opinions, the positions of different newspapers about climate change are made overt (2011, 10).

Editorials and commentaries not only give important signals of the viewpoints that a particular newspaper wishes to promote, but function as both agenda-setters and reflections of broader public debates, and thus can be read as a proxy for the range of public views and discourses surrounding climate change (Day and Golan 2005; Mitman, Nikolaev, and Porpora 2012). Various studies have found that editorials, comment columns, and opinion pieces have been a key component in publicising sceptical or contrarian viewpoints and promoting the interests of those who oppose political action – especially legislation and policy – to address climate change (Boussalis and Coan 2016; Brulle 2013; Hoffman 2011; Elsasser and Dunlap 2013).

Figure 4.2: National Post *front page for November 23, 2011 (note climate change commentary just below the fold)*

Commentary can thus be understood as another means of politicisation. In explicitly outlining values and interests, identifying allies and adversaries, and advocating for specific lines of action, opinion pieces stake out overt political positions. Often the question of politicisation itself is engaged directly; boundaries are drawn between "sound" and "politicised" science, and the "scientific" and "political" aspects of climate change. Reflexively, these discourses can also be understood as a means of politicisation.

William Gamson notes that scientists typically function as "primary validators" of scientific knowledge – that is, defining authorities – while the media serve as a "secondary validators" by relaying the views of experts to the broader public (1999). However, they often encroach upon the realm of "primary validator" by acting as a gatekeeper for the voices of scientists. In commentaries this encroachment goes even further, as the columnists will engage directly with scientific evidence or theories without mediation through a scientific expert. They will offer explicit interpretations and critiques of scientific research. In this regard, editorials and columns become a site of contestation of what counts as legitimate scientific knowledge. Not only are scientific knowledge claims challenged, but also the authority of scientific experts. And again, there is reflexivity to these discourses as the precise question of authority of climate science – the basis of this authority, how far it should extend into the public realm, how much power it should have in defining policy and legislation – becomes a defining issue for climate change debates. In this regard, as discourses where authority is bolstered or challenged, editorials and commentaries are a means of politicisation.

All three newspapers publish a substantial number of editorials, opinion pieces and comment columns about climate change, ranging from a fifth to over a third of all climate change coverage for a given year (Figures 4.1 and 4.3). In comparison, more than one third of news articles that mention climate change do so in only a minor or incidental way (Figure 4.1). Thus, up to half of all major articles on climate change come in the form of commentary. These pieces play a major role in shaping the overall discourses and framings of climate change present in these newspapers, as well as setting the overall viewpoint that is distinctive to each newspaper's representation of the issue. The *National Post* stands out here in that a greater percentage of its articles on climate change are major commentary.[81]

[81] Major commentary denotes comment columns, opinion pieces, editorials, and any other piece that contains explicit opinions in which climate change is a major topic and in which overt positions on climate change are taken (these can include positions on climate science and climate policy). For Ns see Appendix A.

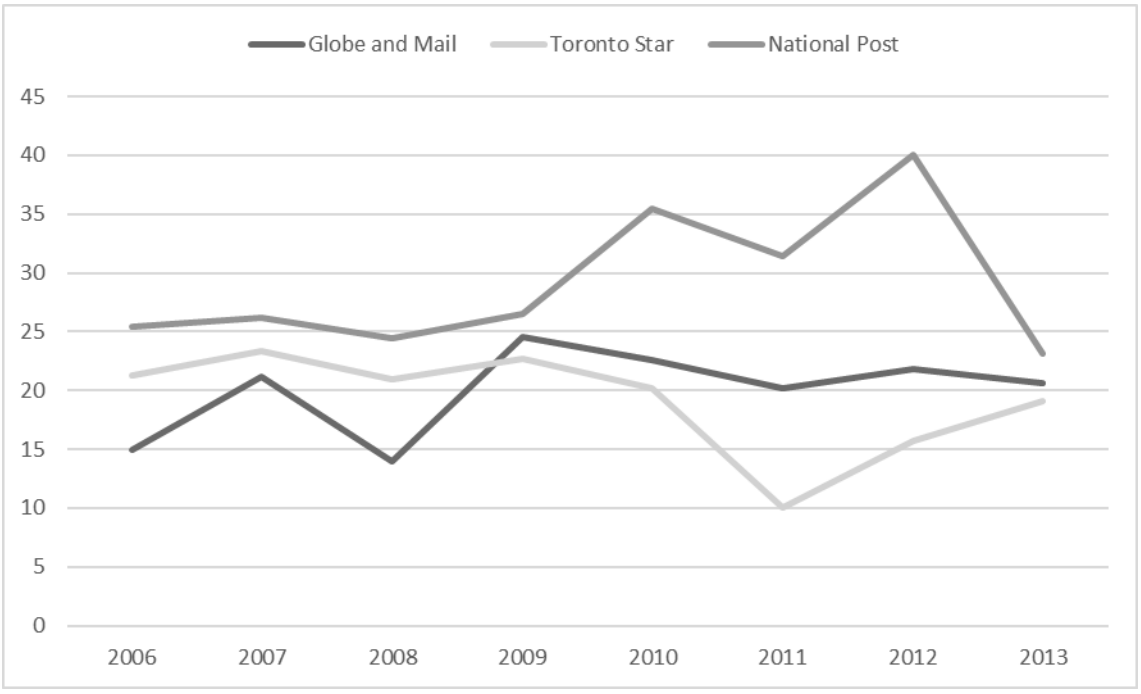

Figure 4.3: Frequency of major commentary on climate change, 2006-2013 (as percentage of sample articles, per year)

Returning to critical discourse moments offers a basis for comparing the different positions established by the newspapers. In the first week of February 2007, all three newspapers published official editorials about the IPCC's Fourth Assessment Report the day following the publication of its *Summary for Policymakers*. Distinct and competing viewpoints and values were offered by each newspaper. At the *Star*, AR4 was presented as grounds to effectively end the debate about political inaction on climate change:

> For years, scientists who studied climate change feared the world's political leaders would not act quickly on the accumulating evidence of global warming. That's because the science was neither certain nor precise enough about the causes of global warming and the threats that it posed. […] But a major report yesterday from the Intergovernmental Panel on Climate Change, a United Nations body made up of hundreds of environmental scientists, completely destroyed all those excuses for inaction. […] In one sense, yesterday's report merely confirms what Canadians have accepted as fact for some time.[82]

Here, the *Star* enrolls the authority of the IPCC scientists to support its editorial view. The primary validator status of these scientists is maintained, as the *Star* further bolsters their status as authorised speakers through its own validator role, which here moves beyond straightforward reporting to affirmation. Issues of scientific uncertainty have been resolved, and the basic premises of

[82] "Leaders Must Act on Climate Change," *The Toronto Star*, February 3, 2007, sec. National Report.

anthropogenic climate change are stated in no uncertain terms as fact: "The planet is getting hotter and it is because of the world's addiction to burning fossil fuel." The report establishes, "*unquestionable* threats of environmental turbulence that flow from this *indisputable* scientific evidence" (emphasis added). Scientific knowledge, on this view, establishes a firm basis for political action.

Conversely, the *National Post* penned an editorial that fundamentally called into question the nature and authority of the IPCC report. It labels the *Summary for Policy* makers as a "sensationalistic […] document that will attract uncritical attention."[83] Despite the report's conclusions that the evidence of climate change is "unequivocal," and that it is "very likely" human activities is causing most of this warming, the *Post* drew attention to - amongst all other possible focuses - a specific point of worst-case-scenario sea level rise by the year 2100, which the Fourth Assessment Report estimates to be 29 centimetres less than the previous estimate in the Third Assessment Report. The editorial continues:

> But even before the summary was released, some scientists were telling us that these new, less shocking numbers don't account for the very latest research, and that they rely on the *questionable assumption* that the ice of the Antarctic will be able to take up some of the water released by thermal expansion and Arctic melting (emphasis added).

The editorial also draws explicit attention to the effect of climate change on Atlantic hurricanes, citing a WMO report which states that, “no firm conclusion can be made." These examples reflect a pattern of the *Post* highlighting points of uncertainty in climate science. The editorial goes on to downplay the potential threat of sea level rise in more likely scenarios, ranging between 21 and 48 cm: "numbers that scarcely summon up visions of gondolas in Trafalgar Square or a Cape Breton Atoll." The article does not consider what kinds of effects exactly a 48 cm sea level rise might produce in different local contexts, but the rhetoric employed implies that the potential consequences of climate change will be relatively mild.

The *Globe and Mail*, as if anticipating the *National Post's* position, also homes in on the uncertainty about sea level rise. But the *Globe* points out that uncertainty can work both ways. In estimating sea level rise, the IPCC did not factor in the melt from Greenland or Antarctica, as there was too much uncertainty regarding the impacts of climate change on these regions. However, two recent studies presented evidence for human-caused melting of both Greenland and Antarctic ice sheets that were not included in the final report. Taking these into account, the *Globe* reports that a sea level rise of 140 centimetres is possible. So, while both the *Post* and *Globe's* editorials frame climate change in terms

[83] “What’s in a ‘Consensus’?” *National Post*, February 3, 2007, sec. Editorial.

of uncertainty, the *Post* parlays uncertainty into downplaying the risks of climate change, while the *Globe* observes that the risks could actually be much greater than predicted. This suggests that uncertainty about risks will be variably interpreted along "ideological" lines. Nonetheless, like the *Star*, the *Globe* takes a position that affirms the authority of both the IPCC and its underlying scientific knowledge and enrolls this authority in support of its editorial position. Indeed, to doubt the science of climate change is to enter the realm of contemptible irrationality:

> That is the success of the IPCC process. It has finally ended all serious debate over climate change. There can be no more denial. Global-warming skeptics and deniers now find themselves in the company of creationists, flat-Earthers and those who dispute the scientific consensus that HIV is the cause of AIDS.[84]

These three editorials, printed on the same day, allow for a sharp comparison which reveals the contested nature of climate change debates. However, these editorials give a tiny glimpse of the diverse range of discourses surrounding climate change present in the media. While synchronic analysis of unique examples can reveal important differences in thematic framing and tone, framing and the establishment of discourses needs to be understood as a systemic process, involving both scale and frequency.

4.4 Concern and Scepticism

The issue of "climate scepticism" has been a major concern in both scholarly and public discussion about climate change. Studies of science communication have often focused on the role played by the media in promoting sceptical views, which, broadly speaking, cast doubt on or seek to undermine the scientific bases of the theory of anthropogenic climate change. However, various studies have found that climate scepticism can be found in many specific forms; not all discourses which might be considered sceptical, nor all actors who might be considered climate sceptics, express the same positions. Several analysts have argued that it is critical to pay close attention to the nuances in these different positions: on the one hand, operating with too general a conception of scepticism risks dismissing legitimate concerns; on the other hand, one must tailor responses to climate change scepticism to the specific discursive strategies employed by sceptics (Hulme 2009; O'Neill and Boykoff 2010; Elsasser and Dunlap 2013).

In examining the literature, I find that climate change scepticism has been categorised in one of two general ways (and sometimes both): either by *type* of scepticism, or by *degree* of scepticism (cf.

[84] "The Plain Fact of Climate Change . . .," *The Globe and Mail*, February 3, 2007, sec. Editorial.

Tables 4.1 and 4.2). As for the former, distinctions are based on the specific kinds of things that one is sceptical about. For example, Rahmstorf (2004) differentiates between "trend scepticism," which doubts evidence that shows that global mean temperatures are increasing; "attribution scepticism," which accepts that the earth is warming, but is sceptical about anthropogenic causes; and "impact scepticism," which does not necessarily undermine the theory of anthropogenic climate change, but holds that the subsequent risks have been exaggerated (2004). In a similar vein, Elsasser and Dunlap borrow characterisations used by the website skepticalscience.com and define these types of scepticism as arguments taking on the following forms: "it's not happening," "it's not us," and "it's not bad," respectively (2013, 760). They add a fourth category – "it's too hard" – which may accept that the earth is warming, the warming is primarily caused by humans, and there are discernible risks, but the potential for any meaningful action is slim, at least as risky as the effects of climate change, or steeped in too many uncertainties. This might be usefully characterised in the manner of Rahmstorf as "action scepticism." Table 4.1 compares the categorisations of prominent studies of climate scepticism that make distinctions based on type.

While commonalities exist between these different rubrics (illustrated by the alignment of rows in the table), they do not map onto each other seamlessly. The different categories that are employed depend in part on the aims of the study, and thus describe different aspects of climate change scepticism. For example, while Rahmstorf's categories point to different kinds of evidence subject to scepticism, Hoffman (2011) adds another dimension to these distinctions by categorising scepticism according to the kinds of frames that appear in newspaper articles: "diagnostic frames" characterise discourses that focus on evidence for and causes of climate change, "prognostic frames" consider risks and outcomes of possible actions, and "motivational frames" concern rationales for action. There are clear similarities between their categories, but also important differences.

Van Rensberg (2015) expands the types of evidence-oriented scepticism introduced by Rahmstorf by distinguishing between different "centres" of scepticism. While an attribution sceptic might doubt the evidence for anthropogenic climate change – for example, the relationship between CO2 levels and global mean temperatures, or measurements of radiative forcing of different greenhouse gases – the basis for that doubt will not always be the same. For some, it will be due to the inherent uncertainty of the evidence itself: we do not have reliable records for long enough time periods, and there are too many variables unaccounted for. The evidence might be diligently collected, and represent our best scientific understanding, but it is too underdetermined. On the other hand, one might locate doubt not in some inherent aspect of the evidence, but in the processes by which that evidence is

collected. Van Resberg calls this "process scepticism": the means by which scientific knowledge is produced have been compromised or corrupted – i.e. the evidence is bad because scientists are doing bad science. This kind of scepticism focuses on problems with institutions collecting and disseminating knowledge on climate change, like the IPCC (see the following section).

Categorisations of scepticism by degree, on the other hand, differentiate between the intensities with which scepticism is held or expressed (see Table 4.2).[85] Hoffman (2011) categorises scepticism along two axes: in addition to diagnostic, prognostic, and motivational orientations, proponents can also be either deniers, sceptics, convinced, or believers. Deniers are an extreme form of sceptic who do not couch their scepticism in uncertainty, or the need to "collect more data," but who rather argue that we can be relatively certain that specific consensus claims about climate change are incorrect. For example, a denier about anthropogenic causes does not merely believe that the evidence is incomplete or underdetermined, but that there is a sufficient amount of evidence to definitively conclude that climate change is caused by something else, for example, solar activities or orbital cycles. On the opposite end of the spectrum, Hoffman places "believers": those who are steadfastly committed to the anthropogenic theory of climate change and, like deniers, employ "a logic that is fairly closed to debate or engagement" (2011, 5). Hobson and Niemeyer (2013) also employ both type and degree categorisations. Their types map closely to Rahmstorf: one can be a sceptic either about the basic reality of the global mean temperature records, or the causal relationship between those records and anthropogenic greenhouse gases, or the impacts of climate change. For each of these types, a sceptic might be emphatic, displaced, or uncertain. The emphatic sceptic rejects outright the knowledge claims being made: e.g. climate change is not happening. The displaced sceptic's concerns about climate change are mitigated by some causal, temporal, or geographical factor: humans are not the *only* cause of climate change, or climate change is happening, but its impacts will not be serious for a long time, or it will not present any major local risks. The uncertain sceptic expresses doubt about the solidity of evidence, or even a personal ignorance that prevents them from taking a definitive position. Thus, any particular type of scepticism can be expressed as a matter of degree. For example, in examining the way that scepticism about anthropogenic causes (i.e. attribution scepticism) has been presented in US newspapers, Boykoff and Boykoff (2004) classify articles according to a four-degree scale: scepticism of

[85] It should also be noted that different types of scepticism can also imply degrees of intensity. For example, trend scepticism is a stronger position than impact scepticism on the proposition that global mean temperatures are rising, and this change is caused by human activity. Indeed, trend scepticism implies impact scepticism (but not vice versa). For this reason, Schmid-Petri et al. consider the former a "fundamental" form of scepticism, while the latter is "subtle" (2017).

anthropogenic contributions is dominant; there is a balanced account of both human and natural causes; there is an account of both natural and anthropogenic contributions, but anthropogenic contribution is emphasised; exclusive coverage of anthropogenic causes.[86]

It is also important to distinguish between the different loci where scepticism is situated and measured in these studies. While this study and many of those cited above are concerned with how different positions on climate change are expressed in newspapers and other media, others are focused on the presence of sceptical viewpoints amongst the broader public or specific actor groups. Hoffman (2011) supplements his analysis of scepticism in newspaper op-eds with observations from the largest "denier conference" in the United States, while Capstick and Pidgeon (2014) measure and classify scepticism based on discussion groups and a nationally representative (in the US) survey. On of the more extensive surveys of this kind was conducted by Leiserowitz, Maibach, and Roser-Renouf (2009). They measured "beliefs, attitudes, risk perceptions, motivations, values, policy preferences, behaviors, and underlying barriers to action" of Americans surrounding climate change, resulting in the categorisation of six distinct audiences, who engage and respond to the issue in different ways: The alarmed, who are "fully convinced of the reality and seriousness of climate change" and taking action to address it; the concerned, who are also convinced that climate change is a serious problem, "but have not engaged the issue personally"; the cautious; the disengaged; and the doubtful, designating different degrees of acceptance and concern about anthropogenic climate change, though none are taking action; and finally, the dismissive, who "are very sure it is not happening and are actively involved as opponents of a national effort to reduce greenhouse gas emissions."

This shows that broad categorisations of scepticism and concern can be given finer gradation. Moreover, it further complicates the distinction between scepticism by type and degree, as the two intersect in complex ways.[87] Leiserowitz, Maibach, and Roser-Renouf measure a broad range of metrics

[86] It is noteworthy that Boykoff and Boykoff's scale includes a categorization of articles that do not discuss natural causes at all (ACC exclusive in Table 4.2), while on the other end of the spectrum, articles "presents both sides, but emphasize [the] dubious nature of the claim that anthropogenic global warming exists" (scepticism dominant in Table 4.2) (128). In this study, the degree of the emphasis on the "dubious nature" of anthropogenic causes is a particular concern, yielding what I call a "contrarian" form or degree of scepticism in which the theory of ACC is flatly dismissed and rejected as incorrect (rather than presented as potentially wrong or containing many uncertainties). In this way, natural causes are viewed not merely the dominant contributions to climate change, but are the exclusive contribution. Contrarianism can thus be considered of higher degree than Boykoff's and Boykoff's most sceptical (of anthropogenic causes) category. Again, this is all to say that different categorizations of scepticism do not neatly map onto each other, and moreover, there are many degrees of nuance in positions on climate change that broad categorizations are bound to smooth over.

[87] I have included it in Table 4.2 below, but these tables and the similarities they imply should only be considered rough and approximate.

to arrive at their categorisations, none of which are reducible to a specific object of scepticism (e.g. trends, causes, evidence, processes) nor a degree of belief. Regarding beliefs, their categorisations are not primarily epistemic in nature, but are also calibrated to attitudes, and crucially, action. For example, many classifications of scepticism imply a sort of principled position based on how one interprets the evidence for anthropogenic climate change, but Leiserowitz, Maibach, and Roser-Renouf's "disengaged" category reveals that there are many people who do not think about climate change deeply in one way or another and are disinclined to take any action. But this does not indicate a staunch belief (not even a principled agnosticism), especially not with regards to scientific explanations for climate change. This bears some similarities to the way that Kari Norgaard (2006, 2011) addresses the issue of climate change denial. Unlike others like who classify deniers as an extreme form of sceptics who actively seek to sow doubt and confusion about scientific understanding of climate change (see section 4.9 below), Norgaard looks at denial as a phenomenon of everyday life. It is a social-psychological response to distressing knowledge, somewhat analogous to denial about one's alcoholism – a refusal to acknowledge a problem resulting in information avoidance. Norgaard also emphasises that denial is "socially organized" – the possibility of ignoring a problem depends on social circumstances (2006, 374). And as opposed to "literal denial," which involves rejecting knowledge as false, Norgaard points a specific kind of denial surrounding climate change – "implicatory denial." This does not involve the active rejection of knowledge about climate change – such knowledge might even be accepted – it rather involves a refusal to confront the implications of that knowledge, namely, the need for action. Thus, categorising positions on climate change propositionally – as measures of the degree to which scientific claims are held to be true or false – is narrow and can neglect the diverse and complex ways people view – and act on – the issue.

While it is beyond to the scope of this study to examine such connections, their work also serves as a reminder of the reciprocal relationships between the media and the public. The media certainly influence the beliefs, attitudes, and dispositions towards action of the groups they identify, but as audiences, these groups are also inclined towards certain interpretations of media representations of climate change, which can then be reflected back into media discourses. For example, Nathan Young (2013) finds that letters to the editor have played an important role in advancing sceptical arguments that would otherwise not meet journalistic standards. Thus, the views expressed in the media are only part – albeit a very important one – of the multifarious ways that climate change is thought about, understood, engaged with, and acted upon.

Table 4.1 Categorisations of scepticism by type

Rahmstorf 2004	Hoffman 2011	Hobson and Niemeyer 2012	Elsasser and Dunlap 2013	Capstick and Pidgeon 2014	Van Rensberg 2015	Schmid-Petri et al. 2017
Trend scepticism	Diagnostic	Reality scepticism	"It's not happening"	Scientific/ physical	Evidence	Fundamental
Attribution scepticism		Causal scepticism	"It's not us"			
Impact scepticism	Prognostic	Impact scepticism	"It's not bad"		Process	Subtle
["Action scepticism"]	Motivational	---	"It's too hard/costly"	Social/ behavioural	Response	

Table 4.2 Categorisations of scepticism by degree

Boykoff and Boykoff 2004	Hoffman 2011	Leiserowitz et al. 2009	Hobson and Niemeyer 2012	Current study
Scepticism dominant	Deniers	Dismissive	Emphatic	(Contrarian)
	Sceptics	Doubtful	Displaced	Sceptical
Balanced		Disengaged	Epistemic uncertainty	Somewhat Sceptical
		Cautious		
ACC dominant	Convinced	Concerned	N/A	Concerned
ACC exclusive	Believers	Alarmed		

4.4.1 Measuring Scepticism

This is all to illustrate the important point that there are many ways of defining, evaluating, and measuring scepticism. Crucially, Painter and Gavin (2016) note that scepticism in newspaper articles can be measured differently depending on the level of discourse. Does one measure specific sceptical claims? Or the presence of individual sceptical claims-makers? Or does one evaluate scepticism on the level of the article?

Here I evaluate scepticism on an *article level* as a qualitative characterisation conveying the *degree* to which climate change is conveyed as a real and serious problem demanding attention and action.[88] There are several reasons for this. As will be illustrated in the discourse analyses below, many

[88] I only consider commentary (editorials, columns, op-eds, etc.), not news articles. This is to continue the previous sections' analysis of the effects of these overt commentaries in shaping climate change discourses. As I state

sceptical pieces convey more than one, and often all, of the different types of scepticism. I am primarily interested with positions regarding action on climate change, but there are many ways of expressing action scepticism. Indeed, trend, attribution, and impact scepticism all imply action scepticism. While a column may explicitly employ an impact scepticism argument, as the *National Post* article above, it may seek to imply a more thorough-going sceptical view. Thus, despite the diversity of types of sceptical discourses, the overall function can be fairly homogenous. As Boykoff argues, newspaper columns might highlight specific examples of uncertainty in climate science but can be understood as a means to construe climate science *as a whole* as inherently uncertain and contentious, with the goal of undermining the action (2007; see also Oreskes and Conway 2010; Lewandowsky et al. 2015). In this regard, the tactics of sceptical discourses in these newspapers need not be internally consistent, nor even especially ingenuous, to have a disruptive effect.[89] Thus, the article level presents a useful scope for evaluating scepticism.

I define as *sceptical* any commentary that conveys an overall sense that the theory of anthropogenic climate change is untrue, unlikely to be true, or at best equivocal to competing theories. Sceptical commentaries are strongly opposed to any sort of concerted climate change action or policy. These also include what I call "contrarian" positions – a characterisation I do not employ in my article-level analysis but use in the following discourse analysis. These positions fall at the extreme end of scepticism. They do not merely challenge the consensus view on the grounds of uncertainty, or the possibility of alternative theories, but instead offer competing scientific evidence or theories. These rival knowledge claims are presented as scientific truths holding greater certainty than ACC, and in this way, they are contrarian. I characterise as *somewhat sceptical* commentaries that for one reason or another convey wariness of climate change action. They tend to view the status quo as carrying less or equivalent risk than concerted policy measures like carbon taxes or industry regulations, and at best support policies with limited disruptive effects (e.g. economic effects). They typically view ACC as likely to be true but may not be wholly convinced.[90]

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above, commentaries typically offer explicit viewpoints, where news articles recruit claims-makers in more subtle ways to present a point of view.

[89] This is an important point – many editorials are not especially good or coherent – they offer a shotgun approach, a smattering of misleading claims to create doubts: Steven Edwards 2007. "Activists' Fashionable Fixes Do More Harm than Good; Demand for Land Threatens Great Apes' Habitat." *National Post*, June 2, sec. World. is a good example.

[90] In this way, *sceptical* commentaries tend to align with trend scepticism or attribution scepticism, while *somewhat sceptical* commentaries align with impact scepticism and action scepticism. However, as I note, to do not employ these category types in any strict way.

Alternatively, I have defined positions that do not express one of these forms of scepticism as *concerned*. Other studies have characterised non-sceptical positions as "convinced" (e.g. Hoffman 2011), but this may downplay a distinction between impact or action sceptics, who are ostensibly convinced by the anthropogenic theory of climate change but are not concerned about its consequences. Concerned positions thus accept ACC but also advocate, either explicitly or implicitly, various forms of action on climate change.[91,92]

4.4.2 Positions in Newspaper Commentary on Climate Change

There are stark differences in the kinds of positions and discourses be promoted in these newspapers. For most years, the *Star* exclusively presents concerned views (Fig. 4.4). Over the entire study period, no major editorial presents a fully sceptical view and only 3% are somewhat sceptical. The *Globe* is more likely to present a range of views. Overall, concerned commentaries are predominant, but not overwhelmingly so, accounting for 54% of major commentaries, and while sceptical positions are infrequent, they make up a not insignificant 12% of the total. Somewhat sceptical positions are expressed in 34% of editorials and commentaries (Fig. 4.5). On the other hand, in the *National Post* 78% of commentaries published over the study period presented fully sceptical stances, with another 12% expressing somewhat sceptical positions. Significantly, 17% of all articles in the *National Post* sample were sceptical commentaries (Fig. 4.6).[93] Concerned pieces made up only 10%, ranging from 3% to 18% in different years. The *Star* and the *Post*'s range of commentaries is relatively consistent from year to year, while the *Globe* exhibits great variation, with concerned pieces sometimes being overwhelmingly predominant, as in 2009, or relatively rare as in the following year.

Painter and Ashe (2013) find support for political parallelism with regard to official editorials in a sample from November 2009 to February 2010 from the *New York Times* and the *Wall Street Journal*. They find that the latter uniformly dismisses or contests sceptical positions, while the latter almost exclusively promotes sceptical positions. Across a broader international sample of newspapers, this difference is less marked, with sceptical voices being found in right-leaning papers only slightly more often than left-leaning ones, at 58% to 42%. On the other hand, Schmid-Petri et al. find no indication of

[91] The above examples illustrate the kinds and range of concerned (activist and critical), somewhat sceptical, and sceptical (including contrarian) framings found in editorials. The *Star* editorials, for example, are characterised as *concerned*, as is the official *Globe* editorial. The *Post* editorials, across all examples, are characterised as *sceptical*. Margaret Wente's editorial below is held to be *somewhat sceptical*.

[92] See Appendix D for more samples of these different characterisations.

[93] See Appendix E for a list of all sceptical commentaries from the *National Post* sample.

political parallelism with regards to scepticism in US print media commentary in 2012-2013. "Left-leaning" papers like the *New York Times* and "right-leaning" papers like the *Wall Street Journal* were found to publish sceptical positions with roughly equal frequency.

These findings need to be understood with regards to long-term trends, as Schmid-Petri et al. find that while political parallelism appears to decline from earlier studies (Carvalho and Burgess 2005), so too does the prevalence of attribution-scepticism and trend-scepticism, regardless of news source. On the other hand, impact-scepticism appears to increase over time (Hoffman 2011 comes to a similar conclusion); in Schmid-Petri et al.'s findings, impact-scepticism accounts for 77% of the sceptical positions. Their overall conclusion is that in conjunction with a decline in political parallelism, climate change scepticism becomes more subtle.

Such trends were not found in the newspaper sources examined here. Instead, political parallelism is well supported. The *Toronto Star* and *National Post* – representative Canadian "left-leaning" and "right-leaning" newspapers – exhibit drastic differences which remain consistent over the study period. The *Globe and Mail*'s editorials and commentaries also support a political parallelism thesis: the paper is regarded as politically "centrist" and it publishes a more "balanced" set of views with regards to sceptical and concerned positions. Nor does political parallelism appear to decline over time.

There is no strong indication in these sources that sceptical discourses are becoming subtler.[94] In the *Star*, this question is relatively inapplicable. The *Globe's* scepticism overall may be considered subtle, but there is no change over time. There is a slight decrease in fundamental forms of scepticism and an increase in impact scepticism in the *National Post* from 2009 to 2013, but trend-scepticism and attribution-scepticism are still predominant even in the most recent coverage. The rise of impact-scepticism, and the relative decline of fundamental scepticism has been linked to more nuanced discussions about the competing risks of climate change and costs of action – often framed as an issue of "environment vs. economy" (Dunlap and McCright 2010). In the *Post* such framings remain constant over the study period, as do extreme contrarian positions dismissing ACC.[95] Furthermore, while major

[94] See Appendix F.

[95] Claudia Cattaneo, "Tory Green Plan Will Kill Oilsands," *National Post*, March 27, 2007, sec. Financial Post; Terence Corcoran, "Growth First, Climate Later; Nations Make Clear the Priority," *National Post*, September 23, 2009, National edition, sec. News; Bjorn Lomborg, "Crunch the Numbers: Kyoto Doesn't Add up," *National Post*, November 1, 2007, sec. Issues & Ideas; "Climate Blowback; The CO2 Crusade Only Generates Hostility against the West; Benny Peiser," *National Post*, April 8, 2008, National edition, sec. FP Comment; Jen Gerson, "Vital Oil Infrastructure Made out to Be Villain," *National Post*, December 27, 2012, National edition, sec. News; Peter Foster, "Canada Scores Own Goal on Carbon Targets," *National Post*, November 1, 2013, National edition, sec. FP Comment.

editorials and commentaries in the *Star* and *Globe* decline in frequency in the years following 2009, in the *Post* they increase significantly. The *Post*'s peak year for editorials in general, and sceptical editorials in particular, comes in 2011. This is the year with the lowest rate of editorials of any kind in the *Star* and *Globe*.

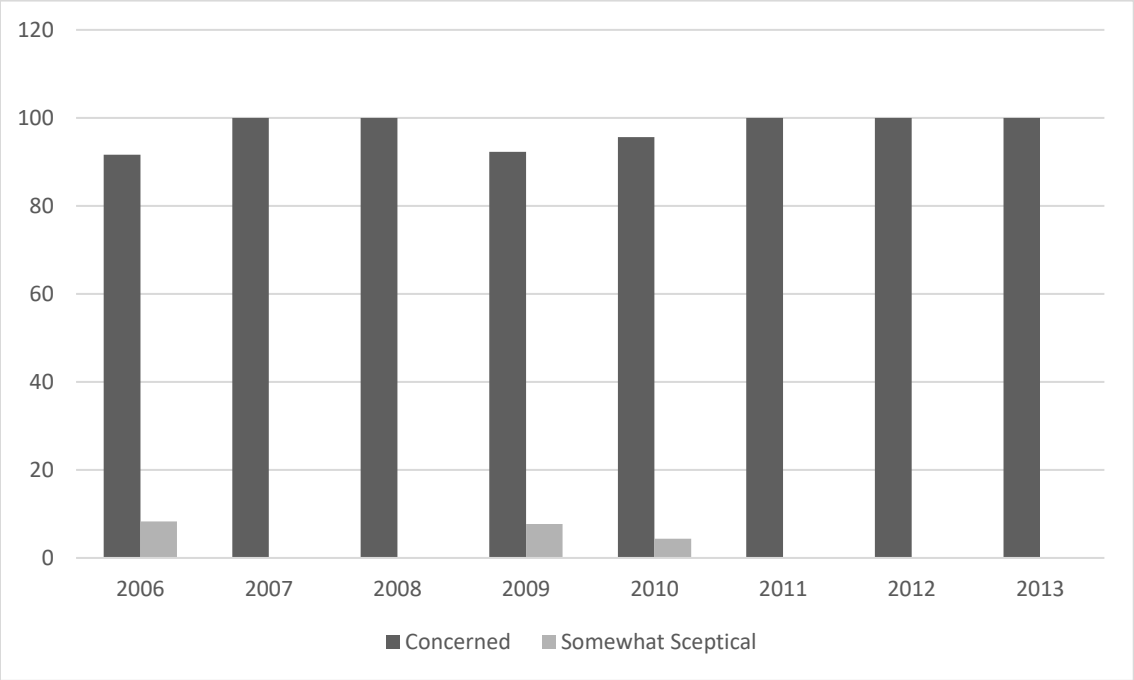

Figure 4.4: Positions in Commentary on Climate Change in the Toronto Star, *2006-2013*
(Figures show percentage of major commentaries expressing each position; see Appendix G for Ns)

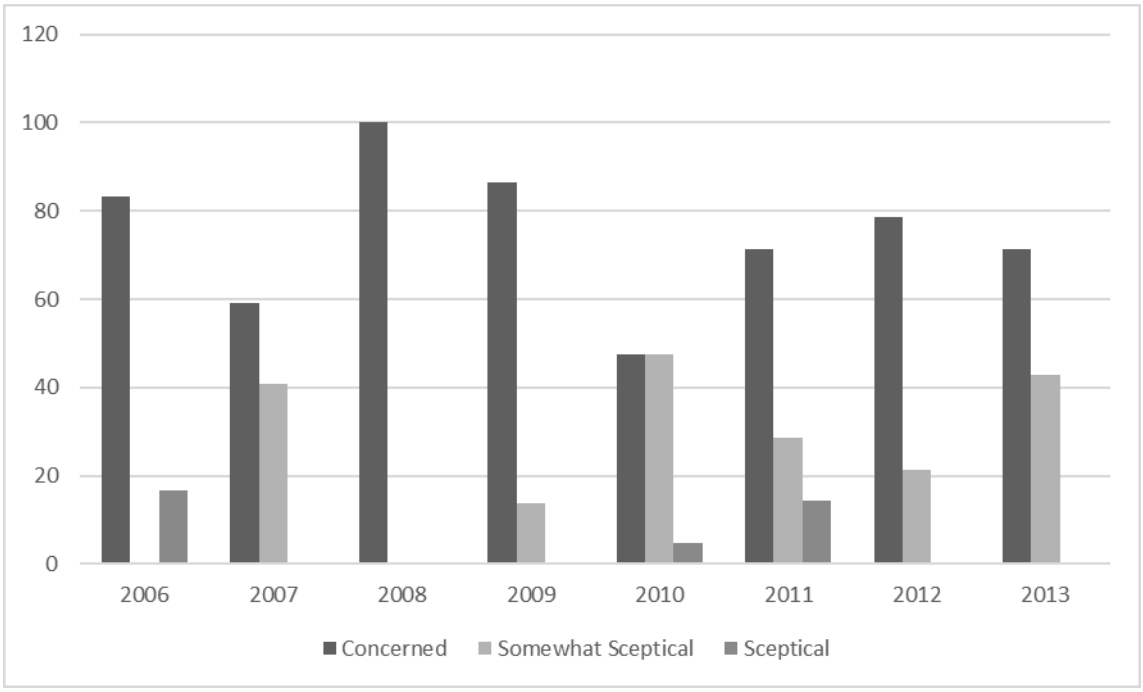

Figure 4.5: Positions in Commentary on Climate Change in the Globe and Mail, *2006-2013*
(Figures show percentage of major commentaries expressing each position; see Appendix G for Ns)

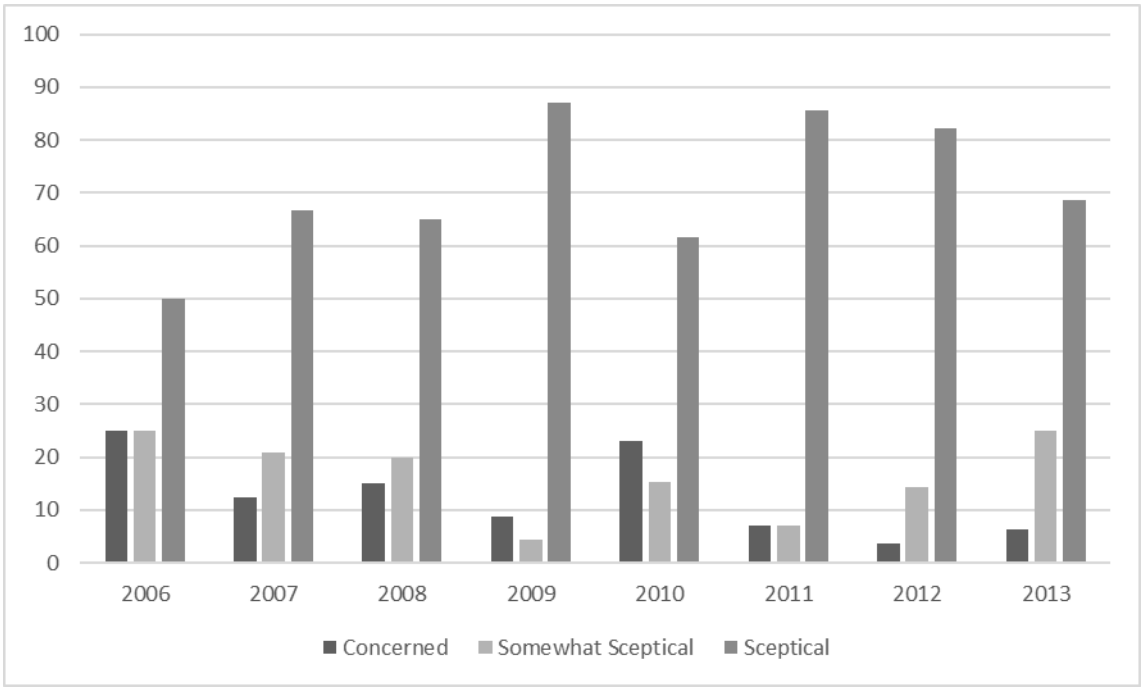

Figure 4.6: Positions in Commentary on Climate Change in the National Post, *2006-2013*
(Figures show percentage of major commentaries expressing each position; see Appendix G for Ns)

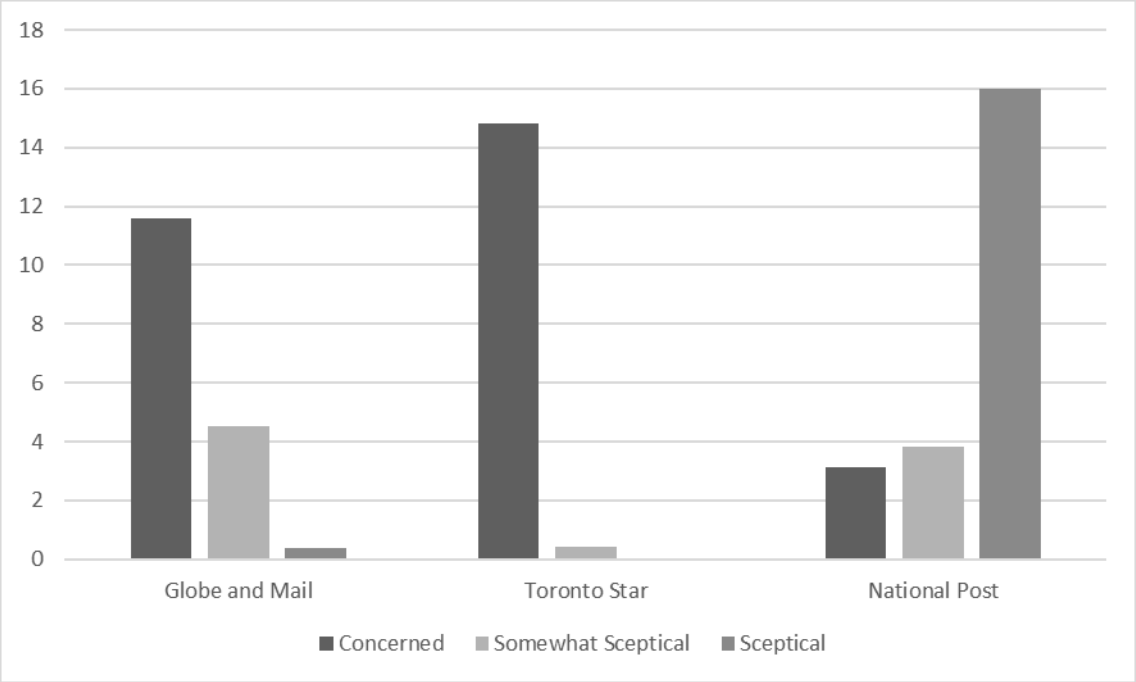

Figure 4.7: Percentage of all articles expressing commentary positions, 2006-2013 (N: See Appendix A)

4.5 The IPCC and the Politicisation of Science

Just as events spark increased media attention and can serve as a reference point for critical discourse analysis, certain topics and actors regularly reoccur in media discourses and become central to the highly contested framings of climate change – they are "critical discourse topics," as it were. They are linked to critical discourse moments, but are not entirely defined by them. These topics can serve as useful focuses of synchronic analysis. The IPCC functions in this regard. Media discourses surrounding the Fourth Assessment Report cannot be understood without considering the broader role of the IPCC.

A crucial aspect of the IPCC in media discourses is its epistemic role. In the *Globe* editorial above, the IPCC's authority is called upon to legitimate the scientific knowledge claims being presented. While the *Globe* bolsters the IPCC's epistemic authority through attribution, in the *Toronto Star* editorial, its knowledge is simply affirmed. It is factual: "unquestionable" and "indisputable." In this way, the IPCC is a "primary validator" of scientific knowledge – it authoritatively imparts "facticity" on certain knowledge claims (Gamson 1999, 23; Carvalho 2007, 225). For the *Post*, this epistemic authority becomes a major source of contestation. The *Post* explicitly challenges the both the specific knowledge claims and the broader epistemic role of the IPCC. Thus, the IPCC functions as a major – if not *the* major – focal point in climate change debates in the newspapers examined here. Here the epistemic and political roles of the IPCC inextricably intertwine; indeed, they are mutually reinforcing. Its broader

political authority – in directing specific governmental policies and legislation on climate change, is to be granted insofar as it is able to produce credible scientific knowledge. And its ability to offer authoritative scientific knowledge is recognised as the IPCC as an institution meets certain political (or perhaps, as will be discussed below, *apolitical*) requirements. (This, incidentally, points to the somewhat paradoxical nature of scientific authority. The establishment of authority is a thoroughly political phenomenon, but scientific authority is recognised typically insofar as it is removed from politics). In these newspaper discourses, then, stablishing or contesting knowledge claims about climate change depend on establishing or contesting the authority of the IPCC.

For the *Post* especially, the IPCC served as a topic of intense critical commentary, In addition to the *Post's* official editorial position, three of the paper's major columnists, Peter Foster, Terence Corcoran, and Lawrence Solomon, dedicated full-length columns to the IPCC, two published the same day as AR4 was released. In these columns, the *Post*'s writers undermine specific knowledge claims, framing them in terms of uncertainty or challenging them outright, whilst explicitly justifying this scepticism with regards to the "politicised" nature of the IPCC.

Figure 4.8: National Post *columnists (from left to right: Peter Foster, Lawrence Solomon, and Terence Corcoran) (Source:* National Post)

Foster casts doubt on both the question of anthropogenic climate change and efficacy of mitigation, claiming "the contribution of humans [to climate change] remains uncertain."[96] Corcoran reaffirms this framing, echoing the *Post's* editorial stance in highlighting the differences between AR3 and AR4: "Clear away the steamy language and the rhetoric from the climate hysterics and in many ways

[96] Peter Foster, "Beyond Gelinas," *National Post*, February 2, 2007, sec. FP Comment.

the new report reads like a scaled-back version of the 2001 report. Temperatures might not rise as much as thought only five years ago, and the warnings of sea-level increases have been cut in half."[97]

Solomon dedicates his entire column to expounding the view, in direct contradiction to the IPCC, that carbon dioxide does not play, or could not play, a significant causal role in climate change.[98] Instead, he profiles a sceptical scientist who believes that solar activity and cosmic radiation explain observed climate changes. Thus, he does not merely present opposing views to highlight genuine disagreement among scientists or between scientific knowledge claims. Generally, when the *Post* calls on scientific experts to offer opposing views, they are presented as corrections to faulty or false science. A key point here is that the *Post* still trades heavily in the currency of scientific authority.

Solomon's column is especially noteworthy in that it does not frame questions of the radiative forcing and relative warming potential of CO2 as a matter of debate, but instead explicitly affirms a specific scientific knowledge claim: "The sun's strong role indicates that greenhouse gases can't have much of an influence on the climate -- that C02 et al. don't dominate through some kind of leveraging effect that makes them especially potent drivers of climate change." This is a clear example of a fully *contrarian* position. It is not merely scepticism stemming from the alleged uncertainty of climate science; it presents, with its own authoritative certainty, an alternative scientific theory that conflicts with that expounded by the IPCC.

Each of these arguments, aimed at undermining the authority of the IPCC as a source of scientific knowledge, underlie broader challenges to the political (regarding governance, policy, and legislation) influence of the IPCC. For the *National Post* columnists, the scientific knowledge of climate change emerging from the IPCC is inherently political and ideological; to believe the consensus (or that such a consensus even exists) on climate science and to promote action is clear evidence of ideological bias. Foster rehearses the notion that politicians, citizens, and media sources who express concern about climate change are engaging in apocalypticism, and bolstering "doom-and-gloom" scenarios while "burying level-headed science."[99] As for the IPCC's findings, they are "politically slanted and invariably paint the grimmest of worst-case scenarios." Similarly, Corcoran describes AR4 as a "UN public relations scam."[100]

Conversely, the *Star*'s science writer, Peter Calamai, penned a column which expounded AR4's conclusions. In the piece, Calamai affirms the authority of the IPCC:

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[97] Terence Corcoran, "2,500 Wiarton Willies," *National Post*, February 3, 2007, sec. FP Comment.
[98] Lawrence Solomon, "Limited Role for CO2," *National Post*, February 2, 2007, sec. FP Comment.
[99] "Beyond Gelinas," *National Post*, February 2, 2007.
[100] "2,500 Wiarton Willies, *National Post*, February 3, 2007.

> The technical summary, which is the authoritative document scientists rely on for their research, is the starkest report yet from the Intergovernmental Panel on Climate Change, a blue-ribbon group of 2,500 scientists and climate experts brought together by the United Nations.[101]

Despite the pronouncedly different construal of AR4's credibility in the *Post* and the *Star*, Calamai too indicates a politicised framing. While the *Post*'s columnists see the political nature of the IPCC as shaping its scientific findings into an alarmist discourse, Calamai reads the opposite. The politics of the IPCC contributes to a more politically palatable set of statements, which minimize the dangers (and thus necessity for political action) of climate change: "Its message was softened in protracted political negotiations among diplomats and bureaucrats from 130 UN member countries that lasted well into last night." The column also frames climate change in terms of uncertainty, but again, it runs counter to implications of uncertainty presented in the *Post*. Like the *Globe*'s official editorial, Calamai suggests that the uncertainty that characterizes much of climate science need not imply overestimates, but may reveal underestimates of the consequences of climate change. Calamai quotes Stefan Ramstorf of Germany's Potsdam Institute for Climate Impact Research, who states, "The data now available raise concerns that the climate system, in particular sea level, may be responding more quickly than climate models indicate."

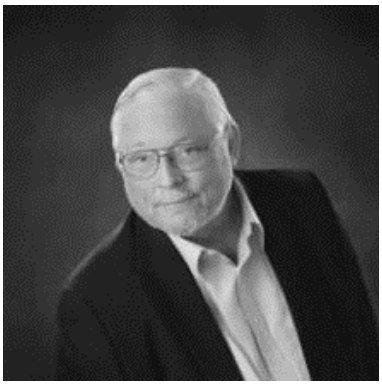

Figure 4.9: Toronto Star *columnist Peter Calamai*

For Calamai, the political nature of the AR4's "Summary for Policy-Makers" needs to be leveled by the scientific authority of the technical "Physical Science Basis." Likewise, the *Globe*'s columnist Jeffrey Simpson acknowledges scientific uncertainty is unavoidable, but argues that more scientific knowledge will fill gaps and eventually minimize this uncertainty:

[101] Peter Calamai, "Scientific Report on Climate Change Paints a Gloomy Picture of Rising CO2," *The Toronto Star*, February 2, 2007, sec. News.

> This being the IPCC's fourth crack at assessing the science of climate change, the report is studded with "extremely likely" and "very high confidence." And the headline findings are clear: The climate is warming; it has warmed fastest in recent decades; human activities are by far the principal cause, especially fossil fuel use; and over the next century, if current trends continue, temperatures will rise between 1.8 and 4 degrees. The IPCC said: "Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in . . . greenhouse-gas concentrations." Conversely, it is "extremely unlikely" that global climate change of the past 50 years can be otherwise explained. So much, therefore, for the theories about sunspots, natural vegetation and long cyclical climatic changes causing what's been happening. Some people will still cling to these theories, just as there are those who believe the Earth is flat.[102]

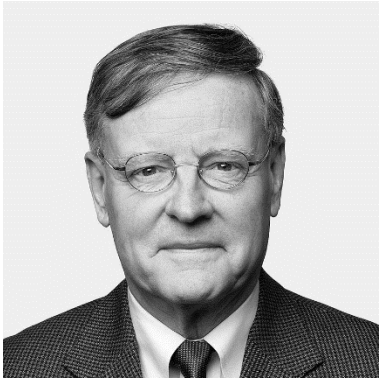

Figure 4.9: Globe and Mail *columnist Jeffrey Simpson*

Some insights can be gleaned here. First, the authority of science, in a broad sense, remains central to the discourses in these columns – these newspapers challenge or bolster this authority. This is an important sense of the way they engage in politicisation. Secondly, the very notion of politicisation is a dominant theme in these debates – it is largely through this concept that the validity of scientific knowledge claims about climate change are questioned or affirmed. Here there is overlap between politicisation as a concept used to analyse these discourses, and a concept used by the media actors to define them. Thirdly, general framings can be construed in quite specifically disparate ways. All three papers have highlighted the political and uncertain nature of climate science, but have read the consequences of that politicisation and uncertainty very differently. This suggests that generalisations that the "media politicises science" are not entirely useful – the precise nature and effects of that politicisation is what matters. Distinct, if not competing, politics are being enacted in these newspapers. Finally, these newspapers themselves become sources of both epistemic and political authority in these debates. They are political actors. They are "secondary validators" of scientific knowledge – as well as

[102] Jeffrey Simpson, "It's Official: The Climate Is Warming. Now What?," *The Globe and Mail*, February 3, 2007, sec. Comment Column.

"primary validators." The *Post*'s columnists not only attempt to undermine the IPCC, but offer themselves as more credible, trustworthy, and authoritative voices on climate change.

4.6 Sound vs. Politicised Science

To borrow the analytical language of STS and apply it with some liberties, the political nature of science is presented in these newspapers in an asymmetrical way. While narratives of science in the popular press are not wholly uncritical, the degree to which they recognize and highlight the politics of science is predominantly negative. These narratives convey the view that politics corrupts science, but (relatively) uncorrupted science exists. Good science, is trustworthy precisely to the degree which it evades or eliminates political ideology. For Jeffrey Simpson of the *Globe*, it is corporate interests that fosters false doubt about the IPCC's findings:

> There will remain denials about the IPCC report from the fringe, the scattered newspaper columnists or TV ranters to entertain audiences with rococo rhetoric. Some companies in Big Oil will keep financing climate-change doubters and fight, as they did in California, against taxes on their products to pay for clean energy option.[103]

On this theme, the day following the release of AR4, the *Star* reported on the case of an Exxon-Mobil-funded think-tank, the American Enterprise Institute, who offered $10,000 to scientists for a "policy critique" of the IPCC report. The article implies that such funding is tantamount to a "bribe" for undermining the conclusions of the Assessment Report.[104] Conversely, the *Post* regards the origin of ideological bias to be the IPCC itself. For the *Post*'s columnists, while the IPCC's politicised conclusions, reviewed by thousands of scientists, are not to be trusted, scientific knowledge – "level-headed science" – serves as the solution. In a pre-emptive piece published a week before the release of the report, Terence Corcoran wrote a piece entitled, "Politics First, Science Second," in which he puts forth an outright dismissal of the entire IPCC process and rejects the legitimacy of any of its conclusions:

> If you've been lifting intellectual weights and taking extra runs around the science track to build mental stamina for next Friday's release of the much-hyped 1,600-page science report on climate change, you can now take it easy. There will be no report. You will not need to know about or read any science, because there will be no science. Instead, we are going to get a few ginned-up pages of generalized political scaremongering.[105]

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[103] "It's Official, the Climate is Warming. Now What?" *Globe and Mail*, February 3, 2007

[104] Deborah Zabarenko, "Scientist Bribes Denied; Think-Tank Funded by ExxonMobil Offered Scientists up to $10,000 U.S. for 'Policy Critique' of Global Warming Report," *The Toronto Star*, February 3, 2007, sec. News.

[105] Terence Corcoran, "Politics First, Science Second," *National Post*, January 27, 2007, sec. FP Comment.

In another editorial, Peter Foster gushingly reviews Donna Laframboise's *The Delinquent Teenager Who was Mistaken for the World's Top Climate Expert*:

> In a meticulously referenced and deservedly praised page-turner, Ms. Laframboise, an accomplished journalist who turned to the skeptical blogosphere, demonstrates how the IPCC is a *thoroughly political organization* (emphasis added). Far from objectively weighing the best available science, it cherry-picks egregiously to support its main objective: to serve its government masters. Its lead authors are not the world's leading scientists but frequently wet-behind-the-ears graduates, and/or ardent activists. They are also selected on the basis of gender and country "diversity" rather than expertise.[106]

Each of these columns, though drawing different conclusions, uphold a common distinction between "politicised" and "sound" science. Like Mooney's earlier definition of politicisation, politics is viewed here as a necessarily distorting and corrupting influence on science. In this way, the concept is wielded by these columnists "asymmetrically" in that it only applies to the scientific claims they view as false; and from the analytical perspective of this project, it is important to note that both concerned and sceptical voices in these newspapers appeal to notions of politicisation. While this might suggest a sort of discursive symmetry – both concerned and sceptical voices appealing to the same kinds of arguments – there is actually a systemic asymmetry. The *National Post's* columnists appeal to the notion of "politicised science" in supporting their sceptical views over three-and-a-half times more frequently than the *Star* does in criticising climate change scepticism.[107]

4.6.1 "Ideologies of Science" in the Media

A key conceptual concern in both STS and media studies of science surrounds "ideologies of science" (Edmond and Mercer 1999). How is science, writ large, construed? What kind of project is it? And with authority is it imbued? Dorothy Nelkin suggested that there existed no thorough-going critique of science in the media, arguing that the way it was presented was "beyond serious criticism (1987; 1991, xiii).[108] Anabela Carvalho's research suggests otherwise – that science was subjected to strong contestation in some media (2007). The above columns and editorials, might be ambiguously interpreted in this regard. Certainly, there is no unanimous reinforcement of particular scientific knowledge claims, and thus as Carvalho suggests, the media can "construct science either as an authoritative and trustable source of knowledge or as a dismissible endeavor" (2007, 238). On the other

[106] Peter Foster, "A Thoroughly Political Body." *National Post*, October 22, 2011.
[107] See Appendix H.
[108] As I discuss in the final chapter, it is not entirely clear what such a "systematic critique" might entail. Perhaps, one might suppose something approaching an STS critique of scientific authority.

hand, one does not find wholesale doubt about the authority of scientific knowledge. These critiques, in themselves, do not encroach upon a sort of epistemic relativism by which scientific knowledge is inherently to be doubted. Indeed, for all the scepticism presented in the *Post*, for all the politicisation of science, science as an overall endeavour is still one that ultimately grants authoritative knowledge.

The difference between the contrasting positions of the *Globe* and *Star*, on the one hand, and the *Post*, on the other, seems to mainly stem from where perceived ideological bias originates. So while for the *Post*'s columnists the IPCC is not to be trusted, they select their own scientists who present impartial, "level-headed science," who can be trusted. In a column by the *Post*'s Lorne Gunter, he affirms:

> In the past decade, the Southern Hemisphere has warmed only half as fast as the Northern Hemisphere. Ice cover at the South Pole is expanding, rather than melting. Since 2003, the upper layer of the Atlantic has lost 25% of the extra heat it had built up in the past three decades. Worries that the Atlantic currents were slowing due to warming have been shown recently to be unfounded: For thousands of years, Atlantic currents have sped up and slowed down as they are doing now. And the broad consensus among solar scientists is that the Earth's warming is almost entirely explicable by increased solar activity that began about 100 years ago, and which will end around 2020. But don't expect any of that to be in the IPCC's release. These inconvenient truths would be bad for the cause of international central planning.[109]

The *Post*'s scepticism revolves around specific knowledge claims, not the limits of science generally. Indeed, it is precisely the appeal to the authority of science that ostensibly bolsters scepticism – the IPCC is to be doubted because of better, more objective science. While the contested nature of science found in these editorials and columns might undermine some caricatures of scientific certainty, the ideal of scientific objectivity, broadly speaking, remains intact.

4.7 Consensus and Epistemic Standards

Why does the IPCC become such a focus of contestation? Part of the answer is that, from multiple perspectives, the IPCC's work serves as the major scientific standard for evaluating knowledge claims about climate change. What is collectively understood about climate change is largely, if not primarily,

[109] Lorne Gunter, "Preaching the Climate Catechism," *National Post*, January 29, 2007, sec. Issues & Ideas. Gunter's reference to "the broad consensus among solar scientists" is curious here, given that the *Post's* columnists routinely dismiss the consensus amongst climate scientists on the grounds that either it doesn't exist, or even it did, it doesn't matter to whether ACC is correct or not (see the following section). Moreover, it is certainly not at all clear that there is such a broad consensus amongst solar scientists – no study has shown this. This may be interpreted as the *Post* promoting a diversity of viewpoints, but I suggest that it is more likely indicative of the *Post's* broader strategy of promoting climate change scepticism – as I note above, sceptical arguments need not be coherent or consistent to have an effect, and indeed, inconsistency may be more effective in generating doubt about climate change than rigorous arguments. See also section 4.8 below.

attributable to its work. With perhaps the exception of practicing climate scientists, this is true for almost all actors in climate change debates, from policy makers, other experts, politicians, environmental groups, the public, and crucially, the media. Above, the *Star* and *Globe* both treat the IPCC's findings as authoritative, while the *Post* contests this authority.

Indeed, to highlight the issue of reflexivity, the IPCC also serves as the major source of climate change knowledge for a range of science communication, PUS, and STS scholars studying climate change. Across a wide range of studies, even those that are deeply constructionist in orientation and eschew relatively simple deficit or dominant models, the IPCC serves as an epistemic authority (Antilla 2005; Bailey 2014; Dispensa and Brulle 2003; Zia and Todd 2010). It is, as Mayanna Lahsen puts it, a representative of the "scientific mainstream" (2005). By and large, it is the basis from which any analysis of climate scepticism proceeds. Indeed, to even speak of climate scepticism, and related questions of media accuracy, is to hold up the work of the IPCC as a standard measure by which to evaluate competing knowledge claims.

Ostensibly, debates about climate change revolve around a set of scientific propositions. However, as illustrated above, these scientific propositions do not necessarily become the chief focus in media discourses about climate change. Takahashi and Tandoc argue that, given an oversaturation of scientific information in the media, people will rely on heuristic shortcuts to evaluate knowledge claims (2015, 6). Of these, the "authority heuristic," by which the credibility of information is evaluated in terms of the expert authority of those providing the information, is of major importance. This, in part, explains why the above editorials highlight (or undermine) the authority and credibility of the IPCC. When faced with competing knowledge claims about natural phenomena, evaluation necessarily shifts away from evidence for said claims, to the credibility of those making the claims.

Inextricably linked to these issues is the question of a scientific consensus. Boykoff, for example, holds that the IPCC's Assessment Reports demonstrate an "entrenched scientific consensus on anthropogenic climate change "where there is clear understanding" which stands in contrast to the "confusion" and "contentious" view of climate science created by the media (2007, 479). Similarly, Carvalho, referencing the work of the IPCC, recognizes that "the claim that there is an anthropogenic influence in the climate system is nowadays widely consensual" (2007, 223). The importance of a consensus can be understood in a public understanding of science perspective as an extension of an authority heuristic. Timothy O'Brien finds that public views of scientific authority – how much influence scientists should have over policy decisions – is determined by whether or not scientists are seen as being in agreement with one another (2013). Public acceptance of knowledge claims about climate

change thus rest critically on the question of *who* (i.e. are they credible, trustworthy experts?) is making these claims – and to what degree those deemed to be authoritative experts agree.

The day following the release of AR4's summary for policy makers, the *Star*'s Peter Gorrie characterizes the report as "the consensus of 2,500 top scientists from Canada and 129 other countries."[110] Another editorial, printed after the release of the summary for policy makers on the mitigation of climate change states,

> The UN Intergovernmental Panel on Climate Change - a multinational group of 2,500 scientists - has predicted an additional increase of between 1.1 degrees C and 6.4 degrees C this century. There is consensus on the cause. In the two centuries since industrialization - a geological millisecond - the concentration of carbon dioxide in the Earth's atmosphere has increased by 35 per cent; a third of that has come during the last four decades. Almost all of the increase is due to human activity.[111]

Other commentaries, while not mentioning "consensus" explicitly, otherwise point to the scale of agreement amongst climate scientists. The *Star*'s official editorial concerning AR4 notes the "hundreds of environmental scientists" comprising the IPCC, while Peter Calamai's commentary describes the panel as "a blue-ribbon group of 2,500 scientists and climate experts." Similarly, an opinion piece by York University researcher Dave McMillan states, "Recent reports by the UN-sanctioned Intergovernmental Panel on Climate Change (IPCC), comprising 2,000 top scientists from across the globe, conclude that human activity is the primary cause of current warming."[112]

However, in these commentaries the relevance of a scientific consensus with regards to the legitimacy of anthropogenic climate change is virtually never expounded explicitly. When it is mentioned – as one column parenthetically refers to the "consensus of the world's leading climate scientists" – it reinforces the truth – the "indisputability" – of the IPCC's knowledge claims.[113] And in general, the term "consensus" does not appear predominantly in the *Star*'s coverage (Fig. 5.6). Somewhat counterintuitively, this might be because the *Star* takes the consensus view for granted. Editorially, the *Star* consistently upholds the conclusions of the IPCC; virtually no editorials or columns call into question these findings or take a sceptical view.

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[110] Peter Gorrie, "Getting Warmer ... Stephen Harper's Environmental Conversion Continues as He Recognizes the 'Enormous' Threat of Global Warming. But Emission Cuts? Not so Fast," *The Toronto Star*, February 3, 2007, sec. News.
[111] Michael Byers, "Eyes of the World Are on Harper," *The Toronto Star*, May 30, 2007, sec. Editorial.
[112] Dave McMillan, "How Science Tests Climate Theories," *The Toronto Star*, April 27, 2007, sec. Opinion.
[113] "The Coming Green Industrial Revolution, *Toronto Star,* 5 February 2007, sec. Editorial.

One of the very few critical engagements with the question of consensus – what it means epistemologically and with regards to scientific credibility – comes in a column in which columnist Joey Slinger sarcastically criticizes a sceptical column written by Lorne Gunter in the *National Post*:

> [Gunter argues that] the vaunted "consensus" among international scientists that the planet is warming catastrophically has only been achieved "by defaming or ignoring" those whose opinions and research "cast doubt on the dogma." And when you think about it, he could be right. Maybe we're not getting the real story at all. Just scary fairy tales. Maybe it's time we found out who is telling the honest truth. It wouldn't be difficult. People like Gunter and the Prime Minister's Calgary gunfighters are believers in the (genuine) scientific method, the one that involves experimentation. And here's a simple experiment. Don't do anything, and see what happens.[114]

In contrast to the *Star,* the question of consensus figures much more prominently in the *Post* (Figure 4.10).[115] And, again in contrast to the *Star*, where the consensus view is consistently implicitly affirmed, columns in the *Post* typically take an explicit sceptical or contrarian position. It is also striking how disproportionately the issue of consensus factors into the *Post*'s climate discourses. It is also noteworthy that this discrepancy is most pronounced in the years in which climate change coverage, in general, was in decline. This trend in the *Post* is also found regarding editorials. As the *Globe* and *Star* published fewer editorials and commentaries on climate change, corresponding with an overall decline in articles, the *Post* published an increasing amount.

Within these sources we find three general arguments. First, the very existence of any sort of consensus is challenged. In a guest editorial, Tom Harris, the executive director of the "International Climate Science Coalition," argues,

> [British Broadcast Regulator] Ofcom does, however, make one very serious mistake. They refer over two dozen times in the adjudication to a supposed consensus in the climate science community "that human activity is the main cause of global warming." This is one of the most prominent myths in the climate change debate. There has never been a comprehensive worldwide poll of climate experts about the causes of climate change and, even if it were known that a majority of scientists in the IPCC agreed with such an assertion (it is not), the IPCC represents only a small fraction of the tens of thousands of climate experts worldwide. To

[114] Joey Slinger, "Green's the New Red Scare; Climate Change Panic, It Turns Out, Is Actually Global Communist Plot," *The Toronto Star*, February 6, 2007, sec. News.

[115] Incidentally, in showing the reverse relationship of what might be expected – the newspaper with the highest degree of sceptical framings is also the newspaper with the highest prevalence of the term consensus, and vice versa – this figure suggests a potential methodological issue in trying to estimate the consensus vs. sceptical positions of news sources according to keywords.

> meaningfully contend that there is a consensus in the field, one must show convincing evidence that such a statement is true. To date, no one has.[116]

Second, and relatedly, it is argued that the findings of the IPCC cannot be considered indicative of a consensus. The title of the *Post*'s official editorial published the day after the first installment of AR4 asks, "What's in a consensus?" The reply: "Perhaps the first thing we should come to a "consensus" about is that consensus is always elusive in science, and conclusions are always tentative." The column concludes, "Even Christians preach from four different gospels; there is no reason people seeking to understand climate change must content themselves with just one." The *Post's* message here is that the IPCC, far from being *the* authoritative source of knowledge about climate change, is merely one of many equally qualified voices on the topic.

Columnist Terence Corcoran takes a more mocking tone calling IPCC scientists "2,500 Wiarton Willies" and its Assessment Reports "a ritual UN public relations scam."[117] On a similar note, he characterizes the IPCC not primarily as a scientific body, but a "UN agency created for the sole purpose of pushing and expanding the climate change agenda." Thus, a politicisation framing is invoked to undermine the credibility of scientific knowledge.

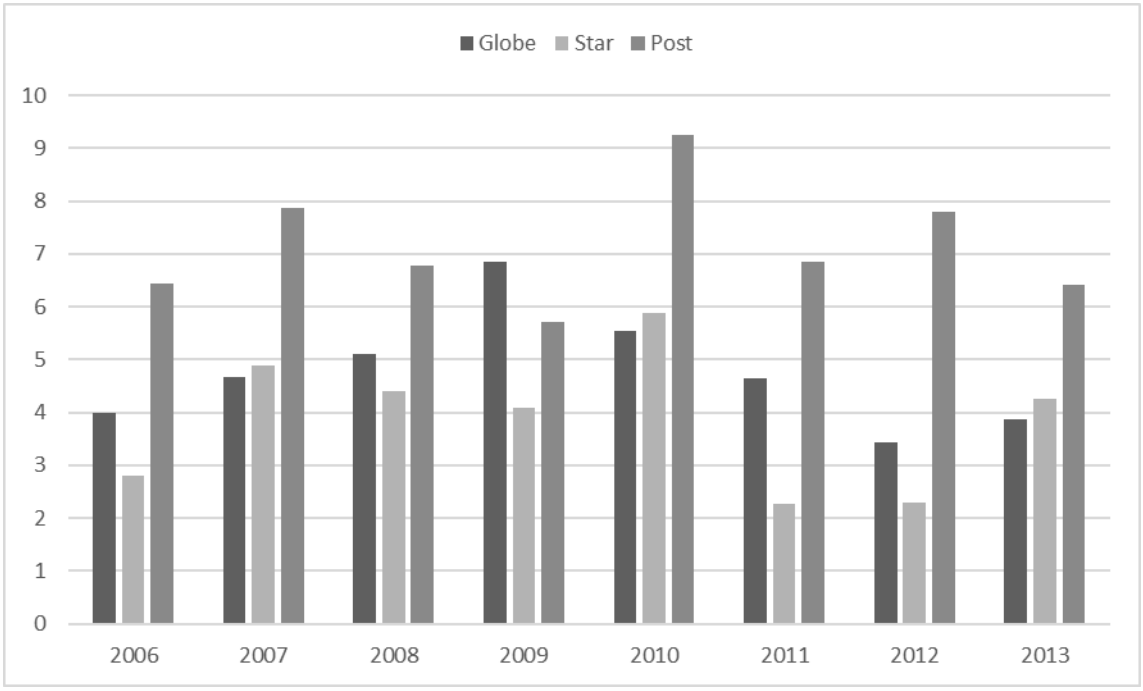

Figure 4.11: Percentage of climate change articles mentioning "consensus" per year, 2006-2013 (N: See Appendix A)

[116] Tom Harris, "No Consensus on Global Warming," *National Post*, July 29, 2008, National edition.
[117] Terence Corcoran, "2,500 Wiarton Willies," *National Post*, February 3, 2007, sec. FP Comment.

Thirdly, it is argued that even if a consensus did exist, this does not imply that the anthropogenic theory of climate change is true. Pre-empting the release of AR4, Terence Corcoran published a column titled, “Climate Consensus and the End of Science.” In it, he waxes philosophical about the decline of objectivist science. Science by consensus, he argues, is not real science:

> Back when modern science was born, the battle between consensus and new science worked the other way around. More often than not, the consensus of the time -- dictated by religion, prejudice, mysticism and wild speculation, false premises -- was wrong. The role of science, from Galileo to Newton and through the centuries, has been to debunk the consensus and move us forward. But now science has been stripped of its basis in experiment, knowledge, reason and the scientific method and made subject to the consensus created by politics and bureaucrats. […] Under the new authoritarian science based on consensus, science doesn't matter much any more. If one scientist's 1,000-year chart showing rising global temperatures is based on bad data, it doesn't matter because we still otherwise have a consensus. If a polar bear expert says polar bears appear to be thriving, thus disproving a popular climate theory, the expert and his numbers are dismissed as being outside the consensus. If studies show solar fluctuations rather than carbon emissions may be causing climate change, these are damned as relics of the old scientific method. If ice caps are not all melting, with some even getting larger, the evidence is ridiculed and condemned. We have a consensus, and this contradictory science is just noise from the skeptical fringe.[118]

In a guest comment column by Christopher Monckton, a hereditary British peer and well-known climate contrarian, he elaborates on this line of philosophical reasoning:

> To date, the "consensus of evidence" does not support catastrophism. "Ah," say the believers, "but there is a consensus of scientists and learned societies." That is the argumentum ad verecundiam, the reputation or appeal-to-authority fallacy. Merely because a group has a reputation, it may not deserve it; even if it deserves it, it may not be acting in accordance with it; and, even if it is, it may be wrong.[119,120]

[118] Terence Corcoran, “Climate Consensus and the End of Science,” *National Post*, June 16, 2006, National edition, sec. Financial Post: Comment.

[119] Christopher Monckton, “Aristotle’s Climate; His Fallacies Exemplified by Warming Hysteria,” *National Post*, April 21, 2012, National edition, sec. FP Comment.

[120] These two columns express a special kind of scepticism that may not be adequately described by the various categorisations offered in section 4.4 above. In degree, they certainly express a high degree of scepticism, and Corcoran’s is partially grounded in doubt about specific empirical evidence. Van Rensberg’s (2015) category of “process scepticism” is relevant here, in that the columnists are sceptical of the very value of consensus in science, but the doubt expressed here appears even more fundamental than that. Likewise, Hobson and Niemeyer’s “epistemic uncertainty” scepticism is relevant here, in that ostensibly, an epistemological argument is being staked out, but one that advances a rather radical empiricism.

The *Globe*, like the *Star*, in general implicitly affirms the consensus position. Simpson writes, "The IPCC report — the fruit of years of labour by hundreds of scientists from 113 countries — says that, in pre-industrial times, carbon dioxide represented 280 parts per million of dry air, whereas, in 2005, the levels were at 379 ppm." This em-dashed summary emphasises the epistemic significance of the level of agreement amongst scientists. Simpson elaborates, "When the IPCC uses the phrase "extremely likely," it means the scientific consensus is 95-per-cent certain, and when the phrase "very high confidence" appears, that means a 90-per-cent chance of being correct."[121] However, while the question of consensus largely goes unexamined in the *Globe*, significant exceptions exist. One such example was published days before the release of AR4 by Margaret Wente:

> Because I'm skeptical by nature, I've always discounted the environmental catastrophists. Their message is religious, not rational. I've also spoken to enough brainy scientists to conclude that human activity is affecting the climate and that global warming is for real. That's the famous consensus you keep hearing about. But that's where the consensus ends. Beyond that, the science is very far from settled. Scientists themselves are deeply split about how alarmed we should be, the nature of the threats we face, how imminent those threats are and what to do about them.[122]

While Wente acknowledges a scientific consensus – and its epistemic significance – with regards to the theory of anthropogenic climate change, she problematizes consensus beyond the epistemological concerns expounded in the *Post*. It is sufficient – and perhaps necessary – to accept the basic premises of ACC, but still leaves room for impact and action scepticism. Thus, it is important to note that media discourses surrounding the question of consensus do not pertain to a single issue, but a diverse set of epistemological and practical concerns.

4.8 Assessing Accuracy and Defining Debate

How does one measure the accuracy of representations of a multifarious issue like climate change? For the sake of precision, many studies have limited the scope of such assessments to the basic tenets of anthropogenic climate change – that there is a causal linkage between increasing global mean temperatures and rising atmospheric CO2 concentrations – or other clearly defined research findings about, for example, level rise, species extinction, health risks, and climate tipping points (Antilla 2005;

[121] Jeffrey Simpson, "It's Official: The Climate Is Warming. Now What?," *The Globe and Mail*, February 3, 2007, sec. Comment Column.
[122] Margaret Wente, "A Questionable Truth; Most Scientists Now Agree Climate Change Is Real — but They Disagree on Nearly Everything Else about It, from Its Severity to Its Solutions," *The Globe and Mail*, January 27, 2007, sec. Focus Column Special Report.

Antilla 2010; Boykoff 2007; Ladle et al. 2005). Again, in news articles with scientific framings, all three newspapers report relatively "accurately" in this regard: scientific research is reported with no evidence of major factual inaccuracies, and while opposing scientific viewpoints are presented occasionally, they are not routine (see section 3.5 above).[123] This is partly a function of the development of climate change as a scientific issue: most basic reporting about scientific research during the period under study concerns the consequences or effects of climate change, which depends on the widespread acceptance of the ACC theory.

However, when it comes to commentaries, inaccurate information is a much more conspicuous issue. The *National Post*'s columnists clearly and routinely published misleading or false claims about both specific scientific findings and the state of broad consensus on anthropogenic climate change. For instance, various contributors spoke on multiple occasions about a so-called "hiatus" in global mean temperature increases starting in 1998, alleging that "global warming has paused."[124] Firstly, the language of a "hiatus" or "pause" misconstrued the available scientific evidence, which instead showed that the *rate of warming* had slowed. Temperatures were still increasing. Furthermore, the widespread agreement amongst climate scientists – including those who identified the "pause" in their research – is that examining short term fluctuations is not sufficient for drawing conclusion about climate trends spanning decades or centuries. Most importantly, numerous scientists pointed out that the "pause" was only conspicuous if one arbitrarily chose 1998 as a starting point. Starting in 1997 or 1999 would reveal warming more closely in line with long-term trends starting in 1970 (Lewandowsky et al. 2015). While the initial statements in the *Post* about the "pause" included some caveats about "statistical significance," later columns merely affirmed the "temperature standstill" – despite numerous peer reviewed scientific articles having addressed the issue.[125] In a column as recently as 2013, Lawrence Solomon supports his claims of a "pause" by citing a study by James Hansen, Makiko Sato, and Redo Ruedy, while ignoring the researchers explicit rejection of the conclusion that "global warming has stopped" (Hansen et al. 2013). It is difficult to interpret such representations as anything less than inaccurate.

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[123] Here I take accuracy to simply mean that in articles reporting on scientific research (for example, those emerging from a recently published study) that there is a high degree of congruency between what the research says and how it is reported.

[124] Lorne Gunter, "Global Warming: Gore Vs. Gunter; There's No Crisis -- the Only Thing Heating up Is the Debate," *National Post*, March 8, 2010, National edition, sec. Issues & Ideas; Lawrence Solomon, "The Lost Debate; Readers Resist the Triumph of Cosmic Rays over CO2," *National Post*, May 5, 2012, National edition, sec. FP Comment.

[125] Lawrence Solomon, "Celsius Not Rising; Public Opinion Won't Change as Long as Temperatures Don't," *National Post*, February 8, 2013, National edition, sec. FP Comment.

In addition to specific scientific findings, Boykoff also examined the broader ways that consensus was represented in US newspapers following the publication of the IPCC's Third Assessment Report (2007). This is crucial, because while particular articles may be entirely accurate, bias can be established systemically through selective framings. He finds that climate science was predominantly portrayed as contentious despite the emergence of a widespread scientific consensus surrounding ACC. This is largely the result of the journalistic norm of balance, which tends to highlight "micro-level battles and debates […] at the expense of providing larger context of climate scientific consensus regarding anthropogenic climate change" (Boykoff and Boykoff 2007, 1199).

4.7.1 "Balance as Bias" in Editorials and Commentaries

While "balance as bias" does not reveal itself to be a factor in news articles reporting on climate science, with regards to editorials and commentaries, the issue is salient. Schmid-Petri et al. find that the balance norm does not appear in op-eds in recent years, the results here exhibit a different tendency. Most conspicuously, the *Globe and Mail* only conveys concerned positions slightly more often than sceptical, somewhat sceptical, or impartial views (Figure 4.5). In this way it is the most "balanced" overall of the three newspapers in its commentaries. This can be linked to the *Globe*'s expressed editorial goals to "spark debate" and convey a diversity of views via op-eds, commentaries, and opinion pieces; this mandate is explicitly linked to an ideal of political centrism.[126]

But the issue here is what precisely constitutes "debate" about climate change – and what it might mean for the media to "spark debate" about it. As Gelbspan points out, a debate framing can misconstrue the "scientific weight" of knowledge claims; by construing scientific disagreement as diametrically opposed views from ostensibly credible experts, the larger context of research and institutional practice from where these views emerge is omitted. Without this context, debate framings can bolster claims with relatively little support amongst the scientific community. Beyond specific knowledge claims, debate framings have a deeper effect of conveying climate science, and climate change more broadly, as inherently contentious.

The *National Post* will routinely balance concerned positions with sceptical ones by publishing two opposing opinions in conjunction with one another, or by inviting counterpoints to its commentaries. In one such instance, the *Post* re-published an op-ed written by Al Gore for the *New York Times* who reiterated the "overwhelming consensus on global warming" and called for widespread

[126] "Editor-in-Chief Greenspon Takes Your Questions," *The Globe and Mail*, April 3, 2008, sec. Comment.

political action; alongside Gore's piece the *Post* ran a contrarian reply from columnist Lorne Gunter who retorted "that there is no consensus on climate science" and that climate change was just as likely a natural phenomenon as an anthropogenic one.[127] In another similar example, the *Post* re-published an excerpt from environmentalist Bill McKibben's book *Eaarth: Making a Life on a Tough New Planet* where he outlines the dangers of rising atmospheric CO2 concentrations and calls for a grassroots movement to fight climate change.[128] As a response, the *Post* published a riposte from Gunter in which he flatly dismisses McKibben as a "conspiracy theorist."[129]

So while the *Post* publishes the viewpoints of those who are convinced and concerned about anthropogenic climate change, they are often directly and explicitly contested and presented to give the appearance of a debate. But though such "balanced" framings appear within or between two diametrically opposed articles, the overall larger-scale trend in the *Post* is not towards balance, where "each side" of climate debates are given equal attention, but skewed towards sceptical views. And again, many of these views do not merely suggest caution before accepting the scientific evidence for ACC, but are contrarian, offering alternative – and routinely presented as superior – scientific knowledge claims. To this end, throughout 2006 and 2007, Lawrence Solomon published a 36-installment serial entitled "The Deniers" (see section 5.7). Adopted from a book he published by the same name, each installment offered a detailed summation of the research of a scientist whose work conflicts with or challenges mainstream climate science. In addition to the sceptical and contrarian pieces written by its regular columnists, the newspaper also routinely publishes guest commentaries written by sceptical experts. Thus, the *National Post* has systematically over-represented sceptical and contrarian views to a large degree. Given that even a "balanced" set of discourses, as in the *Globe*, can be interpreted as a means to systemic bias, the *Post*'s tendency in its commentaries indicates an extreme form of bias.

It is important to note how the *Post* frames their coverage of climate change in direct relation to other media representations. For example, Foster explicitly accuses both the *Star* and *Globe* of "stoking climate-change hysteria" and derisively refers to them as the "media herd." Similarly, in a contrarian

[127] Al Gore, "Global Warming: Gore Vs. Gunter; The Crisis Is Growing - We Can't Wish Away Climate Change," *National Post*, March 8, 2010, National edition, sec. Issues & Ideas; Lorne Gunter, "Global Warming: Gore Vs. Gunter; There's No Crisis -- the Only Thing Heating up Is the Debate," *National Post*, March 8, 2010, National edition, sec. Issues & Ideas.

[128] Bill McKibben, "An Altered Planet; In His New Book, Controversial Author Bill McKibben Claims That We'll Need Massive Changes in Order to Make Our Civilization Endure," *National Post*, April 13, 2010, National edition, sec. Issues & Ideas.

[129] Lorne Gunter, "Green Paranoia on Parade," *National Post*, April 14, 2010, National edition, sec. Issues & Ideas.

piece Lawrence Solomon where he cites a media study of newspaper reporting on climate change he argues:

> Since 1990, for example, 86% of all opinion pieces that *The New York Times* has published on global warming have agreed with the conventional wisdom, compared to only 6% that disagreed. During one season, *The New York Times* published no articles at all that disagreed. *USA Today* in some seasons also published no articles that disagreed – 100% of its articles agreed. Global warming alarmists can hardly expect more slavish support from the media in influencing the climate change debate, short of putting rare dissenters (notably *The Wall Street Journal* in the U.S. and *National Post* in Canada) out of business. [130]

Thus, the *Post's* columnists frame their reporting as a discerning alternative to "mainstream" media sources, who either due to ignorance or ideology, uncritically present the issue of climate change to the public. Since other media sources are failing at providing balance or giving space to contrarian or sceptical voices, the *Post* compensates by taking a pronouncedly sceptical or contrarian position. Thus, it is plausible that columnists and editors at the post still subscribe in some sense to an aim of "balance," but they conceive of this on an inter-newspaper, rather than intra-newspaper scale.

From a "balance as bias" perspective, the *Toronto Star* presents climate change the most "accurately." Out of the editorials sampled from 2006-2013, approximately 96% upheld the consensus view, with only 4% offering a sceptical position. In somewhat crude quantifiable terms, this roughly matches the degree of consensus claimed amongst scientists (Anderegg et al. 2010; Cook et al. 2013; Oreskes 2004). The newspaper clearly eschews balance in favour of promoting the consensus view.

A few general conclusions can be made here. Schmid-Petri et al. (2015) find that neither "balance as bias" nor "political parallelism" hypotheses appear to hold for recent climate change coverage in American newspapers, while Painter and Ashe (2012) and Elsasser and Dunlap (2013) find evidence for the latter in editorials and commentaries. Here, only the *Globe* appears driven by a balance norm, while the *Post* and *Star* tend to extremes in terms of presenting concerned and sceptical views. This finding, in turn, supports political parallelism. The *Globe* tends to promote a politically centrist position, while the *Star* and *Post* express clear "liberal" and "conservative" leanings, respectively. Various studies have linked liberal politics with concern and advocacy on climate change, and conservatism with various forms of scepticism and rejection of policy measures (Boykoff and Mansfield

[130] The study which Solomon cites: Simon D. Donner and Jeremy McDaniels, "The Influence of National Temperature Fluctuations on Opinions about Climate Change in the U.S. since 1990," *Climatic Change* 118, no. 3–4 (February 5, 2013): 537–50.

2008; Carvalho, 2007; Carvalho and Burgess, 2005; Painter and Gavin, 2015: 14). The three newspapers' political leanings map clearly and directly onto the positions expressed in their commentaries.

However, there are some important caveats that need to be offered. Any assessment of accuracy requires a standard of measurement, and here this is set as the consensus view. But this is not an unproblematic basis for analysis. To begin, STS analyses are not typically concerned with assessing the accuracy of scientific knowledge claims, but rather the factors and contexts involved in their production. But turning to the media's role in the production of scientific knowledge does not necessarily alleviate normative concerns. What exactly is the status of these media discourses about the science of climate change? From PUS perspective, the media undeniably shape the public's views of what counts as legitimate scientific knowledge claims about climate change, and this is accompanied by its own complex set of normative concerns relating to public deficits and notions of popularisation (this I address in chapter 6). Moreover, recent studies have found that media discourses like the ones found in these newspapers can directly affect scientific practice, research, and knowledge – even that which is demarcated within the traditional bounds of "proper" scientific practice (this I address in the following chapter) (Lewandowsky 2015). Reinforcing demarcations between "legitimate" and "illegitimate" scientific discourse – that published by credible experts in peer-reviewed journals versus that presented through popular media sources – is the most straightforward way of addressing these issues. But it is precisely these boundaries that the discourses in the *Post* seek to disrupt; and as I will discuss in chapter 6, such boundary-strengthening presents a challenge for "activist" scientists.

On this note, what is to be made of the role and status of media actors, namely columnists? Columnists and other newspaper commentators present a challenge to scientists' role as "primary validators" of scientific knowledge. These columns do not merely represent debates about climate change, but actively define and participate in these debates. And is seen in the above discourses, this participation is reflexive. The *Post*'s columnists do not inadvertently undermine the authority of climate scientists and institutions like the IPCC, but explicitly and knowingly do so. Contrarian discourses about climate change are meant precisely to offer alternative and (presumed to be) superior knowledge claims. Assuming the consensus view as a starting point precludes the legitimacy of these discourses and the role of non-scientist media actors as "primary validators." Many normative theories of expertise would certainly support such a move (e.g. Collins and Evans 2007). But many questions remain. Crucially, to what degree and in what ways can the media legitimately participate in public debates about climate change (or can the public participate via the media)?

Approaching this question through the framework of consensus is still narrowly defined in terms of a relatively neat set of propositions regarding anthropogenic climate change. But as many scientists will readily acknowledge, there is legitimate scientific disagreement in many areas and on many levels of climate change (Boykoff 2007, 487). And more crucially, the "larger context" of climate change is not only that specific bits of research – especially in areas of climate-related science where there is uncertainty – need to be understood with a view to the broader consensus that current observed climate changes are human-caused. The larger context is that these scientific conclusions comprise only several facets – albeit fundamentally important ones – of a multifarious scientific, technological, social, political, economic, and ethical issue. Legitimate concerns attend each of these dimensions of climate change (Douglas 2015; Hulme 2011). How can the debates about a multifarious issue like climate change be represented accurately?

In this regard, the question of accuracy is confounding; while important and useful if demarcated cleanly, it cannot adequately serve as the only, or even primary means of making sense of media's role in climate change debates. At least as important is a question of identifying legitimate concerns surrounding climate change – especially ones that not only call for the views of credible experts, but those of a range of public actors, including the media. Ostensibly, many of the issues raised in the *National Post* – even questioning the very principle of valuing scientific consensus – can serve as legitimate points of public debate. If one recognises the need to broaden public participation in debates involving scientific issues (e.g. Jasanoff 2003; Wynne 2003), then room should be made for these kinds of questions, including those surrounding the basis, need, and extent of the authority of scientific expertise. In this light, how can we make sense of the sceptical discourses found in these newspapers? What might be the grounds for genuine public debate about climate change? Can this be addressed without reverting to metrics of accuracy or expert vs. non-expert distinctions? What might STS offer here?

4.9 Sincere Scepticism?

Boykoff and others argue that overgeneralized use of terms like "climate sceptic" and "climate denier" may serve to dismiss legitimate critiques and concerns (Boykoff 2011, 162; O'Neill and Boykoff 2010). With regards to evaluating scepticism and contrarianism in the media, Boykoff cautions,

> Blanket assertions of climate 'scepticism', 'denialism' or 'contrarianism' across a range of distinct science and governance issues risk rejecting potentially legitimate and useful critiques out of hand by way of dismissing the individual rather than the arguments put forward. Thus,

> treatment of individuals through 'demonizing monikers' does little to illuminate the contours of their arguments; it actually has the opposite obfuscating effect in the public sphere. In other words, placing universalizing labels on claims-makers overlooks the varied and context-dependent arguments put forward (2011, 162).

Many observers have noted that 'scepticism' forms a crucial element of scientific inquiry, and indeed, served as a crucial component in the emergence of the current scientific understanding of climate change (Weart 2011). The columnists in the *Post* and to a lesser extent in the *Globe* have portrayed themselves as fulfilling this important sceptical impulse – their scepticism is in the spirit of good scientific thinking, not contrary to it. Similarly, Jacques, Dunlap, and Freeman find that self-professed sceptics writing on environmental issues routinely portray themselves as "unbiased analysts combating 'junk science'" (2008, 349). However, in the context of climate change debates the term has come to have a pejorative meaning. Spencer Weart traces this change in meaning to a set of tactics adopted by self-styled sceptics that ran contrary to the organized scepticism of science:

> Self-styled sceptics were not proceeding in a normal scientific manner. Scientists continually test their beliefs, seeking out all possible contrary arguments and evidence, and finally publish their findings in peer-reviewed journals, where further attempts at refutation are encouraged. But the small group of scientists who opposed the consensus on warming proceeded in the manner of lawyers, considering nothing that would not bolster their case, and publishing mostly in pamphlets, books, and newspapers supported by conservative interests. At some point they were no longer sceptics - people who would try to see every side of a case - but deniers, that is, people whose only interest was in casting doubt upon what other scientists agreed was true (2011, 47)

In this regard, the "self-styled sceptics" – at least those that seek to undermine specific scientific knowledge claims – are actually misappropriating the term: they call themselves sceptics to invoke certain notions of scientific inquiry, but in practice they do not enact these ideals.

Numerous studies have examined the activities and effects of these self-styled sceptics. When climate change first emerged as a public issue, the fossil fuel industry was largely responsible for scepticism campaigns (Gelbspan 1997). A lobby group active in the late 1990s called the Global Climate Coalition has been the focus of much scrutiny (Frumhoff, Heede, and Oreskes 2015; Jacques, Dunlap, and Freeman 2008; McCright and Dunlap 2003). The group represented an association of fossil fuel and related industries and strove to stifle climate change related regulations through various means, including press releases and advertising campaigns aimed at bolstering the claims of sceptical scientists and casting doubt on climate change science, especially the work of the IPCC.

More recently, conservative think tanks have been the major contrarian voices in climate change debates (Hoggan and Littlemore 2009, McCright and Dunlap 2010). Jacques, Dunlap, and Freeman have found that the media have facilitated the activities of these think tanks by affording them a great deal of attention by presenting them as valid spokespeople in stories and climate change and offering them substantial editorial space (Jacques et al. 2008, 356). For example, the American Enterprise Institute, a conservative think tank funded in part by ExxonMobil, offered $10,000 to scientists to write articles highlighting the limitations of the IPCC's AR4 immediately following its release (Sample 2007).

One of the more conspicuous examples of organised climate contrarianism is a campaign launched by H. Leighton Steward and Corbin Robertson in 2010 called "CO2 is Green." The organization challenges the scientific evidence that shows that anthropogenic CO2 is a leading contributor to climate change. Moreover, it rejects the view of CO2 as a pollutant or that there is any need to reduce its emissions or stabilize atmospheric concentrations. It ran a series of television ads and print ads, the latter run in the *Washington Post*, promoting this view. The organization's website states, "CO2 is actually the 'food' that sustains essentially all plants on the face of the earth […] and a wealth of research has shown that more of it in the air is a very good thing" ("CO2 Is Green – CO2 Carbon Emissions Water Gas" 2016). Steward is an honorary director at the American Petroleum Institute while Roberston is the leading shareholder of the Texas-based coal company Natural Resource Partners (Mulkern 2010; Sheppard 2009).

The ads are reminiscent of a campaign launched in 2006 by another conservative think tank, the Competitive Enterprise Institute which ran a set of television ads promoting a similar contrarian position, one of which concludes, "Carbon Dioxide. They call it pollution. We call it life" (CEI 2006). Two years later the CEI ran another series of ads entitled, "Where's the warming?" and "Hot Air" portraying climate change as a manufactured problem and arguing that global mean temperatures had plateaued (CEI 2008). In addition to these ads, the CEI's pundits have engaged in a sustained and coordinated effort to publish sceptical and contrarian op-eds in a wide array of newspapers and other media. Between 2006 and 2013 the *National Post* published thirteen commentaries written by people working directly for the CEI, and another eleven which cited their reports.[131]

Boykoff and Boykoff (2004) also point to a plan in 1998 by "big oil companies, conservative policy research organizations and trade associations" meeting in the American Petroleum Institute's

[131] See Appendix I.

Washington office to launch a campaign to "recruit a cadre of scientists who share the industry's views of climate science and to train them in public relations so they can help convince journalists, politicians and the public that the risk of global warming is too uncertain to justify controls on greenhouse gases'' (see Cushman 1998). To an even greater extent, Oreskes and Conway (2010) also focus on the influence of individual journalists, columnists, and various other scientific, political, and industry actors given editorial space who shape representations of climate change in ways that are favourable to their particular interests.

These studies have demonstrated that despite rhetoric about "sound science," the actors involved in these organised campaigns are generally disinterested in contributing to scientific knowledge production or conducting or funding further research (McCright and Dunlap 2003, 359; Lahsen 2005). Moreover, even though these campaigns are often framed in explicitly scientific terms, the primary agents in voices involved are very rarely those of practicing climate scientists (Dunlap and McCright 2010). One of Oreskes and Conway's key findings is that many prominent climate sceptics' primary aim is not to further understanding of climate change, but rather to fostering doubt about anthropogenic causes (2010). Boussalis and Coan's work mapping the production of sceptical op-eds bolsters this conclusion by showing that the work of conservative think tanks is reactionary and tactical. The sceptical discourses they disseminate change as new perceived threats emerge: legislation and regulations, policy discussions, or new scientific findings (2016). These shifting counter-claims are not mutually consistent nor coherent.

There remains both explanatory and normative questions. As to the former: what exactly explains the proliferation, and relative effectiveness, of sceptical discourses? Boussalis and Coan's examination of over 16,000 sceptical publications (including newspaper commentaries) identifies clear discursive linkages between corporate groups, conservative think tanks, policy makers, politicians, and the media. Corporations' profit motives – those which would be harmed by climate regulations – are as good an explanation as any for those actors' attempts to obstruct or confuse public debates. And while fairly direct links can be made from specific editorials to specific financial interests, this is clearly an insufficient account of the totality of sceptical discourses found in these newspapers. What connects these media actors with other diverse group such that they perpetuate a distinct set of media discourses and form a relatively cohesive climate "countermovement"? The most common response is ideology (e.g. Carvalho 2007; Corbett and Durfee 2004; Dirikx and Gelders 2010a; Zia and Todd 2010).

Many of the aforementioned studies link sceptical media discourses to conservatism (Elsasser and Dunlap 2013; Hoggan and Littlemore 2009; Jacques, Dunlap, and Freeman 2008; McCright and

Dunlap 2003). Various other ideological connections are identified, ranging from common tropes of a left vs. right political divide (Dirikx and Gelders 2010; Takahashi 2011), economic liberalism and "individualism" (Carvalho 2007); pro-corporate bias (Dispensa and Brulle 2003), neo-liberalism (Boykoff 2014; Brulle 2013; Brossard, Shanahan, and McComas 2004; Carvalho and Burgess 2005; Lahsen 2005); anti-environmentalism (Antilla 2010), technocentrism (Guedes 2000), among others.

The precise causal mechanism of ideologies remains an open question, and rests largely on psychological research (e.g. Hoffarth and Hodson 2016; Hulme 2011; Zia and Todd 2010;). I have not sought to establish a causal linkage between ideologies and the discourses found in these newspapers. However, descriptively, these newspaper commentaries exhibit ideological connections, which is to say, they express positions that can be categorised according to commonly accepted characterisations of ideologies – free-market capitalism, for example[132] – as well as offer explicit ideological self-identification like anti-environmentalism and anti-socialism.[133] Political parallelism is evident.

4.10 Conclusions: The Politicisation of Climate Change Scepticism

These different possible accounts of sceptical climate change discourses have different normative implications. A crucial question is whether these discourses are explicit and intentional or implicit and systematic. Overt contrarianism appears – at least on some levels – relatively straightforward to address. When columnists at the *National Post* say that climate change is a "crock," "a fraud," and an "insane scam," that was "conceived within the bowels of the UN as a justification for global industrial control," and that climate change policy is an "appalling genuine conspiracy," and routinely dismisses those concerned about climate change as "hysterical," what space is there for these kinds of discourses in legitimate public discussions about climate change?[134] Substantive worries about deceptiveness and speciousness present themselves. Given a certain standard of deliberation, it is relatively straightforward to dismiss these kinds of discourses. And when larger systematic analyses reveal the

[132] Peter Foster, "Whatever Happened to Muscular Capitalism?," *National Post*, January 26, 2011, National edition, sec. FP Comment; Peter Foster, "Give Third World Gift Of Capitalism," *National Post*, December 22, 2006, sec. FP Comment.

[133] Rex Murphy, "Rendering Our Sanity unto the Earth Goddess," *National Post*, April 16, 2011, National edition, sec. Issues & Ideas; Craig Offman, "Karl's New Comrades; Rebranding Socialism for the 21st Century," *National Post*, May 12, 2007, All But Toronto edition, sec. News; Terence Corcoran, "Now for the Real Shock Doctrine; Obama and the Rise of Disaster Socialism," *National Post*, November 25, 2008, National edition, sec. FP Comment.

[134] Peter Foster, "Mixed Messages," *National Post*, February 8, 2012, National edition, sec. FP Comment; Lawrence Solomon, "Why Gasoline Wins," *National Post*, September 29, 2012, National edition, sec. FP Comment; Peter Foster, "The Manley 'Conspiracy,'" *National Post*, October 21, 2009, National edition, sec. FP Comment; Terence Corcoran, "Don't Believe Al Gore: Global Warming Is a Crock," *National Post*, July 28, 2007, sec. Issues & Ideas; Conrad Black, "The Great Green Fraud," *National Post*, November 28, 2009, National edition, sec. Issues & Ideas.

regularity and relative over-representation of these discourses, there are good grounds to understand them as intentional strategies to obscure and stymie public deliberations on climate change, rather than good faith contributions.

As for implicit scepticism with unintentional effects, the *Globe and Mail*'s commentaries are significant here. Unlike the *Post*, the *Globe*'s commentaries typically do not promote explicit contrarianism. They are typically equivocal or point to debates about future dangers and policy. These debates are specific and contextualised within a broader acceptance of the consensus on anthropogenic climate change. On the level of an individual article level, this may be apparent. But there is a risk that this nuance and context might be lost on a systematic level. The *Globe*'s tendency towards debate framings might bolster an undifferentiated, over-generalised notion of *climate change as debate* promoted by organised sceptical campaigns. Even these subtle forms of scepticism may present an obstacle to climate change action. As Schmid-Petri et al. point out, they may even be more disconcerting than overt contrarianism, precisely because they may receive less attention and critique (2015). It is thus important that critical analyses of climate change discourses include systemic and diachronic dimensions.

But the root cause of sceptical discourses often remains ambiguous, and even if discernible ideological connections are identifiable, the normative conclusions that can be drawn are similarly ambiguous. On the one hand, it is critical to understand that a considerable degree of sceptical discourses emerge from concerted campaigns of obstructionism, predicated on vested interests or ideological positions and an *a priori* mission of undermining any and all scientific work that might address concerns about anthropogenic climate change. Here, as with the common view of politicisation as a means of misrepresentation, the connotation of ideology as a distortion persists (Douglas 2015; Goebbert et al. 2012; Zia and Todd 2010). If systematic media analyses can reveal these linkages, this presents not a sufficient reason for dismissing sceptical discourses, but perhaps a very good reason to be wary of them. However, symmetrical and reflexive STS understandings indicate that the presence of ideologies, as with politicisation, cannot in themselves be the grounds to dismiss knowledge claims (or doubts about them), as if a "non-ideological" debate could be had. The political parallelism found in these newspapers' commentaries reveals precisely this issue. Each of the newspapers exhibits associations between broader political positions and specific climate change discourses, thus each can be understood to be "politicised" in this sense.

Similarly, another important sense of politicisation emerges here in a symmetrical manner. This can be understood in the way these newspapers trace the expansion of actors and concerns – especially

those of a more colloquially political nature – connected with scientific understandings of climate change. As shown in the previous chapter, such "political" framings are roughly equally predominant across all three newspapers. Each represents climate change as a thoroughly politicised phenomenon. This process has several levels of reflexivity, each pointing to another sense of politicisation. First, the newspapers themselves become a part of this expanded network, adding their own matters of concern, thus actively politicising climate change. Second, many of the discourses produced by these newspapers explicitly address the issue of politicisation (here, actor and analyst categories overlap, adding another layer of reflexivity). Yet another kind of symmetry is revealed: while each of the newspapers systematically convey different judgements about the validity of the theory of anthropogenic climate change and other related scientific knowledge claims, their politicisation discourses supports Dorothy Nelkin's suggestion that no deep challenge to the authority of science is present in the media, at least not directly. For example, the commentaries in the *Toronto Star* and *National Post*, which tend to offer diametrically opposed positions on climate change, nonetheless express the same fundamental distinctions between "sound science" and "politicised science." While scientific authority is not accepted naïvely as it is assumed that science can be corrupted by politics, by eliminating this politicisation science can ultimately be objective and authoritative. It is crucial to note two facets of these politicisation discourses. First, they are polarised: the concerned positions of the *Toronto Star* and the *Globe* point to the influence of corporate and conservative political interests, while the sceptical positions of the *National Post* lambaste the politicised nature of the IPCC, and often the entire enterprise of climate science. They start with the same conception of politicisation, but arrive at opposite conclusions.[135] Second, while conceptually these newspapers' notions of politicisation are mirrored, in terms of scale and frequency of actual use, the *National Post* disproportionately discusses politicised science.

This adds yet another level of reflexivity, as one can speculate a political parallelism to politicisation discourses. Talk of politicised science thus becomes a powerful rhetorical strategy to challenge knowledge claims about anthropogenic climate change, and ultimately pursue a set of interests. Similarly, the polarisation and perennial image of debate, doubt, and uncertainty surrounding climate change can be seen as contributing factors to public disenchantment with science, and ultimately the various legitimacy crises facing scientific experts (Jasanoff 2003). With regards to organised climate change scepticism, this can function as a strategic advantage. To have a systematic

[135] While it is not within the scope of this project to answer this question, this is not to suggest that these different conclusions are equally plausible.

effect, the sceptical discourses like those found in the *Post* need not produce a mutually coherent or consistent set of arguments. The specifics of the knowledge claims offered and contested can be secondary to the function of producing the appearance of debate. As the numerous studies have shown, this has been an extremely effective strategy in preventing regulation, legislation, and action on climate change (Bousallis and Coan 2016, McCright and Dunlap 2003, 359; Lahsen 2005; Oreskes and Conway 2010). This is especially pertinent with regards to increases in impact and action scepticism.

This is normatively precarious territory. Those studies that reinforce a sense of politicisation and ideology as causes of misrepresentation and distortion need to be cautious about the way that such ideas can be easily rhetorically mobilised in these debates. STS notions of symmetry are quite useful here. Appreciating the value of symmetry need not be predicated on or lead to impartiality about anthropogenic climate change, but rather involves the recognition that in general the presence of ideologies or politics cannot ultimately serve as a basis for allowing or disallowing certain discourses in public deliberations – all public discourse, whether about technoscientific matters or otherwise, are ideological and political in some way. But while the presence of ideologies and politics might be broadly symmetrical in climate change debates, the specific effects appear not to be: identifying these problematic outcomes – obscurantism and obstructionism – is a valuable result of systematic analyses of climate change media discourses. More importantly, symmetry and reflexivity underlie the view that all of these discourses, and the science that they try to mobilise, are politicised in some sense. Perhaps the most significant contribution STS can offer in making sense of these climate change debates is to problematise the tropes of "sound vs. politicised science" found within them. What could this distinction possibly mean when accurate media representations of climate change are at least sometimes predictable along political lines? Understood via a richer understanding of politicisation, sound science is politicised science. But it is politicised in a different way than whatever might be demarcated as "unsound" science. An irony here is that climate change scepticism would be undermined by a rich understanding of the many ways that climate science is unavoidably politicised; this would defuse the force of politicisation rhetoric and point to more substantial concerns. Rather than asking how to "de-politicise" climate change discourses, a better question could be asked: can a healthy politics proceed from the misrepresentation of scientific knowledge and practice?

5 Who Speaks for Climate Science?: The Contested Authority of Climate Scientists in Three Canadian Newspapers

In the previous chapters I examined the discourses about climate change presented in these newspapers by primarily looking at framings, content, and discourse – how the issue has been defined. Another key question in media studies of climate change is how specific claims-makers are recruited and represented – so here I explore *who* is defining the issue. It is important to recognise that these are not distinct facets of discursive constructions and framings, but are reciprocal. The content in these newspaper articles hinges on who are making those claims, while the quotations giving voice to these claims-makers are part of the selected content of the article.

This analysis is motivated by the following central questions: how are the credibility and authority of scientific experts recruited, established, bolstered, and challenged in these newspaper articles? How does the enrolment of scientists' voices compare to that of other claims-makers? And how does the selection of these various claims-makers bear on overall framings and representations of climate change – especially in terms of "balance," "debate," and scepticism? It is these regards it is important to consider *whose* claims are being "balanced" against another. How are the terms of the debate defined by the selection of claims-makers? And what kind of "bias" might this reveal?

A key finding is that expert credibility – indeed, the very status of expertise – is not a given that is merely recruited or incidentally bolstered by these newspapers, but something that is also actively constructed and established by and through them. More specifically, I find that the credibility and authority of scientists is established through various mechanisms, some the subtle workings of framings and latent journalistic norms like "debate" and "balance," and others the overt and deliberate efforts of journalists and columnists. Moreover, the expansion of climate change as a matter-of-concern brings with it a host of new actors vying to become "authorised speakers." Thus, climate scientists are not only engaged in direct "discursive competition" with those making contradictory knowledge-claims, but also a host of competing priorities (which may or may not also involve competing knowledge-claims).

In all of these cases I consider the role of these newspapers as both "secondary validators" of claims-makers, and "primary validators" of scientific knowledge claims. These newspapers not only play a key role in only establishing who counts as a legitimate scientific expert through citation and quotation, but its columnists also explicitly participate in ostensible scientific debate, directly challenging the knowledge-claims of scientists. In this capacities, journalists and columnists comprise a special category of claims-maker that defines all others that appear in these newspapers.

The way these newspapers define climate change debates extends well beyond bolstering or challenging specific scientific facts or theories. At stake in these discourses are much broader images or "ideologies of science": the role of scientific experts in public life, who can rightfully participate in scientific knowledge production, and indeed, the core norms of science. Collectively, these findings again demonstrate how these newspapers' roles with respect to scientific enterprise is not merely a communicative one – a conduit to spread information, or "translate" pre-established sets of knowledge – but an integral and formative one. Which is to reiterate my argument that the media are a fundamental part of technoscience. I end the chapter by returning to climate change scepticism – a theme which again emerges prominently in these sources – and considering some more normative implications of these newspapers' roles in climate change debates.

5.1 Methods and Theoretical Issues

Overall, the time frame, sampling procedures, critical discourse and framing analyses, and identification of critical discourse moments in this chapter proceed as laid out in section 3.1, however, there are a few specific methodological considerations for this chapter that I lay out below.

5.1.1 Years in Focus; Critical Discourse Moments

In addition to analysing trends across the time period under study (2006-2013), in this chapter I have selected three years for closer cross-comparison, namely, 2007, 2009, and 2012. These years were selected on the basis of the reporting trends and critical discourse moments identified in chapters 3 and 4. 2007 and 2009 represent the two years with the highest rate of climate change reporting, albeit under different circumstances and in response to different critical discourse moments, namely the release of AR4 and the Copenhagen UNFCCC conference, respectively. Here I hypothesise that these different critical discourse moments will correspond to different dynamics of claims-makers in these articles. In other words, different critical discourse moments will enroll different actors, which will in turn affect reporting. I selected 2012 as the third year for comparison because it represents the year under study with the lowest rate of climate change coverage. No major critical discourse moments emerge in 2012. It thus offers a useful point of comparison for analysing the role of critical discourse moments and issue salience in defining the kinds of claims-makers that are recruited – or that seek to have their claims heard – in these newspapers.

5.1.2 Claims-makers[136]

Similar to framings, the various claims-makers appearing in these newspaper articles were placed in general categories (Table 5.1). This formed the basis for an analysis of the prevalence of different kinds of claims-makers in the newspaper articles. Similar to the framing analysis, and in-depth reading and keyword search was performed to measure actor frequency (see section 3.1). For the former, only major actors were counted, meaning the actor figured in as a central protagonist in the story.

Only an in-depth reading was performed to identify claims-makers. To be counted as a claims-maker, a person or persons needed to be either quoted directly, or a specific knowledge-claim had to be explicitly attributed to a person or group of persons (but could be a summation or paraphrase rather than a direct quotation).

Sometimes claims are attributed to individuals, while other times they are attributed to groups. In the interest of accounting for the claims of these groups (e.g. a research team where individual scientists are not identified, or a business or industry association offering claims through a press-release), figures and estimates identify the *type* of claims-maker in an article, not individual claims-makers. A type is only counted once, but an article that identifies a politician claims-maker type could include several quotes from different politicians. Similarly, a group claim represents many individuals, sometimes hundreds or thousands (as in the case of the IPCC). Thus, this way of estimating claims-maker frequency under-estimates unique claims-makers, but otherwise group claims could not be adequately counted.

This is coupled with critical discourse analysis. Who exactly is selected to speak on matters of climate change, and from what perspective, is a means of establishing thematic framing, as well as imbuing certain kinds of knowledge with import and authority. Of particular concern here is the inclusion or exclusion of expert voices. In this way, broader images of scientific authority are established: does the media present scientific experts as trustworthy arbiters of truth, or merely one of many legitimate (or illegitimate) opinions? Who competes with climate scientists for legitimacy on the issue of climate change? Do the different newspapers treat scientific experts differently? Who and to what end do they recruit as sources for articles?

[136] In previous chapters I analysed the presence of certain "actors" in these newspaper articles. This is distinct from the term "claims-makers" I use in this chapter. Actors refers to people referred to in articles, but who do not necessarily make claims, either directly quoted or attributed, where as claims-makers make explicit claims.

Table 5.1: Claims-makers categories

Major claims-maker category	**Examples of claims-makers**
Business and Industry	*Banks, businesses, business elites, companies, corporations, financial institutions, investment groups, industry groups (e.g. CAPP, OPEC) (and their spokespeople)*
Citizens	*Activists, artists, protesters, residents*
Columnists and Editors[137]	
Experts ("Non-scientists")[138]	*Economists, engineers, historians, lawyers & legal experts, political scientists, psychologists, sociologists, transportation experts, urban planners*
IPCC or other Scientific Institution	*IPCC, WMO, WHO, NOAA, CRU*
NGOs	*Sierra Club, WWF, David Suzuki, David Suzuki Foundation, Tides Canada, Friends of Science, Environmental Defense*
Politicians and Officials	*Elected politicians (and unelected in certain countries), government ministers & their staff, employees & spokespeople for government agencies (e.g. Department of Energy, Environment Canada, Environmental Protection Agency, Ministries of the Environment (Provincial), United Nations representatives*
Scientists	*biologists, chemists, climate scientists, ecologists, environmental scientists, epidemiologists, geographers, geologists (oil geologists), life scientists, meteorologists, paleontologists, physicists, zoologists (ornithologists, marine biologists, entomologists)*
Think-tanks/Research Institute	*Heartland Institute, Pembina Institute, Competitive Enterprise Institute, Pew Center, Conference Board of Canada, International Institute for Sustainable Development, Fraser Institute, American Enterprise Institute*

5.2 The Decline of Scientists and a Diversity of Claims-Makers

The first question I want to address in this chapter is the relative presence of scientists compared to other kinds claims-makers. Just as political framings dominate representations of climate change in these newspapers (see section 3.4), political actors are, in general, the predominant claims-makers across all newspapers over the total period under study (Figures 5.1-5.3).

[137] Guest columns by claims-makers that fall under another claims-maker category were counted there (e.g. a guest column by a politician or scientist), and not under "Columnists or Editors"; only columns by regularly employed columnists are counted in this category.

[138] I realise that this categorisation reinforces "scientist vs. non-scientist" boundaries that this study seeks to explore; this is to be taken as a reflection of the categories that the newspapers themselves employ in demarcating scientists from other kinds of experts; it does not convey my judgement on the "scientificity" of these respective expertises.

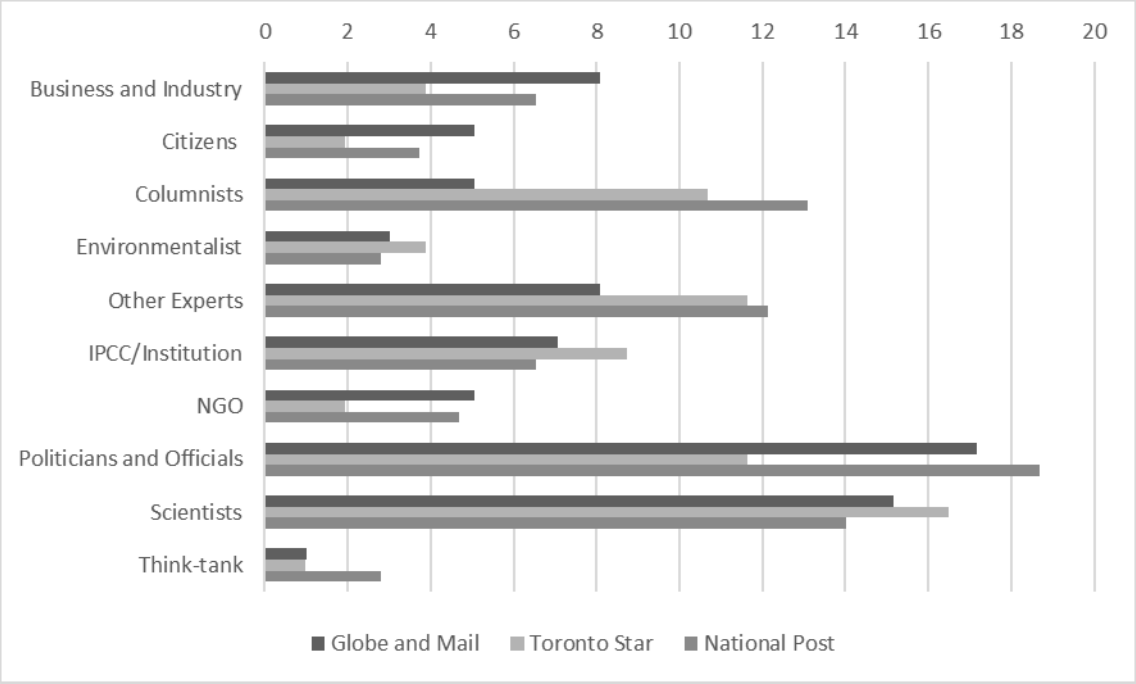

Figure 5.1: Claims-makers frequency, 2007 (as percentage of climate change articles, N: See Appendix A)

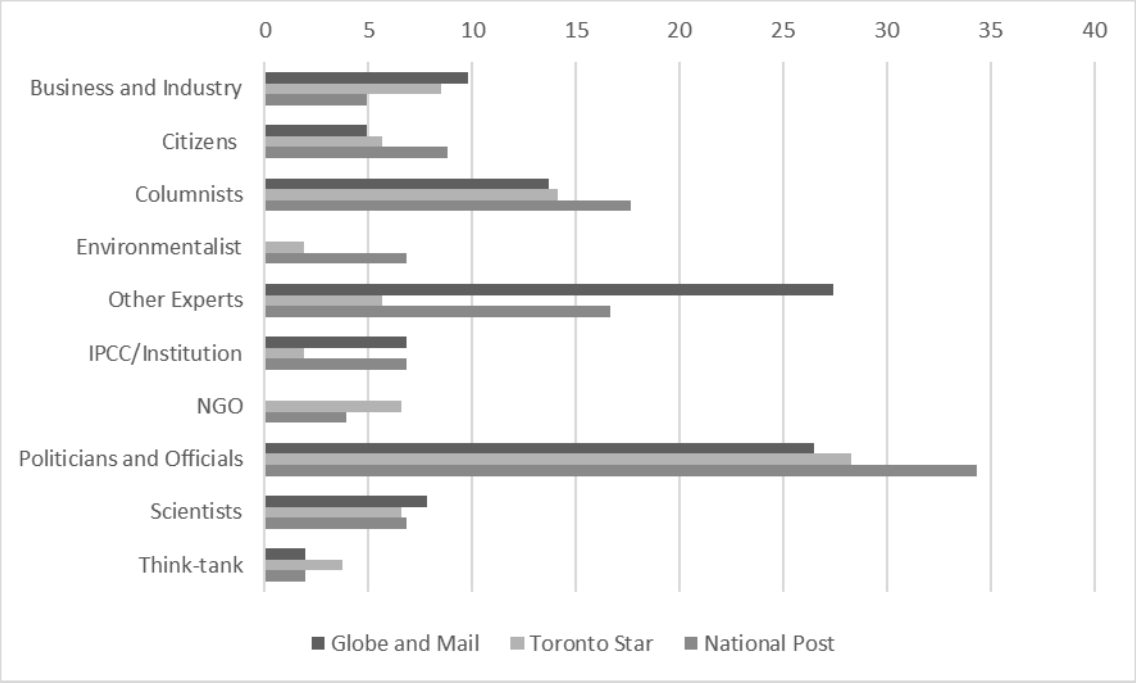

Figure 5.2: Claims-makers frequency, 2009 (as percentage of climate change articles, N: See Appendix A)

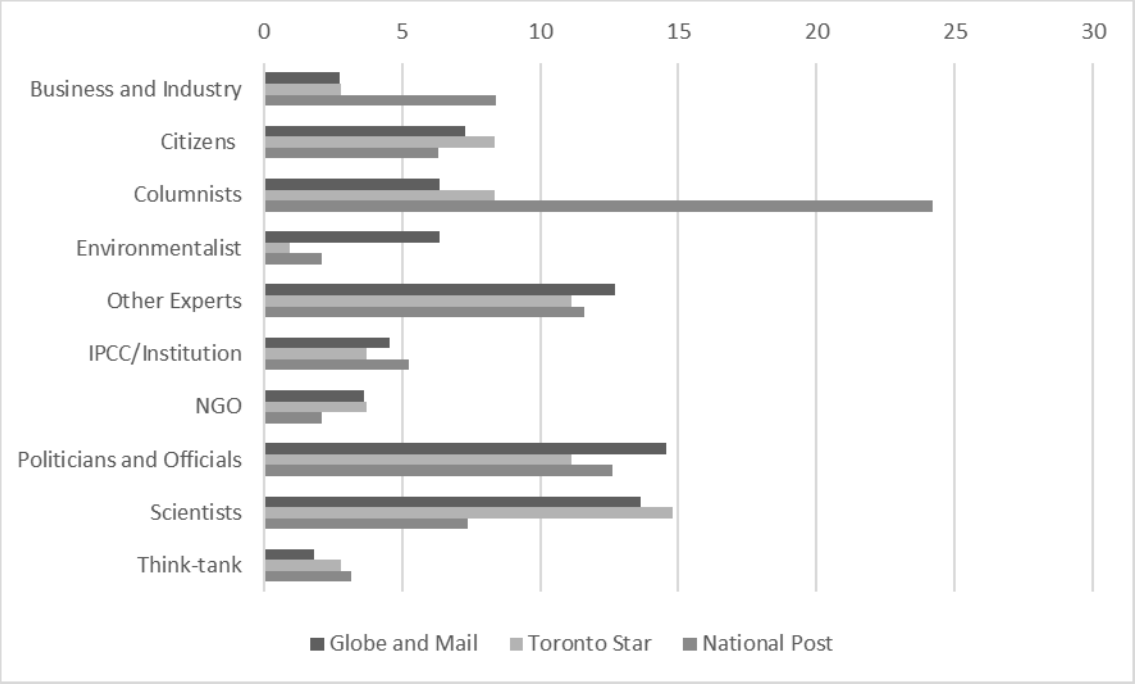

Figure 5.3: Claims-makers frequency, 2012 (as percentage of climate change articles, N: See Appendix A)

In the *Globe and Mail* and *Toronto Star* scientists appear in most cases as the second-most prominent kind of claims-makers.[139] Scientists appear most frequently in the *Globe* in terms of percentage of articles, but most prominently in the *Star* relative to other claims makers. The *National Post* is an exception in each regard. Overall, scientists appear least prominently in the *National Post*, as compared to the other newspapers, as well as compared to other claims-makers within the *Post*. In all three years examined, other (non-scientist) experts are recruited as claims-makers in the *Post* more frequently than scientists. Moreover, columnists act as claims-makers more often than scientists; in 2009 and 2012 they offer claims in over two-and-a-half times more articles than scientists. There are other significant inter-year and inter-newspaper differences.

Compared to other years, in 2007 scientists were most prominent as claims-makers in each of the newspapers, appearing in approximately 14%, 15%, and 10% of articles in the *Toronto Star, Globe and Mail,* and *National Post,* respectively. Conversely, in 2009 scientists least frequently – in only approximately 7% of articles, while political claims-makers appear most frequently – in over 25% of all articles. These differences can be attributed to critical discourse moments (see section 3.2). The relative prominence of scientists as claims-makers in 2007 is connected to the release of AR4; articles offering

[139] Here I count the *kinds* of claims-makers present in articles, not unique claims-makers. For example, if several politicians make claims in an article, I only count this kind of claims-maker once.

scientific knowledge-claims about the causes and impacts of climate change appeared with more relative frequency, and articles explicitly attributing claims to scientists associated with the IPCC account for nearly a third of scientist claims-makers. The major critical discourse moment in 2009 was the UNFCCC conference in Copenhagen. As noted in section 3.3.2, this conference had major journalistic value as a political drama, and thus political actors became the main characters in these news stories.

Furthermore, in 2009 columnists appear more frequently as claims-makers than scientists in all three newspapers. Columns and editorials in this year predominantly concerned, expectedly, the Copenhagen conference, either directly or tangentially. This suggests that the journalistic norms and potential themes that made Copenhagen such an appealing news story (Painter 2010) also extended to columns and editorials. Moreover, I suggest that as a kind of expert claims-maker themselves, columnists' expertise – namely social and political judgements – was most aptly suited to addressing the various matters-of-concern surrounding Copenhagen.

These results mesh with existing studies which found that scientists do not (or no longer) serve as the primary issue-definers of climate change. Trumbo (1996) found that when climate change emerged as topic in the US news media in the late 1980s, scientists were the most prevalent claims-makers on the issue. By the mid-1990s their role as news sources had declined and they were displaced by other claims-makers, in particular, politicians and interest groups. Similarly, Carvalho and Burgess (2005) found that in the British press, "between 1985 and 1990, climate change scientists first gained and then lost definitional control of what climate change was and what it meant for the world" (1464). Other studies have produced similar findings (Boykoff and Boykoff 2004; Ungar 2014; Weingart at al. 2000).

Trumbo links the decline of scientists as claims-makers to the "politicisation" of climate change, as do Carvalho and Burgess (2005), who imply a normative connotation of politicisation, arguing that the "the definitional power of scientists was usurped [by politicians]." But, as I argued in the previous chapter, there are various ways politicisation can be interpreted which do not need imply a "sound" vs. "politicised" science distinction. Politicisation can also be understood as a fundamental part of the broader expansion of technoscientific issues – the movement from a narrowly defined matter-of-fact to and expansive "matter-of-concern." Thus, increasingly diverse and complex framings of climate change can be seen as an indicator of this politicisation (see section 4.2); the expansion and diversity of interested and affected actors and claims-makers provides an even more conspicuous illustration of this process (or "progression" as Downs and Trumbo suggest), as it is through claims-makers that matters-of-

concern are expressed.[140] However, here it must be noted that diversity does not mean equity. And indeed, since the most prevalent spokespeople on climate change in these newspapers are political actors – politicians and other government officials – this contributes to the view of climate change as "politicised."

5.3 Discursive Competition

Carvalho and Burgess describe this arena of diverse claims-makers as one of "discursive competition." However, the expansion of concerned actors does not necessarily involve competition, at least not directly. While it does indicate that more facets of climate change are being considered, these diverse concerns can just as often be complimentary as conflicting. For instance, Trumbo finds that early on in media coverage of climate change, the predominant claims, and claims-makers, focused on the scientific research identifying its causes, especially with regards to temperature records, measurements of CO2 concentrations, and the physical explanations for the relationship between the two in terms of the radiative forcing effects of greenhouse gases (Trumbo 1996). Since then, the scientific understanding of climate change and its effects has expanded immensely.

Indeed, just as scientific framings have shifted away from causes to impacts and effects (see section 3.4 above), the scientists recruited as sources are now more likely to come from disciplines on the periphery of climatology. So, while scientists still make up a sizeable portion of claims-makers in these newspapers, this group too has become more diverse; very few are climate scientists working on the physical science basis of anthropogenic climate change (see figures 5.4-5.6). But these diverse scientists are not inherently in competition with one another. Entomologists examining, for example, the effects of climate change on monarch butterflies implicitly validates preceding physical science research.[141] One can also add to this the other assorted expert claims-makers who are not natural scientists whose research is predicated on the assumption of anthropogenic climate change (Table 5.1).

[140] It should also be noted that the generalised categories do not sufficiently illustrate this diversity. Even amongst scientists claims-makers, the kinds of expertise offered is wide-ranging; practicing climate scientists comprise 7%-24% of scientist claims-makers.

[141] Debra Black, "Monarch Butterflies Face Bleak Odds for Comeback; Climate Change, Loss of Habitat Make It Unlikely Population Numbers Can Recover, Expert Says," *The Toronto Star*, April 1, 2010, ONT edition, sec. News.

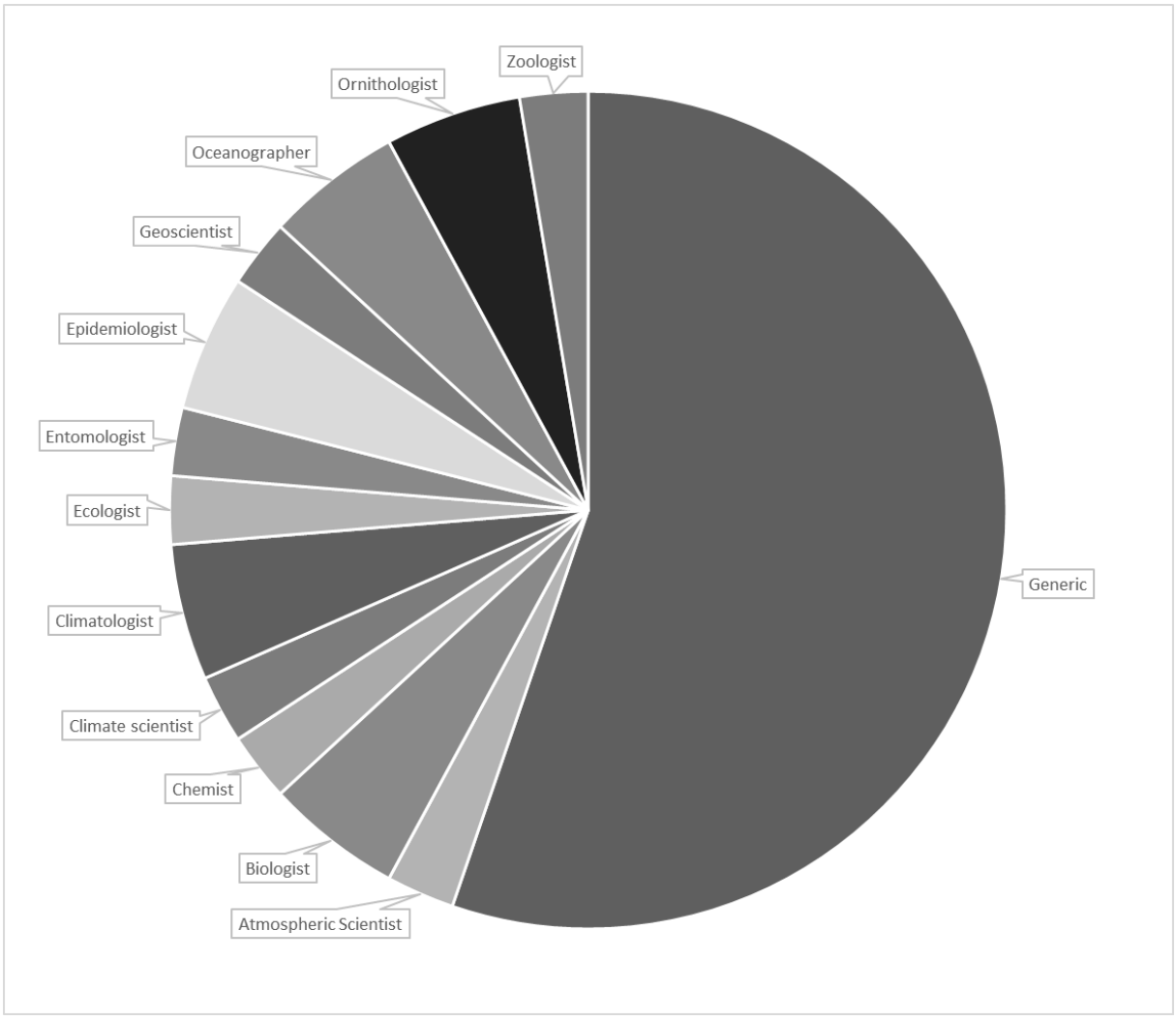

Figure 5.4: Different Kinds and Relative Prevalence Scientist Claims-Makers in Climate Change Articles in the Toronto Star *2007, 2009, 2012 (total of all three years) (N=317)*[142]

However, Trumbo notes that even if different actors are not offering directly competing claims, the nature of the news media places them in a form of competition. There is a finite amount of space in the pages of newspapers, as well as a limited quantity of journalistic resources to commit to covering climate change.[143] So while climate change should be understood as a diverse, multifaceted "technoscientific" issue with many different legitimate claims-makers, one of the functions of these newspapers is to compartmentalise these different facets and speakers and place them in virtual

[142] "Unspecified" denotes a case in which an individual researcher whose name is given is directly quoted, but whose specific field is not specified. "Generic" denotes cases in which no specific researcher is quoted, but claims are attributed to scientists, e.g. "Scientists say that…" See section 5.6 below.

[143] And as noted in the previous chapter, articles about climate change only make up a very small number of total articles in newspapers – about 1%.

competition with each other.[144] This is seen most prominently in these newspapers in 2009, where a limited amount of journalistic space committed to climate change in conjunction with the journalism-friendly Copenhagen conference led to a prioritisation of political framings and hence a predominance of political claims-makers. This kind of prioritisation works subtly to bolster or undermine the authority of certain kinds of claims makers – and, in particular, challenge that of scientists as primary definers of the issue.

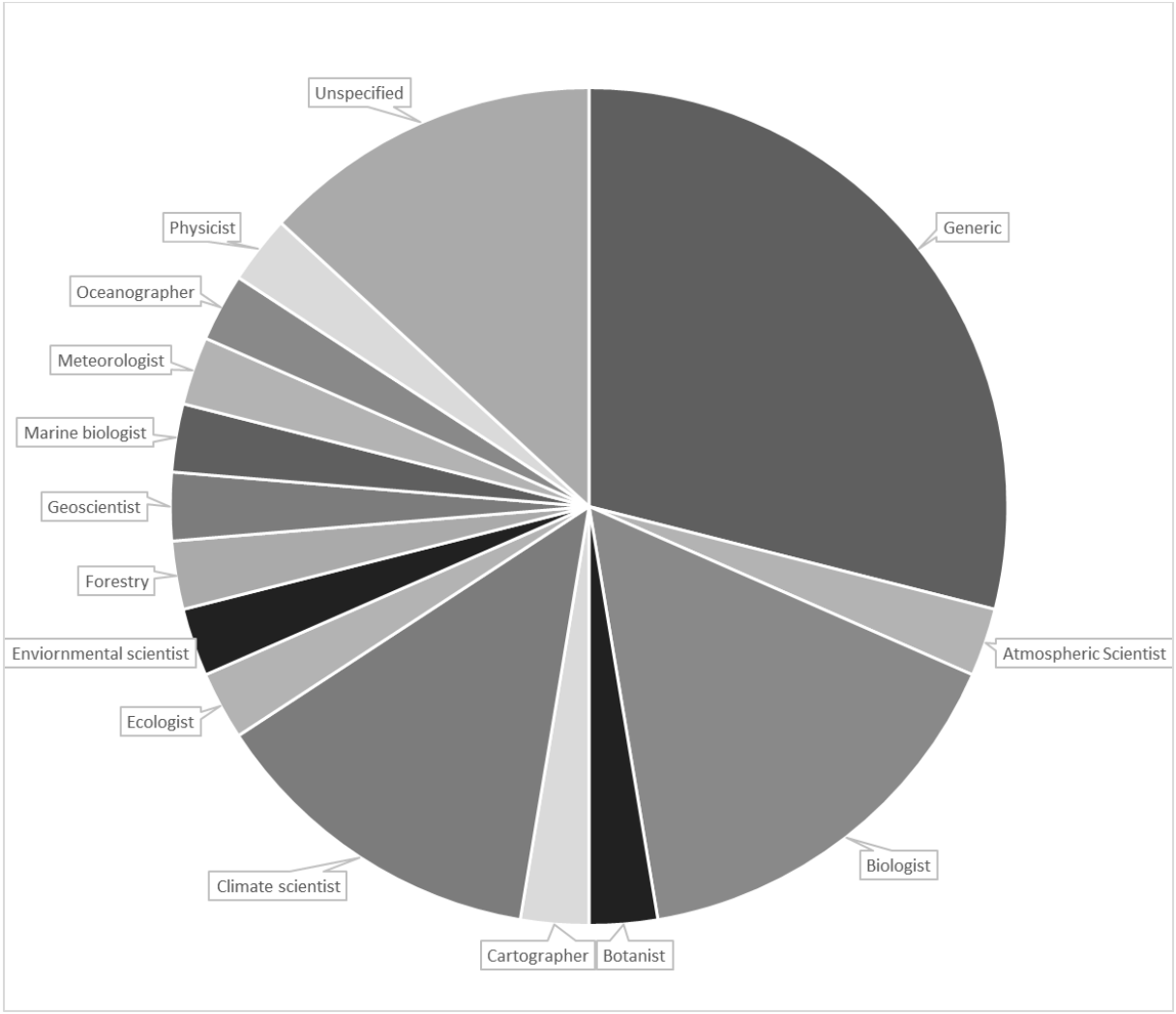

Figure 5.5 Different Kinds and Relative Prevalence Scientist Claims-Makers in Climate Change Articles in the Globe and Mail *2007, 2009, 2012 (total of all three years) (N=311)*

[144] As Latour notes, newspapers serve as a telling source in the ways that technoscientific "hybrids" are cleaved apart into distinct framings and categories (1994, 1-3).

Trumbo and others observe that claims-making and framing work in tandem. Just as framing serves to highlight certain aspects of an issue at the expense of others, so too do claims-makers. So one question that may be asked is, as climate change develops into a complex matter-of-concern, *whose* concerns are prevalent in these newspapers? While economists considering the economic impacts of climate change do not inherently undermine scientific explanations of anthropogenic climate change – indeed, for the most part they implicitly bolster them – in these newspapers they are more prominent as claims-makers than practicing climatologists (Figure 5.8). They do not necessarily vie to make conflicting knowledge-claims, but they are effectively made to compete with each other for space and attention through various media norms which segregate different aspects of climate change.

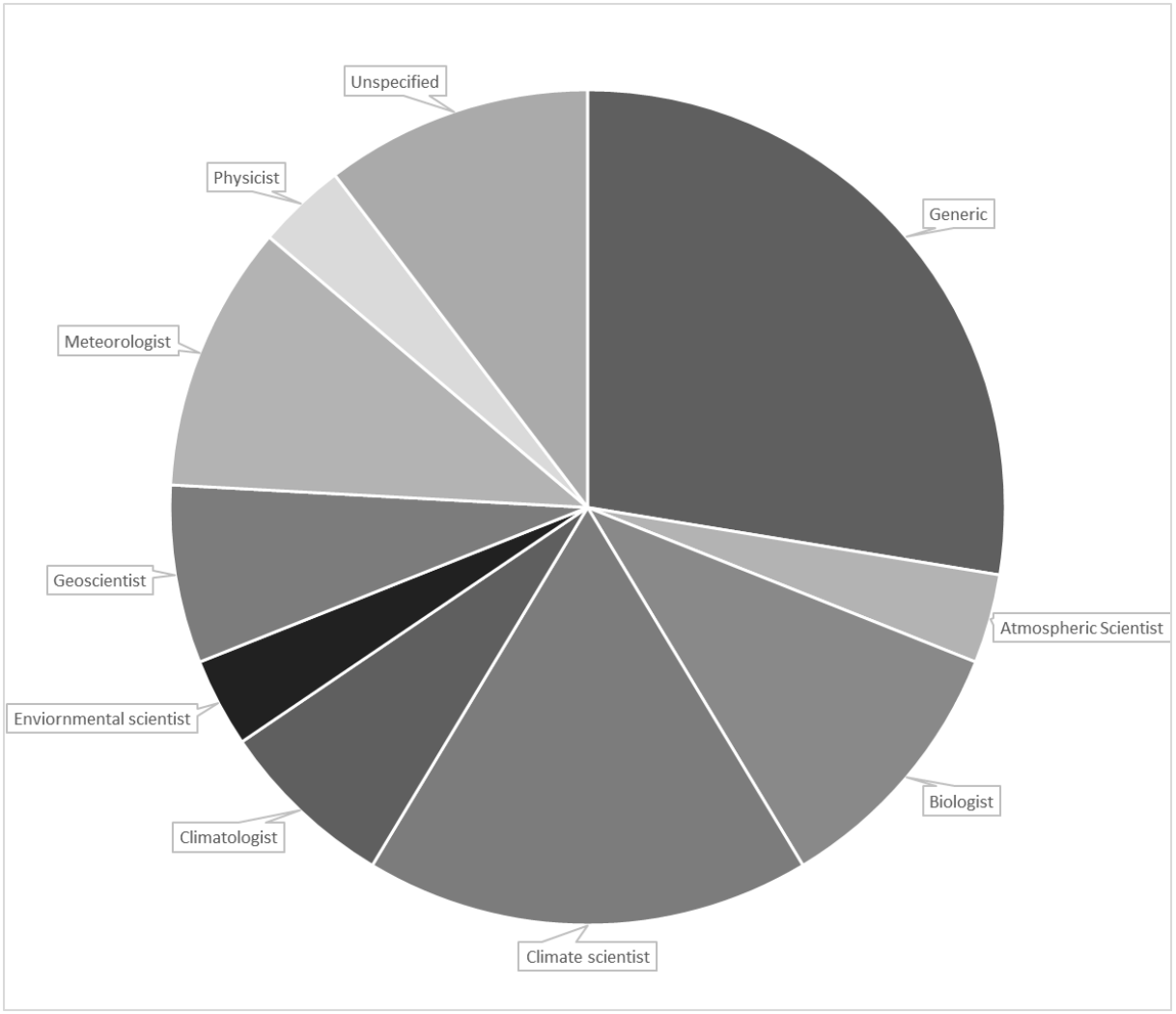

Figure 5.6: Different Kinds and Relative Prevalence Scientist Claims-Makers in Climate Change Articles in the National Post *2007, 2009, 2012 (total) (N=304)*

As Lefsrud and Meyer (2012) note, the "discursive struggle" into which claims-makers enter in the media does not only involve establishing what counts as "facts" and "whose knowledge claims gain the status of truth," but also what aspects of climate change are prioritised and problematised (i.e. come to be seen as problems to be addressed), and which claims-makers can "impact public policies" (1482). This view, I suggest, expands the notion of "validators" offered by Gamson (1999). To speak to the concerns of the previous chapter, this is yet another way these newspapers can be seen to politicise climate change. If the media prioritise the voices of experts considering the economic impacts of certain policy measures, over, say, scientists studying potential species extinction caused by climate change, this addresses different concerns and promotes a certain kind of political focus and policy outlook.[145]

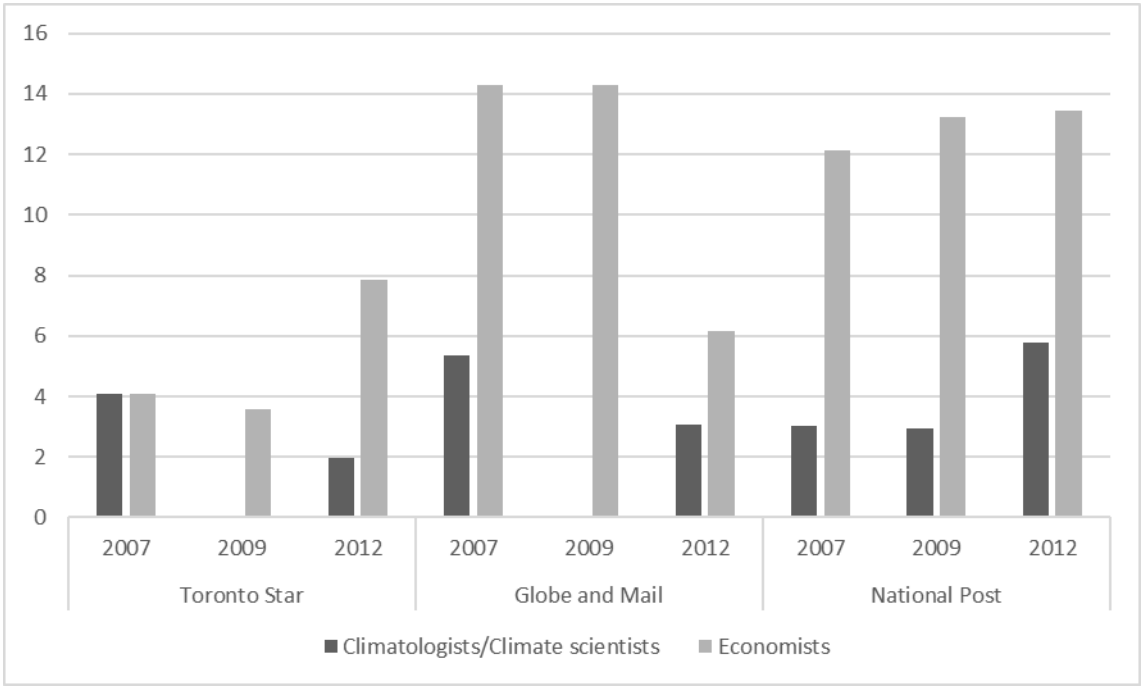

Figure 5.7: Climatologists/Climate scientists vs. economists as percentage of claims-makers

(Toronto Star: 2007, N= 49, 2009, N= 56, 2012, N=51; Globe and Mail: 2007, N=56, 2009, N=63, 2012, N=65; National Post: 2007, N=66, 2009, N=68, 2012, N=52)

[145] Compare the following framings: Karen Howlett, "Economist Predicts Dramatic Electricity Price Hikes; Eliminating Coal Will Be Expensive," *The Globe and Mail*, July 25, 2007, sec. National News; John Ibbitson, "With Eyes Wide Open, It's Time to Decide; The Cost Now Known, Canadians Must Determine Whether They're Willing to Bear the Burden of Cutting Greenhouse-Gas Emissions," *The Globe and Mail*, October 29, 2009, sec. Column; "16,000 Polar Bears Could Vanish by 2050; Sea Ice Retreat Faster Than Model Predictions," *National Post*, September 8, 2007, sec. World; Sarah Foster, "It's a Horse, It's a Fish, It's … a Wonder; The Threats Facing Seahorses Are the Same as Those Facing the Majority of Creatures That Inhabit Oceans; Thus, Saving Seahorses Really Does Mean Saving the Seas," *The Globe and Mail*, November 28, 2009, sec. Book Review.

5.4 Authorised Speakers and the Authority of Science

Steve Rayner argues: "For good or ill, we live in an era when science is culturally privileged as the ultimate source of authority in relation to decision-making" (Rayner 2006, 6). Similarly, Dorothy Nelkin argued some time ago that there is no systematic critique of science in the media, and that the media uphold scientists as "problem solvers, authorities, the ultimate source of truth" (Nelkin 1991, xi). As I discuss in the previous chapter (see section 4.5.1), many of the "ideologies of science" that Nelkin points to remain largely intact; these involve largely "philosophical" assumptions about the nature of scientific knowledge (about "the" scientific methods, objectivity, truth, etc.).

But what does this diversity of claims-makers mean for the authority of scientists (and science)? Given the evidence from these newspapers and corroborating studies, it is not clear if Rayner and Nelkin's claims are still the case (assuming that they once were). Even without the issue of directly oppositional claims-makers, scientists must share (if not compete for) discursive space in the media. Across these newspapers there is what can be seen as a challenge to science's – and more importantly, scientists' – cultural authority. In the arena of newspaper coverage of climate change, the claims of scientists are but some of many diverse viewpoints and concerns. The very presence of this diversity, in effect, undermines the "culturally privileged" position of scientists as dominant "authorised speakers."

The discursive competition surrounding climate change in these newspapers can be understood as a matter of authorisation and validation. As Gamson (1999) and others (Carvalho 2007; Boykoff 2011) point out, scientists have been among the most prominent "primary validators" of knowledge-claims about climate change – with the media playing the role of "secondary validators" by presenting and implicitly legitimating the views of primary validators. In this role, the media facilitate, if not encourage, competition (through the selection of sources and promotion of certain voices) – and act as referees – amongst actors vying to become "authorised speakers" (Gieryn 1999).

Functioning as an authorised speaker, however, also depends on the specific kinds of claims being made. The question is not only "who speaks for the climate?" (Boykoff 2011), but for what aspect of climate change do they speak? In these newspapers, a diverse range of claims-makers are often recruited to speak to different matters-of-concern; articles about climate legislation includes the voices of politicians, economists, businesses, citizens, and scientists.[146] Here, the loss of authority to which

[146] E.g. Constant Brand, "Australia, U.S. Scolded on Climate; EU Official Urges Them to Get on Board with Kyoto Pact as UN Forum Starts," *The Toronto Star*, April 3, 2007, sec. News; Eric Reguly, "African Countries Boycott after Talks Bog Down; Frustrated by Perceived Lack of Progress, Ministers Walk out of Meeting, Pushing Climate-Change Meeting to Brink of Collapse," *The Globe and Mail*, December 15, 2009, sec. International News; Les Whittington,

scientists are subject operates on several, often coinciding, levels. First, on a broader level, scientists struggle against these diverse claims-makers to define climate change as a scientific issue, rather than an issue of politics, economics, or social values. Secondly, scientists compete with other scientists as well as other non-scientist claims-makers to offer more specific knowledge-claims about the aspects of climate change that are typically addressed through scientific explanations – e.g. measurements of climate change trends and impacts and the physical mechanisms accounting for them, such as temperature record reconstructions, the rise of CO2 and other greenhouse gas emissions, radiative forcing effects, feedback loops, and so on.

The degree to which scientists have maintained the first form of authority is low in all three newspapers, given the diversity of competing claims-makers. And insofar as claims-makers can determine (or are associated with) framings, the frequency of scientists as claims-makers does not lead to a corresponding rate of scientific framings, as the latter are relatively rare compared to business, economic, industry, and political framings (cf. Figures 5.1-5.3 and Figure 3.7). This suggests that scientists' issue-setting capacity is low; while the exact reason is unclear, existing research suggests a discord between scientists' and these newspapers' agenda-setting priorities, which might be attributed, at least in part, to journalistic norms (Boykoff and Boykoff 2004; Boykoff 2007; 2008; Painter 2010).

As for the second type of authority, there are specific and crucial differences between the newspapers. In news articles with scientific framings, all three newspapers are generally deferential to scientists, meaning that articles are most likely to attribute claims about the physical science basis of anthropogenic climate change to scientists, as opposed to any other type of claims-maker (see also section 3.3.1). However, these newspapers sometimes attribute such claims to scientists without explicitly identifying their relevant credentials, or even specifically identifying the specific scientists making the claims. I call this the "generic scientist citation." For example, an article in the *Globe* about the climate change impacts of air travel states,

> Scientists have warned that the reef's famous corals could be killed by rising sea temperatures caused by global warming, which is blamed on greenhouse gases from burning fuels such as those used by airlines.[147]

"Canada's Approach on Kyoto Criticized; Climate Change Scientist Tells Conference the Original Emissions-Reduction Goals Set by Ottawa Were Naively Optimistic," *The Toronto Star*, March 28, 2007, sec. News.

[147] Lawrence Bartlett, "Oz Fears Jet-Flight Guilt; Eco-Conscious Travellers Could Shun Long-Haul Destination," *The Globe and Mail*, April 25, 2007, sec. Travel.

Exactly who these scientists are, their credentials, and where these warnings were made are not specified. Similarly, an article about government efforts to protect polar bear populations states, "Scientists have warned the bear is at risk from global warming," without any further identifying information.[148] In one article, the *Star* vaguely identifies the institution of the scientists, but little else: "A newer report, from scientists at the Naval Postgraduate School in the U.S., suggested [Arctic summer sea ice may vanish] as early as 2013."[149] Out of the articles that explicitly mention "scientists" in the *Globe* in 2007, 30% do so "generically," with no identification of who exactly these experts are, or what specific credentials or expertise they possess. The *Star* and *Post* cite generic scientists less often, at 15% and 20% of the time scientists are mentioned, respectively (see also figures 5.4-5.6).

The implications of these generic scientist quotations are ambiguous. On the one hand, this can be interpreted as bolstering the authority of scientists, as scientists are presented as an over-arching category of experts whose expertise can extend to wide range of knowledge-claims; the specific forms of expertise that qualify a scientist to weigh-in on a certain issue are not examined. On the other hand, without a clear indication of why a certain speaker's claims should be recognised as authoritative (other than the generic "scientist" label), this effectively opens up the range of potential claims-makers on a certain issue. Through this increased discursive struggle, the authority of specific and narrow forms of expertise are undermined.

This points to a question about the extension of authority – on what specific topics do different claims-makers offer their voices (or is their authority recruited by these newspapers)? Trumbo (1996) found that in US newspapers scientists' claims were relatively narrow in scope – that is, they would offer authoritative claims in their field of expertise and would rarely encroach onto matters of politics or policy. Similarly, Verhoeven found that in European news outlets, when scientists were called upon as sources they would rarely comment on political or economic issues, even if this was the predominant framing of a story. On the other hand, Trumbo found that politicians were much more likely to speak on scientific matters than scientists were to speak on political matters. The *National Post* stands out here, as it is more likely to offer space to non-scientist claims-makers to offer explanatory claims. This is most evident in the role of columnists as claims-makers (see section 5.7 and 5.8 below). The *Post* also offers

[148] Steven Chase, "Time to Kill the Beaver? Senator Pitches Polar Bear as National Emblem; Harper Appointee Suggests Canada Has Had Enough of Furry Rodent," *The Globe and Mail (Breaking News)*, October 27, 2011, sec. Other.

[149] Mark Abley, "Does Baird Know What He's Saying?," *The Toronto Star*, December 18, 2007, ONT edition, sec. Opinion.

more space to experts from fields outside of climate science to evaluate explanatory claims. Such instances in the *Post* always involve sceptical or contrarian claims.

Overall, there appears to be a loss of authority for climate scientists – their authority does not extend enough to broadly define news article framings, whilst on narrow questions of climate science, other claims-makers' claims are presented as equal in legitimacy. Thus, in these newspapers (at least), scientists cannot be regarded as "ultimate" sources of authority. And in this regard, relying on philosophical abstractions about scientific knowledge to define its authority is not entirely helpful. Whatever epistemic authority supposedly underlies science, across these newspapers it does not yield uniquely authoritative knowledge claims, nor a wholly deferential attitude to the claims of scientists. Instead, it seems useful to distinguish between epistemic authority – based on the conception of a science as a uniquely superior means of generating knowledge claims – and its cultural, and indeed, practical authority. The discord between the two may help explain the intensity of discursive competition.

As I discussed in the previous chapters, while specific knowledge claims have come under intense criticism or have been flatly dismissed, especially in the context of the *Post*'s scepticism, the underlying "ideologies of science" have remained intact – and indeed have been asserted with exceptional vigour by climate sceptics. Thus, these discursive struggles should be understood – especially in the context of scepticism – as an attempt to wield the epistemic authority of science. I consider the broader consequences of this in chapter 7.

5.5 "Dueling" Claims-Makers, "Balance," and Climate Change "Debates"

How does this expanding range of competing claims-makers bear on the issue of journalistic balance and debate discussed in the previous chapter? To begin, it complicates the "dueling-scientist" motif. Several studies have found that early newspaper coverage often presented "dueling-scientists" as sources, and thus offered competing scientific knowledge-claims about climate change (Boykoff and Boykoff 2007; McCright and Dunlap 2003;). However, these and similar studies (Trumbo 1996; Schmid-Petri et al. 2015) also found that in later coverage – especially that following the publication of AR4 – oppositional claims-making about science had declined (along with the decline of scientific framings in general), while political claims-makers and framings became predominant.[150]

[150] The results here generally support these findings; see sections 4.1.1 and 4.7.1.

Thus, "dueling scientists" have been largely displaced by "dueling-politicians."[151] One also finds "dueling-economists," or "dueling-think-tanks" or even "dueling-citizens."[152] Such articles ostensibly present something akin to a "balanced" view, about a common and (relatively) clearly defined proposition – for example, a specific economic policy like a carbon tax or cap-and-trade policy.[153] This extends Boykoff and Boykoff's "balance-as-bias" issue (2004; 2007). They argued that the norm of journalistic balance seeks to present "two-sides" of an issue – especially where specialist claims are involved – but in the case of climate change this leads to a misrepresentation of the state of knowledge of the climate science community as a whole, systematically over-representing fringe views.[154] For each of these additional realms of claims-makers and knowledge-claims, a similar issue presents itself.

Several studies have found that, in general, "balanced" or "two-sides" climate change coverage has seemed to decline, regardless of claims-makers (Boykoff 2007a; Nisbet 2011; Schmid-Petri et al. 2015, Xie 2015).[155] The results here support these findings, with the notable exception of the *National Post*. In 2012, claims-makers (of any kind) offering directly competing claims to each other appear in roughly 6% of *Star* articles, 8% of *Globe* articles, and 34% in the *Post* (see Appendix J).[156]

How does one make sense of the *Post's* tendencies here? As I suggest at the end of last chapter, debate framings can be constructed in diverse – and often subtle – ways. Here I examine more closely

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[151] E.g. Gloria Galloway, "Don't Defund Freshwater Research, Ontario and Manitoba Tell Tories; Provincial Environment Ministers Plead with Kent and Ashfield to Reverse Decision That Pulls Plug on Experimental Lakes Area," *The Globe and Mail (Breaking News)*, June 18, 2012, sec. Other.

[152] E.g. Terence Corcoran, "Mulcair, GM, Pembina and the Old Left," *National Post*, June 2, 2012, National edition, sec. FP Comment; Margaret Wente, "Why People Are Chilled by Warming," *The Globe and Mail*, October 15, 2009, sec. Comment Column.

[153] E.g. Allan Woods and Tanya Talaga, "New Climate Plan Would Favour Oil Sands; Ottawa's Pitch Helps Economies of Saskatchewan, Alberta at Expense of Other Provinces, Critics Say," *The Toronto Star*, September 5, 2009, ONT edition, sec. News; Shawn McCarthy, "U.S. Climate Laws Risk Trade War: Study; Penalties for Goods from Polluting Countries Could Incite Tit-for-Tat Tariff Battle If Not Accompanied by International Co-Operation," *The Globe and Mail*, July 9, 2009, sec. Business.

[154] Boykoff and Boykoff use the following four characterisations to measure debate about anthropogenic climate change in newspaper articles: 1) The article only presents argument that anthropogenic global warming exists, clearly distinct from natural variations; 2) Presents both sides, but emphasizes that anthropogenic global warming exists, still distinct from natural variation, 3) Presents a balanced account of debates surrounding existence of anthropogenic global warming, 4) Presents both sides, but emphasizes dubious nature of the claim that anthropogenic global warming exists. As I discussed last chapter, while Boykoff and Boykoff find that articles of the fourth type are rare – thus, the newspapers they examine do not strive for inter-article "balance" – articles of the second type characterise over half of the articles they sample. 2004, 128. Boykoff and Boykoff exclude editorials, opinion pieces, and columns.

[155] These studies have primarily examined "balance" pertaining to the causes of climate change; though Schmid-Petri et al. also look at "action-scepticism," finding polarisation, but not intra-article balance on the issue.

[156] As a percentage of articles containing explicitly cited claims-makers. As a percentage of total articles about climate change (citing claims-makers or not), the figures are as follows: 3%, 5%, and 19% in the *Star*, *Globe*, and *Post*, respectively, in 2012. See Appendix J.

the ways that claims-makers – in their capacity as authorised speakers – constitute these debates.[157] How does the recruitment of authorised speakers affect debate framings? How do these debate framings challenge or bolster the authority of scientists and other claims-makers? How do debate framings relate to other kinds of discursive competition? And how does the recruitment of authorised speakers relate to broader framings (e.g. advocacy and scepticism), editorial stances, and discursive strategies?

A column by Guelph University economist Ross McKitrick entitled "Contaminated Data: Hot Cities, Not C02, Cause Urban Thermometers to Rise," provides and illustrative and rich case to consider these issues.[158] McKitrick cites the work of climate scientists at length while publicising his own research which he argues demonstrates that land surface temperature measurements have over-estimated warming trends due to non-climactic effects such as "urban heat-islands." Ostensibly, McKitrick is presenting and participating in a scientific debate, balancing two sets of competing claims (one of which are his own). But many of the scientists' claims are cited so they can then be overtly dismissed. The reader is left to assume that the claims that McKitrick rejects are being conveyed relatively faithfully and accurately.[159] However, McKitrick is unequivocal in his views:

> By the time they began writing the recent Fourth Assessment Report, they had before them a set of papers proving the data are contaminated. How did they handle this issue? In the first draft of the IPCC report, they simply claimed that, while city data are distorted by urban warming, this does not affect the global averages. They cited two familiar studies to support their position and ignored the new counter-evidence. I submitted lengthy comments criticizing this section. In the second draft there was still no discussion, so again I put in lengthy comments. This time the IPCC authors wrote a response. They conceded the evidence of contamination, but in a stunning admission, said: "The locations of socioeconomic development happen to have coincided with maximum warming, not for the reason given by McKitrick and Michaels (2004), but because of the strengthening of the Arctic Oscillation and the greater sensitivity of land than ocean to greenhouse forcing, owing to the smaller thermal capacity of land." Note the irony: Confronted with published evidence of an anthropogenic (but non-greenhouse) explanation for warming, they dismissed it with an unproven conjecture of natural causes. Who's the "denialist" now?

[157] This is intended to supplement earlier studies that have primarily examined the construction of debate framings through content analyses – looking for the presence of competing claims (but with less focus on those making the claims), e.g. Boykoff and Boykoff 2004; Schmid-Petri et. al 2015. Indeed, Boykoff and Boykoff call for this in their research: "In this arena of study, future research could explore the role that specific claims-makers have in the creation of news" (2004, 134).

[158] *National Post*, December 5, 2007, National edition, sec. FP Comment.

[159] For example, at the time that McKitrick had published this column, a response paper had been published in *Climate Research* (Benestad 2004) critiquing the McKitrick and Michaels (2004) paper he cites here. He makes no mention of these critiques of his own work.

> Furthermore, the claim is preposterous. The comparison of land and ocean is irrelevant since we were only talking about land areas. The Arctic Oscillation is a wind-circulation pattern that affects long-term weather trends in the Arctic. It certainly plays a role in explaining Arctic warming over the past few decades. But for IPCC lead authors to invoke it to explain a worldwide correlation between industrialization and warming patterns is nonsense.[160]

In general, the *National Post* recruits the IPCC as a claims-maker with equal frequency to the *Star* and *Globe* (Fig. 5.1). But in 75% of the instances the IPCC is quoted or cited in 2007, 2009, and 2012, its claims are directly undermined.[161] In an article echoing that of McKitrick's, two economists and marketing professors state:

> Policymakers and the public should be made aware that the forecasts from the MIT modellers, as well as those used by the IPCC, are merely the opinions of some scientists and computer modellers. It is not proper to claim that these are truly scientific forecasts.[162]

In another article, Christopher Monckton, a British peer, political adviser, and well-known climate change sceptic argues,[163]

> "The rate of global warming is accelerating. Therefore it is caused by us." That is the fallacy of ignoratio elenchi, the red-herring fallacy. Even if global warming were accelerating, that would tell us nothing about whether we were to blame. The IPCC twice uses this fallacious argument in its 2007 Fourth Assessment Report. Even if its argument were not illogical, the warming rate is not increasing. The notion that it is accelerating was based on a statistical abuse that the IPCC has refused to correct.[164]

And in another article, *Post* columnist Terence Corcoran states:

> The IPCC is now on wobbly legs at all four corners. It's [sic] models are inadequate and need overhaul, data integrity is at issue, the climate is not quite following the script, and the communication program for the whole campaign is a growing struggle.[165]

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[160] Ross McKitrick, "Contaminated Data; Hot Cities, Not CO2, Cause Urban Thermometers to Rise," *National Post*, December 5, 2007, National edition, sec. FP Comment.
[161] Similarly, in 2007, a third of all scientists' claims were explicitly contested, most often by columnists, or by other experts.
[162] Kesten C. Green and J. Scott Armstrong, "MIT's Unscientific, Catastrophic Climate Forecast," *National Post*, June 17, 2009, National edition, sec. FP Comment.
[163] George Monbiot, "Monckton's Climate Denial Is a Gift to Those Who Take the Science Seriously," *The Guardian*, June 8, 2010, sec. Environment.
[164] Christopher Monckton, "Aristotle's Climate; His Fallacies Exemplified by Warming Hysteria," *National Post*, April 21, 2012, National edition, sec. FP Comment.
[165] Terence Corcoran, "Bailing out the Bailouts," *National Post*, October 2, 2009, National edition, sec. FP Comment.

In each of these examples, while the claims of IPCC scientists are offered, this is done to undermine their role as authorised claims-makers, not bolster it. In this way, a recruited claims-maker's role as an authorised speaker can be ambiguous. On the one hand, the IPCC's authority is implicitly acknowledged in that the *Post's* columnists are compelled to address its claims, but the *Post* also seeks to explicitly delegitimate this authority. This shows that the validation of claims-makers requires more than being given a voice. Similarly, the mere presence of competing claims-makers is not an indicator of "balanced" debate. A key point here is that validation (or invalidation) and balance (or the skewing of balance) is subtly construed and may be difficult to discern on an inter-article level.

McKitrick, seemingly aware that his column might appear "one-sided," offers the following explanation for his stark and harsh critiques:

> This is no mere tiff among duelling experts. The IPCC has a monopoly on scientific advising to governments concerning climate change. Governments who never think to conduct due diligence on IPCC reports send delegates to plenary meetings at which they formally "accept" the conclusions of IPCC reports. Thereafter they are unable -- legally and politically -- to dissent from its conclusions. In the years ahead, people around the world, including here in Canada, could bear costs of climate policies running to hundreds of billions of dollars, based on these conclusions. And the conclusions are based on data that the IPCC lead authors concede exhibits a contamination pattern that undermines their interpretation of it, a problem they concealed with untrue claims.

As I noted in the previous chapter, the questions of "balance" and "debate" are complicated in that the *Post* purportedly strives to achieve it not on an intra-article level, where two opposing viewpoints are juxtaposed, but on an inter-newspaper level (but they frequently eschew these norms according to their mandate of combating what they regard as the broader "bias" of climate change discourses).
This editorial outlook can explain a great deal as to why competing claims-makers persist in the *Post*, while are rare in the *Star* and *Globe*. The *Post* gives a great deal of space to claims-makers who have allegedly been excluded from broader climate change debates – namely "sceptical" scientists – in the name of providing the "other side" (I discuss this at length in the following section).[166]

McKitrick's column is especially noteworthy as he is himself an expert who as been engaged with climate change. This is an example of an expert exercising their authorised speaker role through a

[166] Lawrence Solomon, "Keeping Canadian Students in the Dark on Climate," *National Post*, January 30, 2010, National edition, sec. FP Comment. It should be noted that, as discussed in the preceding chapter, this form of balance is not achieved on an intra-article level, but conceived on an inter-newspaper level. Thus, the *Post* strives to achieve balance against the *Star* and *Globe*, rather than internally.

direct contribution in the media, further blurring the primary and secondary validator roles of experts and the media. McKitrick simultaneously acts as an expert and a media-actor. His role as an expert is further complicated in that he does not offer a narrow set of knowledge claims pertaining to his expertise. Although his specific expertise (economics and statistics) lies on the periphery of climate science, he parlays his expertise in statistical modelling to make much broader claims about the IPCC, the state of climate science in general, and climate policy. Echoing the *Post's* general stance, he justifies his overt criticism of scientific research and the broad publicising of his own minority views (amongst the field of experts studying climate change) on the assumption that his work has been systematically under-represented. Thus, no attempt at internal discursive balance is warranted.

In sum, the constitution of debate framings presents a range of possibilities, from journalistic balance on an intra-article level that leads systematic over-representation of minority expert views, to the inter-newspaper "balance" (or bias-to-combat-bias) found in the *Post*, to the over-extension of authority from one realm of expertise into another, to the potentially fraudulent misrepresentation of one's credibility. This adds further support to a key finding of numerous other studies: what constitutes a "balance" of views is constructed, in part, by the newspapers themselves; similarly, debate framings, "discursive struggle," and the authorisation of different claims-makers are co-constituted. Thus, "*the* climate change debate" can be understood, in part, as a product of the media. And again, a novel finding here is that such framings are not only produced intra-article, or even on a systematic intra-newspaper level, but as part of inter-newspaper discourses.

It is important to reiterate that debate framings may be produced by any form of discursive competition – not only through overt "balance" or explicit "duels." The simple juxtaposition or prioritisation of claims-makers can have a similar outcome as presenting explicitly competing knowledge claims. For example, "action-scepticism" discourses do not necessarily challenge the scientific theory of anthropogenic climate change but they can have a similar discursive effect (Schmid-Petri et al. 2015). On behalf of climate sceptics and contrarians, such discourses are often bluntly tactical and strategic; the actual substance of the alleged debate is less important than conveying the existence of a debate (Jacques, Dunlap, and Freeman 2008; Oreskes and Conway 2010). Similarly, the multiplicity of claims-makers and concerns need not involve conflicting claims about a specific proposition, but can still provide the semblance of a "debate"; thus, the recruitment of certain claims-makers by these newspapers (or seeking to be heard by them) can serve a similar tactical function.

The net effect of these framings, discursive strategies, and authorisation of speakers is difficult to estimate without a broad set of measures. It potentially contributes to a generalised view of climate

change as debatable (see also section 4.9 above), but the specific mechanisms by which this is accomplished require further examination. For example, does debate about policy imply debate about science? Can different forms of scepticism encroach upon one another? This development is particularly significant with regards to the more subtly constructed debate framings and diverse forms of scepticism present in recent newspaper coverage of climate change (Boussalis and Coan 2016; Schmid-Petri et al. 2015). Moreover, the overall representation of climate change depends on what sources are involved, again pointing to the inter-newspaper dimension of these debates. Existing research suggests that newspaper audiences are deeply divided along ideological and other demographic lines that do not typically overlap (Hoffman 2011; McCright and Dunlap 2011). Thus, the presumed inter-newspaper "balance" that the *Post* hopes to effect seems more likely to beget polarisation and "talking past each other." (Given that such attempts at "debate" may be disingenuous – see section 4.9 above – such polarisation may be a welcomed function of discursive strategies). Here supplementary research about public reception of climate change newspaper coverage needs to be compared to and combined with media analyses.

A pressing normative question here is to what degree this authorisation of speakers and construction of debate framings is incidental (as Boykoff argues is the outcome of the journalistic norm of balance – or just the desire to present a "range of views") or intentional (as Oreskes and Conway and others argue is the outcome of concerted contrarian and obstructionist campaigns). I discuss this issue further in section 5.7 below.

5.6 Genuine and Generic Scientists

From these debate framings a question about the extension of expert authority arises: Are the competing claims-makers each qualified (according to the standards of their expert communities or other criteria) to weigh in on the issue? The *Post* frequently offers space to claims-makers who make knowledge-claims outside of their field of expertise (commonly its own columnists);[167] so in what sense does this convey a "balance" of views (on either and intra-article or inter-newspaper level)? And as Oreskes and Conway point out, the issue can be more directly misleading than an expert lightly overstepping the bounds of their relevant expertise: they find that many of the scientists who have become outspoken climate sceptics lack expertise in climate science, despite their scientific credentials being bolstered in the media (2011). Similarly, Anderegg et al. (2010) find that scientists who are climate

[167] E.g. Peter Foster, "Let the Climate Debate Begin," *National Post*, November 25, 2009, National edition, sec. FP Comment.

sceptics rank lower on several metrics of research and expertise than scientists who propound the theory of anthropogenic climate change.[168] In other words, in what might appear as a case of "dueling-scientists," one of the claims-makers might not be a scientist at all.

Oreskes and Conway also note that this question of relevant expertise can effectively be evaded as long as the terms of the debate are vaguely defined. While climate change involves a multiplicity of concerns, and thus a multiplicity of debates, in some prominent editorials one comes across discussion of "*the* climate change debate."[169] But what specifically constitutes this debate is not precisely defined. The "dueling scientists" motif (which implies a specific point of debate over a presumably scientific knowledge-claim) has given way to the juxtaposition of diversity of claims-makers, who compete to have their voices heard, but who each might be speaking to a different matter-of-concern.[170] In speaking of *"the* climate change debate," a range of concerns are often amalgamated or conflated into a singular, monolithic debate. This functions to further muddle the question of the extension of expert authority. The question, "Who speaks for the climate?" – and, crucially, about which part of the climate do they speak? – still looms.

However, on this issue, several insights can be gleaned. These newspapers do not merely recruit scientific experts whose authority is pre-established. As "secondary validators" they play a central role in establishing who counts as an "authorised speaker." In the case of the *Post*, it employs this special role to undermine the authority of other claims-makers (whose authority has been established, in part, by other news sources) whilst attempting to bolster the authority of claims-makers whose legitimacy tends not to be well established in broader climate change discourses, especially scientific ones. As Gamson notes, the primary vs. secondary validator distinction can be fluid and reciprocal. Often these newspapers, especially in terms of editorials and columns function as either primary or secondary validators, or both at the same time (see sections 4.3 and 4.4). And as Trumbo observes, "It is in the source that the broader authority of the story resides" (1996, 270). In this way, recruited experts

[168] But what metrics are relevant for establishing expertise has been contested by both scientists and theorists of expertise (Bodenstein 2010; Collins and Evans 2007).

[169] E.g. Peter Foster, "Let the Climate Debate Begin," *National Post*, November 25, 2009, National edition, sec. FP Comment; Alex Morales, "New IPCC Report Hardens Stances on Both Sides of Climate Debate; Slower Warming," *National Post*, September 28, 2013, All but Toronto, sec. News; Margaret Wente, "The Science Isn't Settled. Now What? The Climate Debate Is Usually Portrayed as a Fight between People Who Think Global Warming Is a Hoax and People Who Think Catastrophe Is Imminent. But There's a Third Position," *The Globe and Mail (Breaking News)*, February 16, 2010, sec. Other. Between 2006-2013, the *National Post* refers to "*the* climate/climate change/global warming debate," *"the* debate over/about climate/climate change/global warming," three times more than the *Globe* and *Star* combined (in 2.3%, 0.5%, and 0.25% of articles, respectively).

[170] When considering a diversified range of claims and claims-makers, the *Post* again stands out compared to the Star and Globe, presenting competing claims-makers three to five times as often as either newspaper.

frequently validate editorial or columnists' positions, just as the other way around. One function of the diversity of claims-makers is that it facilitates this recruitment – there is an extensive stock of would-be authorised speakers. Here, another connection to extension can be made: the authorisation of scientific claims-makers in the media is in large part a process of extension – from the "scientific" realm to the "public realm" – in other words, extension and authorisation go hand-in-hand.

As I noted above with regards to "generic scientists," the validation of authorised speakers, the recruitment of their authority, and the extension of this authority to weigh in on specific knowledge claims is often implied, rather than explicitly addressed. Even when the credentials of experts are offered less generically, the status of these credentials are almost never qualified. Again, in 38% of articles with scientist claims-makers, their specific field expertise is not explicitly identified (figures 5.4-5.6). There is rarely any attempt to evaluate or qualify expertise, whether in terms of relevance to the particular claims at issue, or whether one claims-maker's expertise is more legitimate, prestigious, or qualified than another's (as I discuss in chapter 7, this contributes to what Sheila Jasanoff calls a "relativist view of expertise").

However, a set of exceptional cases pertaining to climate scepticism emerge in the *National Post*. In these cases, the credentials of expert claims-makers are explicitly addressed – in sometimes contradictory ways. A key tactic is to dismiss or reject the credibility of established experts and institutions, as in the examples above and in the previous chapters attacking the IPCC. An illustrative example comes from an opinion piece written by Patrick Keeney, an adjunct professor in education at Simon Fraser University.

He starts by offering an ersatz reflexive argument about a "media pseudo-environment," in which "spin doctors establish a priesthood of experts who alone are in a position to adjudicate truth," and "ordinary citizens are encouraged to abandon their own judgment, and blindly place their trust in the approved experts."[171] According to Keeney, the "climategate" e-mails reveal that the IPCC and its

[171] Patrick Keeney, "Trust Us, We're Experts," *National Post*, March 5, 2010, National edition, sec. Editorials. Keeney (mis)appropriates the term "media pseudo-environment" from Rampton and Stauber (2002), who in turn borrow it from Walter Lippman's book *Public Opinion* (1997 [1922]). Lippman used the term to refer the perception of the world the populace gained through the media – a "medium of fictions" – which oversimplified the complexities of events, issues, and ideas. This "pseudo-environment" was, in short, the result of propaganda to suit the interests of power groups. Ironically, Rampton and Stauber employ this term to describe the work done by organised scepticism campaigns aimed at creating doubt about anthropogenic climate change, dedicating an entire chapter to the issue and yielding an analysis that is in line with Oreskes and Conway, and contrary to Keeney. Indeed, it is almost certain that Rampton and Stauber would view Keeney's and the *Post's* representations of climate change as contributing to this media pseudo-environment. And for what it's worth, Lippman called for an "independent, expert organization for making the unseen facts intelligible to those who have to make the

affiliated climate scientists have perpetuated "a sort of intellectual fraud on society, one which operates in opposition to a scientific stance." As a corrective to the "intellectual dishonesty" he detects in climate science, he offers a view of the proper nature of science:

> Science is skeptical, questioning, disinterested and somewhat cynical. It is also fundamentally democratic, in that all claims must be brought before the bar of scientific reason. Rather than taking anything on faith, the scientifically literate demand that all claims be backed with publicly available evidence.

Keeney concludes:

> It is time to put behind us the preaching of a priesthood who would have us believe that the debate can only proceed according to their pre-determined script. In the spirit of genuine science, we need to listen to the voices of honest dissent; we need to admit to the debate those mavericks whose views arise from a spirit of scientific disinterestedness, rather than allegiance to the party line.

As in the editorials examined in the previous chapter, these positions point to the broader images of science and scientific authority at play in these debates. The scepticism that is prevalent in the *Post* is often grounded in the assertion that such scepticism manifests the "spirit of *genuine* science." This is closely associated with the "sound vs. politicised science" discourses found in the newspaper, according to which the *Post* is a guardian of "scientific disinterestedness" against "established orthodoxy," or even "intellectual fraud."

The ostensible philosophy of science underlying Keeney's "healthy scepticism" reinforces two crucial themes that are common in the *Post's* treatment of climate change. Here connections to the way the *Post's* columnists fulfill their roles as validators of scientific knowledge-claims and claims-makers can be drawn. First, in their role as secondary validators, the *Post's* columnists frequently highlight the views of fringe scientists, which are outside of mainstream scientific opinion on climate change and conflict with the consensus view, while simultaneously denigrating the consensus as "approved orthodoxy" which is "obediently" followed. Keeney justifies prominently airing the claims of "those mavericks" on the grounds that "dissent" is indicative of a proper scientific attitude. In this way, fringe views are seen as somehow inherently more genuinely scientific than established theories.

Secondly, Keeney advocates that the "scientifically literate" public employ their "own judgement" in evaluating scientific knowledge claims against the "publicly available evidence." The

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decisions" to combat this pseudo-environment, which could be read as an endorsement for an organization like the IPCC.

Post's columnists routinely offer themselves as authorised speakers – primary validators of scientific knowledge – despite not being scientific experts. They do not simply attribute scientific judgements to experts, but they themselves make explicit knowledge claims about anthropogenic climate change. This meshes with Keeney's view that science is "fundamentally democratic," and any member of the public can hypothetically test knowledge claims against the "bar of scientific reason." Credentials or established expertise is thus not a prerequisite for engaging in *"the* debate."

5.7 "The Deniers"

The most prominent case illustrating these intersecting issues – the connections between credibility, authorisation, validation, scepticism, and conceptions of science – is a serial collectively titled, "The Deniers," written by the *National Post's* Lawrence Solomon. In 2007, over the course of the year Solomon profiled in detail the views of thirty-six scientists, each given a 1000-word article's worth of attention (on average), all of whom challenged, in some regard, the consensus view on anthropogenic climate change.[172]

While the columns do not follow a strict rubric, they all share several key aspects. Near the beginning of the piece Solomon will outline, attributively and with an air of journalistic impartiality, the profiled scientist's key findings and theories. A representative example:[173]

> We live in extraordinarily hot times, says Sami Solanki of the Max Planck Institute for Solar System Research in Germany. In 2004, he led a team of scientists that, for the first time, quantitatively reconstructed the sun's activity since the last Ice Age, some 11,400 years ago. Earth hasn't been this hot in 8,000 years and, he predicts, the hot spell will carry on for a few more decades before the sun turns down the heat. The 19th and 20th centuries are especially noteworthy. "The sun is in a changed state. It is brighter than it was a few hundred years ago and this brightening started relatively recently -- in the last 100 to 150 years," he says. "The sun has been at its strongest over the past 60 years and may now be affecting global temperatures."[174]

[172] Solomon later compiled and expanded these columns into a book of the same name.
[173] This example was selected randomly from the 36 "The Deniers" articles.
[174] Lawrence Solomon, "The Heat's in the Sun," *National Post*, March 9, 2007, sec. FP Comment. It is also worth noting that even though Solomon attributes the initial claims to Solanki, he does not quote him directly but paraphrases his research. The opening sentence, "We live in extraordinarily hot times, says Sami Solanki," is curious, in that if Solanki had actually said this, a direct quotation would seem appropriate. Moreover, the following sentence, "Earth hasn't been this hot in 8,000 years and, he predicts, the hot spell will carry on for a few more decades before the sun turns down the heat," ostensibly paraphrases the conclusions of Solanki's research (specifically, this article: S. K. Solanki et al., "Unusual Activity of the Sun during Recent Decades Compared to the Previous 11,000 Years," *Nature* 431, no. 7012 (October 28, 2004): 1084–87, doi:10.1038/nature02995). However, Solanki et al.'s conclusion is not that the "Earth hasn't been this hot in 8,000 years," but that, "The level of *solar activity* during the past 70 years is exceptional, and the previous period of equally high activity occurred more than

Solomon will then continue to explicitly elaborate precisely how the scientific theories run counter, cast doubt, or point to uncertainties about anthropogenic climate change – in this case outlining theories pertaining the sun's total irradiance, solar spectral irradiance, ultraviolet radiation in the stratosphere, and the sun's open magnetic flux. In each of the articles a subtle shift occurs between Solomon's role as a secondary and primary validator, in that he will blend attribution through quotation with affirmation. Solomon starts attributively,

> Dr. Solanki gives cold comfort to those who claim that global warming took off with the Industrial Revolution, and that the warming we've seen over the last century is mostly man-made. To demonstrate how unlikely this is, Dr. Solanki shows an *almost perfect correlation* between solar cycles and air temperatures over the land masses in the Northern hemisphere, going back to the mid 19th century (emphasis added).

Then moves to an affirmative tone:

> For example, when the length of solar cycle increased dramatically, as it did in from 1910 to 1940, so did the temperature on Earth; when it decreased, as it did from the 1940s to the 1960s, so too did Earth temperatures.

More importantly, in merging roles as primary and secondary validator, Solomon offers his own interpretations of the work of scientists. Above, he describes the "almost perfect correlation" found by Solanki – it is ambiguous if this is Solanki's assertion or Solomon's conclusion. Further in the article, he writes,

> Among the factors that he believes hold great promise, and that cry out for investigation, are the sun's irradiance and its magnetic field, which underlie all solar activity. "Unfortunately, regular and detailed measurements of the sun's surface magnetic field are only available for a few decades, not long enough for comparison with climate," he says on his Web site. "Records of the solar irradiance are available for an even shorter length of time" -- accurate measurements began in 1978 using instrumentation aboard spacecraft. *With knowledge of these fundamental determinants of Earth's climate still in their infancy, we cannot act with confidence on climate change* (emphasis added).

Again, it is unclear if this final sentence and its conclusion – "we cannot act with confidence on climate change" – is meant to be read as a paraphrase of Solanki's views, or is instead Solomon's own

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8,000 years ago." Furthermore, the claim that "the hot spell will carry on for a few more decades before the sun turns down the heat," is a conclusion that Solanki et al. do not offer, and Solomon asserts, contrary to Solanki's own research, that the sun's increased level of activity is the main causal mechanism to current warming. Instead, Solanki et al. conclude, "The rarity of the current episode of high average sunspot numbers *may indicate that the Sun has contributed to the unusual climate change* during the twentieth century," but add the caveat that the precise mechanism owing to increased solar activity is not clear. In earlier research Solanki and Krivova conclude that increased solar activity does not explain warming since the 1970s (Solanki and Krivova 2003).

interpretation. However, it appears that the latter is more probable: Solanki is never directly quoted in the article talking about the broader policy implications of his work. Given the care that Solomon takes to attribute specific claims to Solanki in the rest of the column, such statements stand out.

The aim of this chapter is not to assess reporting accuracy *per se*, in that I am not principally concerned in weighing the claims made in these newspapers against either their sources in scientific publications or whether quoted statements are faithfully represented. But to reiterate the point about columnists' role as primary validators of knowledge-claims – and thus, interpreters of science – it is also worth noting that Solanki himself has reiterated on several occasions that current warming since the 1970s or 80s is attributable to greenhouse gases, and has never explicitly made any public claims about action on climate change (also see note 36 above).[175] Solomon adds an interpretive gloss that does not readily emerge from the scientific research or scientists' statements he cites. As seen in the examples above, such interpretive work can come about quite subtly.

The most consistent facet of these columns is the detailed "CV of a denier" that Solomon provides at the end of each scientist's profile. Here he explicitly outlining credentials, teaching and research positions, peer-reviewed publications, grants and awards, and other accolades. For Solanki, he writes,

> Sami Solanki is director and scientific member at the Max Planck Institute for Solar System Research in Germany. Previously, he was appointed professor of astronomy at the University of Oulu in Finland in 1998 and Minnaert Professor at the University of Utrecht in the Netherlands in 1999. Among his research interests are solar physics, the physics of cool stars, radiative transfer and astronomical tests of theories of gravity. Dr. Solanki obtained his doctorate from the ETH in Zurich in 1987.

These examples mark a significant departure from typical practice in addressing and elaborating on the expert credentials of those recruited as authorised speakers. Why, in Solomon's "Denier" columns do scientists' credentials receive such elaboration, when elsewhere in these newspapers they receive scant attention? And why, in the *Post*, are the expert credentials of scientists concerned about climate change either ignored, challenged, or dismissed? And what do these validation practices imply for the authority of scientists?

Solomon outlines his rationale for the project thus:

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[175] Max Planck Institute, "How Strongly Does the Sun Influence the Global Climate?," accessed July 26, 2017, https://www.mpg.de/research/sun-influence-global-climate; Richard Black, "Sun and Global Warming: A Cosmic Connection?," *BBC News*, November 14, 2007, http://news.bbc.co.uk/1/hi/sci/tech/7092655.stm. For what it's worth, the *BBC* interprets Solanki's position thus: "Even though misguided journalists have sometimes mistaken his work as implying a solar cause to modern-day warming, Sami Solanki agrees with the IPCC verdict."

> I follow a few rules. The most important is that I do not attempt to settle the science myself. Herein you will find scientists who disagree profoundly not only with some of their colleagues who support the doomsayer view but with other scientists profiled in [these columns]. Such disagreement is the very stuff of science. More important, I am a layman trying to understand, and help other laymen to understand, how we should think about the global warming debate. For us, the answer cannot be to settle the science directly. For the most part, the layman must rely on the argument from authority, including a careful sifting of the credibility of the authorities and the relevance of their expertise to their particular claims for which they are advanced as witnesses.
>
> The question of credibility brings me to another rule I imposed on myself: I would not play the numbers game. I would not rely on claims that 14,000 scientists signed one petition saying the planet is toast, or that 14,001 signed another saying global warming is a hoax. There are a lot of scientists in the world. By definition most of them are mediocre. Getting thousands of mediocrities to sign a petition is an impressive work of political organizing; it is not science. No, I was looking for a relative handful of scientists of great eminence, whose credibility (unlike their equations) would be transparent to the lay reader.
>
> […] The scientists are not alone in having their credibility on trial in the global warming debate. They are not the only "authorities" in the argument, and not even the most important "authorities." Most laymen, most citizens, owe most of what we think we know about global warming not to science directly, but to science as mediated by the media and by political bodies, especially the UN and our governments. *We citizens, trying to discern what to do about global warming, must judge not only the credibility of the scientists but of those who claim to tell us what the scientists say* (emphasis mine).
>
> To that end […] judge for yourself the credibility of those who dismiss these scientists as cranks or crooks.[176]

There is much to unpack in this statement of purpose. One particularly notable feature is the way that Solomon obfuscates his validator role. First, he expresses concerns about the role of non-scientist validators of scientific knowledge. Then, he speaks of the role of the media in mediating science to the public. But in he does not self-identify his role this regard, but rather, counts himself as a member of the public – "*we* citizens." This peculiarity occurs in other columns, where the *Post's* columnists set themselves apart from the rest of the media (section 4.7.1).

Solomon's statement is also significant in that it lays out explicitly (rather than implicitly as has typically been the case) a professed epistemology, especially as it pertains to the public understanding of science. Solomon asserts, in line with the *Post's* controversy and debate framings, "disagreement is the very stuff of science." Like Keeney, Solomon rationalises the disproportionate coverage of "sceptical" scientists in the *Post* on the grounds that it achieves some scientific ideal; the implication here is that upholding the consensus view, as the *Star* does, is somehow "less scientific" than the *Post's*

[176] Lawrence Solomon, "Why I Wrote Deniers; Lawrence Solomon's Series Becomes a Book, Providing Heft to the Claim That Climate Science Is Not Settled," *National Post*, April 5, 2008, National edition, sec. FP Comment.

approach. And again, reiterating the theme of politicised vs. sound science (see section 4.5), Solomon definitively states what science is (or is not): “Getting thousands of mediocrities to sign a petition is an impressive work of political organizing; it is not science.”

What this points to is another degree of nuance as to how and why climate change media discourses – especially regarding scepticism – are constructed in the ways they are. This contributes further insights to role of “ideologies of science” in the media, and indeed, complicates them. Nelkin argued that the media, writ large, perpetuates the authority of science, especially its epistemic authority as a source of truth. While on one level this appears to be the case in these newspapers, this level is too general. Quite different conceptions of science – *different* “ideologies” – are at play in these climate change discourses. In short, each of these newspapers upholds science as a source of truth, but they have conflicting notions of what constitutes scientific truth and how it is achieved. Moreover, these different notions of science are associated with conflicting media discourse outcomes across a wide range of measures: framings, employment of rhetoric and other discursive characteristics, the recruitment of experts, these newspapers’ roles as validators of scientific knowledge, and of course, the explicit positions taken on anthropogenic climate change.

Among these consequences, the contribution of these columns to generalised debate framings stands out. As Solomon himself admits, he is not interested on working towards a view of climate change that captures the most scientific agreement. Instead, he sets his mandate as highlighting points of disagreement, even amongst so-called sceptical scientists. He tries to pre-empt critiques that he inflates the views of unqualified experts by the elaborate listing of credentials. But without contextualising the nature of these disagreements, their implications for the broader understanding of anthropogenic climate change, and, crucially, how they have been addressed by other researchers and taken-up in the scientific literature, Solomon’s curation of expert views can be understood as a rather egregious form of a cherry-picking with the outcome of conveying climate change as mired in debate.

5.8 Sceptical Strategies

As an epistemology is being espoused in these columns, I find it hard to resist a normative engagement with these issues, especially concerning the logic of the *Post’s* rhetorical strategies. Contradictorily to the *Post’s* actual overall approach, Solomon appeals to an argument from authority. But, as seen in its treatment of consensus and the IPCC, one of the *Post’s* main discursive tactics has been to undermine arguments from authority – and as I will show in the next chapter, to undermine the authority of individual scientists. The IPCC’s Assessment Reports, the work of thousands of scientists, most with

equally elaborate credentials as those Solomon profiles, have repeatedly been undermined or dismissed on the grounds that such authoritative reports – even a majority consensus of expert opinion – are not to be heeded on the word of expert authority, but are instead to be evaluated for their scientific merit, as Keeney argues above. Solomon and the *Post's* other columnists routinely offer interpretations of scientific research and affirmations of specific scientific knowledge-claims, and have consistently undermined scientists who uphold the consensus view.

But here Solomon surprisingly undermines those positions, and says that people need to trust experts. But why the experts that Solomon profiles, and not the scientists who disagree with them? On the grounds that they are "mavericks"? Solomon offers an argument from authority – but one that prioritises the views of fringe scientists over establishment and consensus. So just as speaking of "ideologies of science" is too general to make sense of the crucial differences between these newspapers, thinking of them as fundamentally bolstering the authority of scientists is also too broad of a conclusion. They bolster the authority of *different* scientists, who advance competing knowledge claims, and according to different rationales.

Since Solomon and others suggest that "debate" and "disagreement" are so fundamental to science, why present only one side of the "debate"? Why not clearly articulate the disagreements by profiling not only the "sceptical" scientists, but the concerned and convinced ones as well? While other media sources have constructed debate framings through the "dueling-scientists" motif, the *Post* has for the most part offered one-sided representation of experts. Again, this may have to do with the way that *Post's* columnists and editors imagine that they are effecting "balance" on an inter-newspaper level – assuming that since the consensus "orthodoxy" has been so "slavishly supported" in the rest of the media, they should not be compelled to even offer space to scientists who uphold this view (see section 4.7.1). The *Post*'s columnists suppose that the public has become indoctrinated, turning into "obedient apologists" and "advocates" for the consensus opinion. Numerous studies, however, have shown that this assumption is wrong, finding the opposite instead: the media have consistently been biased towards sceptical views, not the other way around (Boykoff 2007; Carvalho 2007).[177]

Assessing the broader effects of the *Post's* over-representation of sceptical or contrarian claims requires further research into readership and consumption of climate change coverage, as well as public opinion on climate change, but it is highly unlikely that the *Post's* disproportionate scepticism

[177] This, again, needs to be related to the way that the *Post* attempts to achieve "balance" on an inter-newspaper level, rather than an intra-newspaper level. This can be read as a strategy to construe balance and bias in a way that supports sceptical views.

contributes to more "balanced" views amongst the public, given the propensity for polarisation in media consumption habits (Fisher et al. 2013).

Returning to the questions presented in section 5.3 above, Boykoff and Boykoff's concept of "balance-as-bias" does not appear to apply to the *Post*. They find that scepticism in climate change news reporting can emerge incidentally through journalistic norms rather than overtly or intentionally through editorial management or concerted efforts to promote scepticism on behalf of experts (2004). They, however, did not consider opinion columns; as this study has shown thus far, these columns play a major role – if not the major role – in defining climate change discourses in these newspapers. In this regard, the disproportionate recruitment of sceptical experts in the *Post* (or experts whose views purportedly support scepticism) does not stem from the passive workings of common norms governing the practice of journalists, but rather an overt and deliberate mandate to promote scepticism – rationalised in part by a different conception of media "balance." But it is also possible that the *Post's* columnists are not genuinely interested in promoting balance.

Here it's crucial to note that the *Post's* columnists typically go further than debate framings. Its columnists do not typically strive for equivocality, or seek space for "legitimate disagreement" (see section 4.8) The predominant position of the editors and columnists at the *National Post* is the rejection of a theory of anthropogenic climate change. This has been consistent across the time period under study, and has not changed regardless of any new scientific research (indeed, sceptical editorials have increased in proportion to more and more definitive statements about the reality of ACC). And of course, this view runs contrary to the conclusions of the majority of climate scientists. Essentially, the *Post*'s view is that the majority of climate scientists are *wrong,* and that its columnists are correcting bad science.

It is thus extremely important that other studies have found that much overt scepticism in media coverage of climate change has been intentionally disingenuous. Several studies have found that so-called sceptics have deliberately engaged in misleading scepticism campaigns, masking their financial interests, and their connections with conservative think tanks or PR firms whose chief goal is to block action on climate change (Boussalis and Coan 2016; Brulle 2013; Jacques, Dunlap, and Freeman 2008; Oreskes and Conway 2011). As noted in the previous chapter, think-tanks have been active in producing opinions pieces for the *Post* (see section 4.8). But even here, a question of duplicity remains somewhat ambiguous. Can the intentional, disproportionate recruitment and validation of sceptical claims-makers be sincere?

Or, more plainly: do the *Post's* columnists actually believe what they say? Do they sincerely subscribe to the view that climate change sceptics deserve extensive media attention? Do they believe they are employing their validator roles with integrity and honestly? Another, more specific, formulation of the question: The *Post* intentionally constructs debate framings, highlighting politicisation, uncertainty, and doubt, in large part through their validation of climate change sceptics as authorised speakers – but for what reasons and to what end?

Among the more elusive proposed determinants of climate change media discourses are ideologies, which are especially relevant to the question of sincerity (see section 4.8). This links to the "political parallelism" thesis – which holds that various social, political, and economic interests and ideologies will determine outlooks on climate change. As noted in the previous chapter, the political parallelism thesis holds for the *Post* (as well as the *Star* and *Globe*), which is to say that one finds a cluster of associated "ideological" framings. The *Post's* climate change discourses are frequently paired with economic framings and anti-regulation sentiment – especially discourses that favour economic growth over environmental protection (see sections 3.3.2, 4.3.1, and 4.8).

Numerous studies have argued that protecting financial and economic interests from climate change legislation and regulations has been a key motivator in promoting climate change scepticism in the media (Brulle 2013; Jacques, Dunlap, and Freeman 2008). For example, Oreskes and Conway find that various claims-makers promoted intentionally misleading claims in the media to foster doubt and uncertainty with the avowed goal of stifling regulation (2010). A sincere engagement with the scientific understanding of climate change is thus not a priority to this end. However, they also find that while some participants in climate change debates in the media were duplicitous in order to serve rather bare financial interests, this could not simply account for all scepticism, especially that coming from ostensible experts. They argue that deep-seated ideologies of free-market fundamentalism were a major motivator in these debates – the implication being that some participants were sincere in their sceptical positions, in that they were not purposefully deceptive and that they genuinely subscribed to their expressed beliefs.

Thus, similar media practices and discourses may result from different motivations. This explanatory question has deep normative implications. If one potential application of this research is to contribute to improved media discourses – or at least contribute insights that allow for the normative assessment of media discourses – different causes will demand different interventions and strategies. I return to these questions in chapter 7.

5.9 Conclusions: (In)Validating Climate Science

In these newspapers' coverage of climate change, scientists' validator roles are manifested in a variety of ways. These can be classified according to six key categories: deference, debate, competition, enrollment, contribution, and contestation. In articles with scientific framings (usually news-briefs), all three newspapers are generally deferential to scientists' claims. Scientists are the key speakers and primary validators in these articles, and are often interviewed to provide a quote about a recently published study. Overall, these cases are relatively uncommon; such articles only make up a small percentage of total climate change coverage.

In the second category, debate framings are sometimes produced by juxtaposing the competing views of two scientists. The scientists here each serve as the primary claims-makers, but their validator role is complicated, if not undermined, in that their knowledge claims are contested, and hence, not fully validated. This so-called "dueling-scientist" framing is also rare in these newspapers.

Competition refers to the way that scientist claims-makers must contend with other kinds of claims-makers in media coverage on climate change. In this regard, the validator role of scientists is highly contested; while scientists comprise a relatively major group of claims-makers, they still only appear in approximately 10% of all articles. This is more or less evenly rivaled by politicians, other (non-scientist) experts, and columnists. However, for the most part, conflicts are not direct. Competing claims appearing in the same article are rare in the *Star* and *Globe*, though more common in the *Post*, appearing in a third of articles with explicit claims-makers. Competition amongst claims-makers is better understood on a large-scale over many articles, where claims-makers vie for discursive space in these newspapers.

While all scientist claims-makers are recruited by these newspapers in some regard – indirectly by citing their work, directly for quotations, as contributors for guest columns, or by selecting their letters for publication – enrollment occurs when scientists' claims are used to bolster the views of a media actor, typically those of columnists.

Scientists fulfill their validator roles most directly when they offer contributions to these newspapers as guest columnists. Such columns appear relatively uncommon for scientists, though as shown above and in the following chapter, such engagements have the potential to greatly influence the landscape of climate change media discourses. More research is needed, however, on the frequency and effect of such columns.

Finally, contestation occurs when scientists' claims are presented and challenged by media actors. Such contestation is predominantly linked to sceptical discourses, and as such, appear most frequently in the *Post* and very rarely in the *Globe* or *Star*.

These different discursive practices reveal how scientists' validator roles, along with the distinction between primary and secondary validators, are complicatedly blurred in these newspapers. In terms of enrollment, media actors are the primary claims-makers. Who is validating whom? In the case of the *Post*, the authority of the scientists it recruits bolsters the sceptical arguments made by its columnists. In turn, the *Post* uses its authority as a major media source to offer a platform for the views of sceptical scientists – views that have been largely invalidated by traditional means of scientific claims-making in scientific journals. Thus, the knowledge validating authority of the media and scientists is co-constituted and mutually reinforcing.

Conversely, columnists' ability to take on a primary validator role of scientific knowledge claims can be mobilised to undermine the authority of scientists. In many of their commentaries, the columnists at the *Post* directly challenge the claims of scientists who uphold the consensus view. In such cases, the authority of media actors rivals, if it is not significantly greater than, that of scientists. Indeed, whatever form scientists' validator roles take in these newspapers, they are always subject to the authority of media actors. Journalists and columnists select which scientists to quote, and editors select which scientists to give column space; ultimately, columnists have substantially more discursive power in these newspapers to promote, offer, or challenge knowledge claims about climate change. In the following chapter I focus on a set of cases where these competing forms of authority have resulted in intense and protracted conflicts.

6 The Perils and Politics of Media-Active Scientists

The previous chapter shows that scientists compete with a range of other actors in these newspapers in making claims about climate change. Nonetheless, scientists still constitute a special kind of claims-maker, most conspicuously in their role validating certain kinds of knowledge claims – about the physical causes and effects of climate change, for example. [As was shown, scientists do not participate with the media in a straightforward manner and manifest their validator roles in a variety of ways: deference (scientists' claims as authoritative, definitive, and stand-alone), debate (scientists function as primary validators, but whose claims are "balanced" against another experts'), recruitment (seeks scientists' authority, but to support the views of a media actor), contribution (scientists become media actors themselves), and contestation (media actors reject or challenge scientists' claims).] In this chapter, I look more closely at the specific dynamics of scientists' media engagement, especially as they respond to and conflict with each other.

I examine specific cases in which scientists actively take on validator roles by regularly serving as sources, and, especially, instances where these scientists have become direct media contributors. In the previous chapter I examined so-called sceptical scientists in these capacities. Here I examine scientists who are overtly concerned about climate change and have advocated for action. Such cases address and complicate the questions of authority, credibility, and boundary work in several ways. On the face of things, the deferential, enrolled, and contributory roles of scientists in these newspapers seem to bolster scientists' authority by reinforcing their positions as primary validators of knowledge about climate change. However, as I will show, these roles often instigate incidents of contestation, especially in the context of climate change scepticism in the *National Post*, where these media-active scientists' claims are challenged, or, more often, their authority and credibility as expert claims-makers is attacked, often in quite rancorous and personal terms.

These attacks on authority and personal credibility are often framed in terms of politicisation; this offers another level for understanding the boundary-work pertaining to conceptions of "sound science" at play in these newspapers. These media-active scientists are accused of being advocates, activists, or political partisans, thereby transgressing some norm of scientific practice and/or knowledge. This presents a valuable point of inquiry. How are the boundaries of "sound science" established (or challenged) in these newspapers with regards to the media activities of scientists? And given the risks involved, I also wonder why scientists might become media-active. To offer insight into this question, I interviewed three climate scientists who have been active in the media about their experiences, two of whom have been subjected to overt criticism by media-actors.

Both the media coverage and interviews reveal that traditional boundaries of proper scientific behaviour have been and are being reworked and re-imagined. But the resulting sets of boundaries are not straightforward, but tend to shift depending on their context of application and the actors enforcing them. This often leads to conflicting or contradictory boundary-work. Navigating these fluid boundaries makes scientists' media engagements rather precarious. In this regard, the rhetorical nature of this boundary work is especially significant; they are appealed to or transgressed for ad-hoc tactical reasons – not to support or challenge the authority of validators in general, but to undermine specific knowledge claims. I conclude this chapter by considering ways to reconstitute such boundaries.

6.1 Politicisation and the Value-Free Ideal

As I argue in chapter 4 and 5, the notion of politicisation can be understood in several, somewhat distinct ways. As various observers have noted, politicisation is seen as a corruption of a proper scientific attitude, namely, a "value-free" ideal (Proctor 1991).[178]

On one level, I want to treat this as a substantive issue, and elaborate on the arguments I lay out in sections 4.9 and 5.2.5 above. As I note there, starting with the assumption that politicisation is necessarily a corrupting influence on science is clearly problematic, especially from a STS perspective that holds that all science is in some way political. The interesting sociological question from this point of view is to understand the ways that concerns about political interference and scientific propriety shape scientific practice, and in particular, media-scientist interactions. However, I am also interested in normatively addressing the issue of politicisation, so I also return to the question I lay out in chapter 5: in *what ways should* science be political? In both these regards, it should prove useful to delve more deeply into how boundaries between science and politics are conceived, and in particular, how they are imagined to govern or set parameters for the proper behaviour of scientists.

Peter Galison finds a corollary to the value-free ideal in the notion of "pure science." He traces one version of these ideals to a Cold War context, in which scientists reflected on the ways in which science could be appropriated for the horrors of military conflict, or corporate avarice, or other nefarious ideological ends (Galison 2008). The ideal of "pure science" was set up as a safeguard against these corruptions – a vision of curiosity-driven science, compelled by a virtuous quest for truth, unadulterated by petty squabbles or base worldly desires. In this way, science should be "value-free,"

[178] As with my considerations of politicisation in the previous chapter, here I don't intend or pretend to offer an exhaustive historical or philosophical account of the "origins" of the "value-free" ideal and how it shapes normative conceptions of politicisation.

which Hugh Lacey observes tended to entail one or all of the following: impartiality – scientists should cultivate a freedom from political ideology; neutrality – scientific knowledge should not be construed with any clear political implications; and autonomy – scientists should not be employed towards a particular political purpose (2005).[179]

Conversely, others find that it was precisely as a response to the role of science in the development of weaponry and the environmental and health risks produced by industry that led to more public and political roles being undertaken by scientists. Books like Rachel Carson's *Silent Spring*, Barry Commoner's *Nature, Man, and Technology*, and Paul Ehrlich's *The Population Bomb* emerged and became symbolic of the new responsibilities demanded of and taken on by scientists. Dorothy Nelkin explored these changes and tensions in an early science studies paper which considered the ways that public and political demands for scientific knowledge affected the professional activities of American ecologists (1977). On the one hand, many ecologists welcomed or embraced their newfound public and political importance, and were indeed actively engaged in cultivating it. However, others found these demands disconcerting, and attempted to solidify the boundaries of the value-free ideal.

Operating under an assumption that politics was an "alien element, essentially destructive of scientific endeavour," many ecologists tried to more strictly define the limits of proper scientific practice (Haberer 1969, cited in Nelkin 1977, 81). This was partly motivated by professional concerns, as consulting firms and think-tanks proliferated who wanted to capitalise on the newfound public and governmental demand for expert ecological knowledge. Ecologists were being recruited by various groups, from environmental activist organizations like the then-fledgling Greenpeace, to various federal American agencies operating under the recently established National Environmental Policy Act, to a multitude of industrial corporations looking for scientific assessments of their environmental impacts. Lacking a clear system of professional certification like medical doctors, many feared that these competing "instant experts" would undermine the legitimacy and authority of professional and academic ecologists.

But attending these concerns about professionalisation were deeper worries about the proper role of scientists, the perceived conflict between politics and science, the effect of policy-driven research on the character of scientific knowledge, and ultimately, visions of "pure," "value-free," science (cf. sections 4.5 and 5.2.5). Much of knowledge being produced was not perceived as neutral as it was often conducted for the purpose of addressing specific, short-term exigencies like measuring pollutants, often

[179] See also Daston and Galison (2010) and Douglas (2009; 2015).

in the context of "environmental assessments" for industry. Nor was it autonomous, as many scientists were not independent, but worked on contracts for government or industry. Many scientists – even those sympathetic to the kinds of research being done – felt that other researchers had lost their impartiality, which in turn was seen as a threat to the epistemic authority and professional credibility of ecology.

Thus, many scientists turned to traditional boundary-work to protect the internal mechanisms of science from the external influences of political ideology and corporate interest. This partly involved delineating between properly scientific communication and "popularisation" or "sensationalism." Biologist Ira Baldwin, though also concerned with the health risks associated with pesticides, took to the pages of *Science* to criticise the "dramatically written emotional appeal" of Rachel Carson's *Silent Spring*, and urged concerned citizens to consult instead the "careful study" and "sound judgement based on facts" to be found in the National Academy of Science reports (Hecht 2001, 292). Many ecologists eschewed the media and other forms of public engagement. But these boundaries were frequently breached and led to a Catch-22. Ecologists were compelled to be publicly engaged and influence environmental policy, but also felt that too much or the wrong kinds of engagement would undermine their integrity, which was ultimately the grounds for their influence. The balance they tried to achieve led to a great deal of normative ambiguity. While one should take care with historical comparisons, the historical case of ecologists provides useful conceptual analogies for marking sense of the issues surrounding media-active climate scientists.

6.2 Are Scientists Evolving into Climate Crusaders?

At the end of January 2007, the same week as the *Summary for Policymakers* of the IPCC's Fourth Assessment Report was published, the *Globe and Mail* published a column by Anne McIlroy entitled "Are Scientists Evolving into Climate Crusaders?"[180] The column profiles Dr. Gordon McBean, a scientist from the University of Western Ontario and chairman for the Canadian Foundation for Climate and Atmospheric Sciences. The article recounts deliberations in 2002 by the Liberal government, then in power in federal parliament, about whether or not they should ratify the Kyoto Protocol. In the context of these deliberations, McBean decided that he would cross a "self-imposed boundary" between science and advocacy and personally push not only for the government to ratify the protocol, but to go beyond it in its emissions targets in order to avoid or mitigate the most serious consequences of climate change.

[180] Anne McIlroy, "Are Scientists Evolving into Climate Crusaders? Warnings of Warming Dangers Have Become Increasingly Dramatic, Anne McIlroy Finds," *The Globe and Mail*, January 29, 2007, sec. National News.

McIlroy states that McBean was compelled to cross this boundary by what he saw as the increasingly convincing evidence for anthropogenic climate change and its serious risks, as well as a feeling of intergenerational and international moral responsibility for those who would be most affected by climate change. Of these warnings from scientists McIlroy asks,

> Is it a good thing that [scientists] are sticking their necks out, talking publicly about what they see happening and what needs to be done? After all, their work is the foundation for political action on global warming, both in Canada and internationally. Or are they going too far, becoming climate crusaders instead of objective analysts and observers?

McIlroy is equivocal in assessing the boundaries implied by these questions. She argues that scientists' warmings have become "more dramatic – and, according to some critics, far more apocalyptic than is warranted by the science." To illustrate the "passionate" and "emotional" arguments employed by scientist advocates, McIlroy turns to Andrew Weaver, a Canadian climate modeller working in the School of Earth and Ocean Sciences at the University of Victoria. Weaver is an established climate scientist, with over 130 peer-reviewed publications and numerous research awards, and author of two popular books on the science and politics of climate change. He was also a lead author on various chapters in the second, third, fourth, and fifth Intergovernmental Panel on Climate Change (IPCC) Assessment Reports.

McIlroy says that like McBean, Weaver believes that climate scientists have a "moral and ethical responsibility to talk about" the threats posed by climate change. The column quotes Weaver,

> When you are a scientist and you realize humanity as you know it is being threatened, what is your job? Is your job to stand by and say nothing, or is your job to say, we are on a precipice, and there is no joking about it. I don't get off on saying the sky is falling. I am seriously concerned about the planet that my kids' kids are going to live on. It is not a planet that will look anything like it is today…It is time for people to get scared.

McIlroy continues with a tone of impartiality, stating that there are "experts who disagree about the threat posed by global warming…[who] make a number of arguments, including that warming temperatures may be part of the natural variation in the Earth's climate." She points to an open letter that approximately 60 scientists, economists, and other experts sent to Prime Minister Stephen Harper in April of 2006, the week that parliament resumed with the Conservative Party of Canada heading a minority government after winning the federal election earlier that year. The letter specifically addressed the Kyoto protocol which came into effect the previous year and had been ratified by a previous Liberal government (the Conservatives eventually withdrew from the protocol in 2011, being

the first country to do so). It asked for "balanced, comprehensive public-consultation sessions be held so as to examine the scientific foundation of the federal government's climate-change plans," and argued that "while the confident pronouncements of scientifically unqualified environmental groups may provide for sensational headlines, they are no basis for mature policy formulation." Moreover, the letter maintained that "there is no "consensus" among climate scientists about the relative importance of the various causes of global climate change."[181]

In response to this letter, Weaver, McBean, and another scientist, Kenneth Denman – who worked for Canadian Centre for Climate Modelling and Analysis, and the Institute of Ocean Sciences, part of the Department of Fisheries and Oceans – drafted and circulated their own open letter to Prime Minister Harper which specifically took issue with this last claim. They emphasised that the conclusions reached by the IPCC "are shared by the vast majority of the national and international climate science community," reiterated that "there is increasingly unambiguous evidence of changing climate in Canada and around the world," and called for a national climate strategy to deal with these changes.[182] The letter was signed by 90 Canadian scientists working on climate change (and came to be known as the "Climate 90" letter).

Ken Denman reported that as a government scientist, "there was some unhappiness among senior bureaucrats" for his perceived advocacy role, noting that he was "free to talk about science but not policy." However, he was not disciplined for his actions. McIlroy concludes that the "duelling missives are a sign of how political the scientific debate over global warming has become."

The *National Post* published both letters; the second was accompanied by a column written by Terence Corcoran in which he criticizes its "dubious origin." The underlying premise of his criticism is that the letter has lacks impartiality and neutrality because it is signed by "an astounding number" of "government-funded researchers," "grand-recipients," and "activist." He explicitly singles out Gordon McBean and accuses him along with other scientists who signed the letter of a conflict of interest for arguing for more funding that would directly benefit their own research. The implication here (one that Corcoran often repeats in other columns – see the following section) is that government scientists, in virtue of being linked to political institutions, have sacrificed the value-free ideal and their independence. The first letter, however, received no special comment other than to suggest that it shows "clear evidence of scientific disagreement." Curiously, Corcoran does not hold the signatories of

[181] "Open Kyoto to Debate: Sixty Scientists Call on Harper to Revisit the Science of Global Warming," *National Post*, April 6, 2006, National edition, sec. Financial Post: Comment.
[182] "Scientists Urge PM to Fund National Climate Strategy," CBC News, http://www.cbc.ca/news/technology/scientists-urge-pm-to-fund-national-climate-strategy-1.617844.

the sceptical letter to account on the same grounds, despite many of them being university researchers and government-funding-recipients in their own right – the precise grounds on which Corcoran claims Weaver is a "civil servant" (see below). Moreover, the sceptical letter also calls for further research and government assessments of climate science, which would presumably be government funded, yet Corcoran does not address these.

6.2.1 Weaver, Andrew v. Post, National

Andrew Weaver, who was one of the key subjects of McIlroy's column, had been media-active – and the subject of critical media attention – for many years prior to his involvement with the "Climate 90" letter. In the early-1990s Weaver was occasionally recruited by news organizations to be a source in stories about climate change, mainly because of his role on the IPCC. He soon ended up on newswire source lists, and became a regular source for comments on stories about climate change in the Canadian media.[183] Weaver eventually took a more proactive role in media engagement. In 1996 he co-penned with his colleague Ken Denman a brief letter to the editor of the *Globe and Mail* in response to disparaging remarks made by then-business-columnist Terence Corcoran about the review process of the IPCC's Second Assessment Report that had been published earlier that year.[184] Weaver and Denman, who were both lead authors on the report, rejected Corcoran's claim that the IPCC report had been "altered at the last minute to expunge certain qualifications and doubts in the minds of many scientists about global warming," and thereby make a stronger case for anthropogenic climate change than was warranted.[185] Instead, they argued that the IPCC report had been inherently conservative in its proclamations, precisely because they had overplayed sceptical concerns in order to facilitate approval from reluctant member countries.

Another of Weaver's first major forays as a media contributor was an opinion piece published, perhaps fatefully, in the *National Post* regarding an earlier piece by sceptical scientist Fred Singer. Singer

[183] "Sources & Sidebars for Monday, Dec. 1: Meeting on Global Warming," PR Newswire, December 1, 1997.
[184] Kenneth Denman and Andrew Weaver, "Global Warming," *The Globe and Mail*, July 22, 1996, Metro edition, sec. ROB Letter.
[185] Terence Corcoran, "Report on Warming Doctored," *The Globe and Mail*, July 17, 1996, Metro edition, sec. ROB Column; this was one of two consecutive columns offering pronounced sceptical views on climate change following the publication of IPCC's SAR. The first was published just a day earlier: Terence Corcoran, "Global Swarming," *The Globe and Mail*, July 16, 1996, Metro edition, sec. ROB Column. In the second column, Corcoran recruited physicist Frederick Seitz to bolster his climate change scepticism. Seitz's prominent climate change scepticism raised many concerns, particularly in light of the consulting work he had done for the R.J. Reynolds Tobacco Company in developing their strategy in undermining the science pertaining to the risks of cigarette smoke (Oreskes and Conway 2010).

had written a major column in which he was heavily critical about Environment Canada's official position on climate change, claiming its mandate was to persuade "Canadian citizens that a warmer climate would hurt them so much that they should pay a lot more for gasoline to discourage its use" and linked the institution's concern about anthropogenic climate change to "overheated claims of global warming theorists and political activists."[186] Weaver took issue with these claims and sought to clarify what he viewed as a series of inaccuracies or distortions advanced by Singer of the existing climate change research. He concludes, portentously, that he is "extremely concerned about the disproportionate coverage the mainstream media gives to what is, in reality, negligible scientific controversy."[187] Though Weaver's column was already a response to Singer's earlier sceptical piece, Singer was invited again to respond to Weaver in which raised further doubts about anthropogenic climate change and promoted his book, *Hot Talk, Cold Science: Global Warming's Unfinished Debate*.

In the following years, Weaver became increasingly media-active, appearing regularly in various capacities in a range of newspapers, including the *National Post*.[188] His typical recruitment in the *Post* was in a debate capacity, where his views were quoted and "balanced" against those of another ostensible expert who took a sceptical position. An archetypal example is a piece in which Weaver was invited to respond to a set of "climate change myths" advanced by various climate sceptics.[189] For the most part, there was no overt criticism of Weaver, except for a column by Dr. Madhav L. Khandekar, a sceptical scientist and former Environment Canada researcher, who challenged the positions Weaver expressed in the "climate change myths" article at length.[190]

The seemingly cordial relationship between the *Post* and Weaver changed when Terence Corcoran (now at the *Post*) mentioned Weaver in a vociferous and scathing criticism of an article written by Charles Montgomery at the *Globe and Mail* entitled, "Nurturing Doubt about Climate Change is Big Business." Montgomery's piece outlined in detail the activities of Canadian climate change sceptics, in particular, those of Timothy Ball, a University of Winnipeg Geography Professor who taught climatology

[186] S. Fred Singer, "New Heat on Global Warming: Despite Environment Canada's Dire Warnings, Atmospheric Physicist S. Fred Singer Says Global Warming Is Still Suspect -- and a New Study Shows a Hotter Climate Could Be Beneficial," *National Post*, August 7, 1999, National edition, sec. Financial Post: Comment.
[187] Andrew Weaver, "Clash over Climate Change: Singer Article Clouds the Picture," *National Post*, September 2, 1999, National edition, sec. Financial Post: Comment. It is worth pointing out that in these earlier instances of media discourse about climate change debate framings had already been firmly established.
[188] Between 1999-2006 Weaver appears in 22 articles abut climate change published by the *Post.*
[189] "Kyoto: Myths and Science," *National Post*, November 14, 2002, National edition, sec. Canada.
[190] Madhav L. Khandekar, "Faulty Forecasts: With More and More Scientists Questioning the Real Cause of Recent Global Warming, Rushing to Ratify the Kyoto Accord Is Ridiculous in the Extreme," *National Post*, November 21, 2002, National edition, sec. Financial Post: Editorial.

and publicly promoted climate change scepticism, through public talks and guest newspaper columns. Montgomery claimed that the climate change scepticism advocacy group for whom Ball worked, the Friends of Science, was partly financed by oil and gas companies and their executives through the Science Education Fund set up under the Calgary Foundation, a charity organisation. Montgomery also detailed the financial relationships between oil and gas companies and various other Canadian climate change sceptics. In the article, Montgomery quotes Weaver as saying about Ball, "He says stuff that is just plain wrong. But when you are talking to crowds, when you are talking on TV, there is no challenge, there is no peer review. […] *What Ball is doing is not about science. […] It is about politics*" (emphasis added).[191]

In a 3,200-word column, Corcoran dismissed Montgomery's piece as a "4,200-word hatchet job" and set out defend Ball from "smears, innuendo, fabrications, distortions, errors, untruths and omissions gross and minor."[192] Corcoran offered a near point-by-point rebuttal to Montgomery, and sought out direct clarification from Ball. Weaver's remark, in particular, caught Corcoran's attention, who wrote, "perhaps Mr. Montgomery can be forgiven his lapse on the facts, since he appears to have taken many of his cues from a man named Andrew Weaver." He goes on to accuse Weaver of hypocrisy for saying that Ball's work had been politicised: "When it comes to politics and climate science, few beat Andrew Weaver as a player," and loudly implied that Weaver's scientific work had been compromised by "partisan politics."

Weaver responded with a letter asking for corrections to be made, specifically regarding factual errors regarding his job position.[193] Corcoran claimed that Weaver was a "federal civil servant" and his agency (presumably referring to the Climate Modelling Group at the University of Victoria) was a "division of Environment Canada," neither of which were accurate. Corcoran also repeated a claim that had appeared in an earlier piece in the *Post* that Weaver had called a paper by Ross McKitrick and Steven McIntyre allegedly debunking the so-called "hockey-stick graph" "pure and unadulterated rubbish." Weaver said that the quotation was erroneous; what he had actually claimed was that the idea that the entirety of climate science (and the theory of anthropogenic climate change) depended on the specific research paper pertaining to the "hockey stick graph" was "pure and unadulterated rubbish";

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[191] Charles Montgomery, "Nurturing Doubt about Climate Change Is Big Business," *The Globe and Mail*, August 12, 2006, sec. Focus.
[192] Terence Corcoran, "Hockey Sticks and Hatchets: Inside the Globe's 4,200-Word Hatchet Job on Climate Skeptics," *National Post*, August 23, 2006, National edition, sec. Financial Post: Comment.
[193] Andrew Weaver, "My Information Was Not False," *National Post*, August 31, 2006, National edition, sec. Financial Post: Comment.

the underlying study, while significant, was not foundational and its overall findings had been corroborated by numerous other temperature reconstructions.[194] Weaver pointed out that this specific quote had already been the subject of an earlier editorial correction and retraction.[195] The *National Post* issued an editorial statement acknowledging error and offered corrections to information regarding Charles Montgomery, but not to Weaver.[196] Corcoran himself penned a lengthy mock apology in which conceded that Weaver had not used the "pure and unadulterated rubbish" phrase in the context implied, but otherwise defended his assertions with regards to Weaver.[197] When he called Weaver a "federal civil servant," for example, Corcoran claimed that he did not mean it in the literal sense as somebody who works for a government agency; rather, he suggested that any discerning reader would be able to pick up on that fact that Weaver was a metaphorical servant of the state because he has received funding from the Canadian government as the Canada Research Chair in Atmospheric Science and collaborated with Environment Canada, specifically through the Canadian Centre for Climate Modelling and Analysis located at the University of Victoria.[198] Corcoran speculates that millions of dollars of "government money supports the elaborate climate structure around Mr. Weaver."

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[194] The study that gave rise to the so-called "hockey stick graph" was Mann et al. 1999. The McKitrick and McIntyre paper (2005) in question specifically critiqued the methodology and findings of Mann at al. 1999. The "hockey stick" term was coined, or at least popularised, by climatologist Jerry Mahlman (Biello 2012). The *National Post* gave the McKitrick and McIntyre paper considerable coverage, starting with the following article: James Cowan, "Canadians Find Flaw in Kyoto 'Hockey Stick': Global Warming Debate," *National Post*, January 27, 2005, National edition, sec. News. Cowan's article claims that Mann et al. 1999 is a "pivotal global warming study central to the Kyoto Protocol" and that the McKitrick and McIntyre paper showed its "serious flaws." The degree to which the *Post* routinely championed McKitrick and McIntyre's work is based on the implication that the "hockey stick graph" is foundational to the theory of ACC, and that if it could be shown to be flawed, then the totality of climate science showing ACC would be undermined, including the work of the IPCC and climate agreements like Kyoto. This is precisely the view that Weaver sought to dismiss. As was discussed in section 5.2.4, the *Post* also gave considerable and regular space to McKitrick (as well as McIntyre) to promote their own research, often in lengthy columns. For example: Steve McIntyre, "Revisiting the 'Stick': Despite Proof That the Official 1,000-Year Temperature History (the Hockey Stick) Is Wrong, Government Scientists Refuse to Correct the Flaws in the Data," *National Post*, June 17, 2005, National edition, sec. Financial Post: Comment. The way the "hockey stick graph" is employed as a rhetorical device and synecdoche for climate science, and the repeated and regular claims about it being "debunked" in the *National Post* presents a compelling case study of the ways climate change scepticism is manifest in the media. Besel (2011) and Demeritt (2006) consider these questions in the context of the American news media.

[195] The original error was found in James Cowan, "Canadians Find Flaw in Kyoto 'Hockey Stick': Global Warming Debate," *National Post*, January 27, 2005, National edition, sec. News, and was correct the following week: Correction," *National Post*, February 2, 2005, National edition, sec. Financial Post: Letters.

[196] "Corrections and Retraction," *National Post*, August 30, 2006, National edition, sec. Financial Post: Comment.

[197] Terence Corcoran, "The Hockey Stick: They Shoot, Don't Score," *National Post*, August 31, 2006, National edition, sec. Financial Post: Comment.

[198] It is perhaps of interest to note that he did not at any point refer to Tim Ball as a "civil servant" despite working at the University of Winnipeg, nor Ross McKitrick, who works at the University of Guelph, both publicly-funded institutions.

Over the following three years, columnists at the *Post* would periodically criticise or disparage Weaver. Corcoran called him "the CBC's go-to scientist for suggestive but unproven links between bad weather and climate change."[199] Peter Foster, another *Post* columnist suggested that Weaver was influenced by "ideological bias" and that much of what he does "isn't science." [200] He also called him "one of Canada's leading climate alarmists" and rehashed the accusation that he launched a "diatribe" against McKitrick and McIntyre (based on mis-quoted "pure and unadulterated rubbish" claim, which was subsequently subject to yet another correction and retraction).[201]

Weaver's interactions with the *Post* culminated in a series of incidents in late 2009 and early 2010. Foster wrote an attack piece about Weaver and labeled him "Canada's warmist spinner-in-chief" and said he had become part of the "left coast Suzuki-PR-industrial complex".[202] The focus of the article was a recent set of break-ins at the University of Victoria, which Weaver speculated were targeting climate scientists in an attempt to discredit or intimidate them (the break-ins occurred shortly after stolen e-mails between members of the University of East Anglia's Climate Research Unit (CRU) and other climate scientists were released to the public). Foster claimed that Weaver blamed the fossil fuel industry for the break-ins, and called on him to produce evidence for the allegations, though Weaver had never made any such accusation. Foster then sarcastically tried to draw a parallel between Weaver's flimsy evidence for his allegations and his apparent without-basis belief in anthropogenic climate change. The following day, Corcoran wrote another piece explicitly about Weaver, repeating the false claim that he was "publicly blaming the oil industry for the break-in at his office," and ridiculed

[199] Terence Corcoran, "Politics First, Science Second," *National Post*, January 27, 2007, sec. FP Comment. See also: Terence Corcoran, "Nothing 'Wacky' about the Weather," *National Post*, June 18, 2008, National edition, sec. FP Comment, and Terence Corcoran, "So Cold It's Getting Hot; It May Be Cold, but CBC Reassures Us That Calamity Still Looms," *National Post*, February 29, 2008, National edition, sec. FP Comment, in which Corcoran accuses Weaver of inconsistency, if not deliberate misleadingness, in interpreting the links between weather and climate (specifically, that Weaver ignored near-record breaking cold temperature events, while highlighting record-breaking hot temperature events. However, in Weaver's quotes, it is clear that he is talking about single days in the former case, and longer-term variations in the second, compared to long-term averages).

[200] Peter Foster, "Nature: Red in Tooth & Politics," *National Post*, February 27, 2008, National edition, sec. FP Comment.

[201] Peter Foster, "Green Policy Arsonists," *National Post*, February 14, 2009, National edition, sec. FP Comment; "Correction," *National Post*, February 29, 2008, National edition, sec. News.

[202] Peter Foster, "Weaver's Web." *National Post*. December 9, 2009. For reasons explained below, this article is no longer available on the *National Post* website or through any database. The reference to the "left coast Suzuki-PR-industrial complex" (echoing Corcoran's earlier claims linking Weaver to the "Suzuki axis of climate fear") is a reference to Canadian environmentalist David Suzuki, who the columnists at the *National Post* deride as the central figure of climate alarmism in Canada.

Weaver after it was revealed that there had in fact been multiple break-ins in various buildings at the University of Victoria campus, suggesting that Weaver's office was not intentionally targeted.[203]

The following month Corcoran wrote a column that appeared on the front-page of the *Post* which, in light of the so-called "Climategate" incident, charged the IPCC with fraud, manipulation, and distortion and suggested that Weaver supported this accusation.[204] The piece incorrectly stated that Weaver was leaving the IPCC and erroneously claimed he was calling for "the replacement of IPCC leadership" and "institutional reform." Corcoran described Weaver as someone who "generated his own volume of climate advocacy that often seemed to have crossed that dangerous line between hype and science" and given Weaver's own dubious line-crossing, his alleged critiques of the IPCC must mean the panel was in "deep trouble." The piece went on to say that Weaver had made an about-face on the CRU e-mail theft, repeating Foster's earlier claim that Weaver had concocted a "cockamamie" story that the fossil fuel industry was responsible for the break-ins to his office to distract from the attention given to the issue. Finally, a few days later, the *Post* ran a column by Kevin Libin repeating this claim. It further went on to claim that Weaver's career was dependent on "global warming panic," and implied that Weaver helped manufacture such panic for financial gain.[205]

In response to this set of articles, Weaver contacted the *National Post* asking them to correct and retract the various false or misleading statements. The *Post* refused and Weaver ended up suing for the newspaper publisher and the columnists for libel, claiming its columns had promoted the view that he was "untrustworthy, unscientific and incompetent, and that he distorts and conceals scientific data to promote a public agenda and receive government funding."[206]

While the case was pending, the *Post's* claims that Weaver criticised and sought to leave the IPCC were repeated in a column written for the *Canada Free Press*, an online conservative tabloid, by the aforementioned Tim Ball.[207] Ball also implied that Weaver had bribed grad students with research funding in order to secure personal financial benefits from further government funding, and refused to

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[203] Terence Corcoran, "Weaver's Web II," *National Post*, December 10, 2009.
[204] Terence Corcoran, "Climate agency going up in flames; Exit of Canada's expert a sure sign IPCC in trouble," *National Post*, January 27, 2010.
[205] Kevin Libin, "So Much for Pure Science," *National Post*, February 2, 2010.
[206] 2015 BCSC 165 Weaver v. Corcoran, http://courts.gov.bc.ca/jdb-txt/SC/15/01/2015BCSC0165.htm#_Toc410739102.
[207] The original piece has since been removed by the *Canada Free Press*, but their subsequent retraction and apology (which is also unable to be found on the *Canada Free Press* website) can be found here: "Andrew Weaver Wins One Against Canada Free Press, No News on National Post Libel Case," *Carbon Fixated* (blog), January 21st, 2011, http://carbonfixated.com/andrew-weaver-wins-one-against-canada-free-press-no-news-on-national-post-libel-case.

debate in public out of fear that it would expose his incompetence. Overall, Ball conveyed Weaver as intellectually deceitful, lacking in expertise, and corrupt. He flatly conjectured that Weaver "knew very little about climate." After being contacted by Weaver, the *Canada Free Press* promptly removed Ball's piece from its website and issued a public retraction and apology. Ball offered no personal apology or retraction and was subsequently also sued for libel by Weaver. The case is still pending.[208]

6.3 Why Should a Scientist Engage the Media?

To supplement these media accounts, I conducted semi-structured interviews with both Andrew Weaver and Gordon McBean, as well as a third moderately media-active Canadian climate scientist.[209] Given the apparent challenges faced by media-active climate scientists, I wondered about both the motivations for media activity, and the perceived consequences. As the preceding chapters have shown, science-media relationships are not unidirectional. The media are not only subject to norms that attempt to be enforced by scientific claims-makers – for example, those implied by dominant models of science communication; science and scientists are routinely critiqued or challenged by media actors who appeal to various normative standards – for example, the motif of sound vs. politicised science. Thus, the central question here is how media-active scientists navigate these multidirectional boundaries that manage the media as a site of scientific practice.[210]

Table 6.0: Sample of interview questions

What motivated you to become media-active (give interviews, write letters-to-the-editor, contribute guest columns, etc.)?
Do you think scientists should engage with the media?
Do you think there are any reasons why scientists would not engage with the media?
What kinds of rules do you think scientists should follow in their interactions with the media?
Can or should scientists become advocates?
Do you think media engagement poses a risk to scientific objectivity, impartiality, or credibility?
What are some challenges you have encountered in engaging with the media?
What do you think are some issues with the way the media has covered climate change?

[208] John Collins Rudolf, "Climate Scientist Sues Skeptic for Libel," Green Blog, February 8, 2011, https://green.blogs.nytimes.com/2011/02/08/climate-scientist-sues-skeptic-for-libel/. Many of the details of the original piece can be found in Weaver's Statement of Claim regarding the lawsuit: http://www.desmogblog.com/weaver-sues-tim-ball-libel.

[209] Interviews were conducted via Skype. The third scientist requested anonymity.

[210] The selection of Weaver and McBean was not intended to give them a privileged voice but emerged from the media analysis. Weaver is the most media-active (and politically-active) Canadian climate scientist in the Canadian media (appearing in 253 climate change articles in the *Globe*, *Star*, and *Post* combined), and McBean is the second-most (appearing in 78 articles); they are also two of the most maligned by media sources with overt sceptical positions on climate change. Thus, they present ideal sources for exploring the questions posed here.

As other studies have shown, the ideal of "value-free" or "pure" science has both functioned to govern scientific practice and establish the broader authority of science. This is also the case in the newspapers sources examined within this study; the motif of sound vs. politicised science serves as a key boundary-discourse. How do these normative demands influence these scientists' media practices? How do they navigate concerns, for example, that media-engagement, or public-engagement through the media, poses a threat to their credibility as scientists? Weaver and McBean, in particular, have been subject to overt criticisms that their scientific impartiality has been jeopardised by the advocacy positions they have taken in the media. What boundaries and norms are recruited to navigate or respond to these critiques? (See Table 6.0).

6.3.1 Interviews with Media-Active Scientists

Each of the interviewees recognised or had been subject to views that held that media activities fell outside the scope of proper science, and that being media-active might lead to a perception of credibility loss. The third interviewee spoke of the view that media-active scientists just wanted "exposure" or "liked the limelight." McBean noted that at different points in his career, his media-activities had been critiqued as a "waste of time," especially in an academic context where such activities did not factor into any of the standard metrics of success or promotion, especially within the university environment. However, he also acknowledged that such views were less prominent "than they used to be", with "scientific organisations [and] universities becoming more encouraging [of media-activities]." Likewise, Weaver said that such views belonged to "the thinking of a time that we've moved beyond," and noted that his university encourages "knowledge mobilisation" through various public channels, including the media.

For both McBean and Weaver, media-engagement in general was not just a permissible, but crucial activity for scientists. In response to a question about the circumstances that led to his media activities, McBean stated,

> I think scientists as a collective have a certain responsibility to communicate science to citizens of our country, and globally. […] I guess that's always been a motivator for me, to think about not just doing science for theoretical sake but I also think it's important – and I perhaps grew up with this thinking – that you want to do something that has some societal benefit.

Similarly, Weaver responded,

> I've always worked on problems that are societally relevant, because […] I think that's what we should be doing. […] The people who fund our work, invariably, are the taxpayer [if] you're in the university. […] And so, we as scientists in the field have a responsibility to convey the work that we do to others when asked. I believe it's critical for a scientist to do that. You have a duty and a responsibility to ensure that the science that is conveyed is done so in a manner that is guided by your expertise.

In this regard, media engagement is presented as a means of science communication. In this scope of science communication, both Weaver and the third interviewee said that there are certain rules that should be followed. Weaver stated,

> I don't publish my results through the op-ed pages. And that's absurd. I publish my results in peer-reviewed literature. But "Joe Public" is not going to pick up the latest issue of *Climate* and read an obscure paper that's using the language that we would comfortably speak amongst our colleagues. I start throwing out words like "barotropic potential vorticity equation" and they're just going to go all goo-goo eyed. […] You can publish [scientific papers] and [you can engage with the media]. You're doing things for different audiences.

Weaver elaborated that in order to address these different audiences, "You use different words and different language":

> When I'm talking to you we're having one discussion, when I'm talking to my kids I'm having another discussion, if I'm talking to experts in my field we're having another discussion. It's about knowing what your audience understands – I recognize that when I talk about scientific uncertainty, scientific uncertainty and the discussion of that in a scientific context is quite different than a discussion of uncertainty in the policy realm, and it's quite different in a media realm. That's why the use of metaphor is often, allows you to transition from talking to your colleagues to people who don't have the expertise in the actual subject matter.

The importance in distinguishing between peer-review and science communication in the media was also expressed by the third interviewee:

> The basic thing is that if you want to make a scientific argument, the way to do it is to publish a paper in a peer reviewed scientific journal. […] That's the system: you go to the mainstream conferences, you present your results, you get feedback and criticism. You try to publish [your research] in journals and then it will be refereed, and if it's criticised you'll have to defend it. […] If you want to engage in [scientific] debate you have to step into the arena and argue in that way. You just can't sit by the sidelines and throw stones. You know, scientists find it incredible that anybody would be taken seriously that wouldn't publish serious articles, but of course, the press doesn't make a distinction.

Subsequently asked about their perceptions of the way the media present climate science, the third interviewee responded,

> One of the things that is irritating, is that when you read some of the coverage of climate science from the sceptics, or from the *National Post*, you get this image of climate scientists as this club that just wants to fund themselves and support each other and this sort of thing. […] But, there's definitely a lot of healthy self-criticism within the scientific community. So, the idea that scientists can't be trusted to judge their own area is just crazy. […] [The media] is just asking people who don't really know anything about climate to be the judges of climate science. I think it's just absolutely nuts.

They continued that they also perceived a degree of sensationalism,

> I think the problem is, is that they want to sell headlines, and so you need something […] really catchy. An example of a scientific question at the moment is that the sea ice in the arctic is disappearing really fast, and it could be that it is really going to continue at that rate, or it could be that the extreme rate is the result of natural variability and it will slow down for a while? Everyone is very confident that the sea ice will be gone by the end of the century, […] but [presenting the nuance] is not going to sell a newspaper, would it?

Similarly, Weaver spoke of those who "echo" concerns about climate change, but "inadvertently" create confusion in media and public discourses:

> You have people talking about "runaway greenhouse effect," [which is] theoretically, not [correct]. You can have positive feedbacks, but we're not turning to Venus any time soon. The world's not going to end and life is going to go on and there'll be people. […] [But] I don't think it's an issue now. You know, we don't need to see maps of Florida under water and stuff like that.

Asked about the challenges in engaging in science communication in the media, Weaver pointed to a "lack of understanding of science" amongst the media. He elaborated,

> Media 101 that tells you must heed both sides of the story and you look into the controversy because controversy sells. […] There's a tendency to not understand the science and to conflate the science and policy. […] [The role of] the media in a democratic society is to keep people abreast as to what is going on, hold elected leaders accountable, and to bring a voice to the democratic society through letters to the editor, et cetera. When [the media] does that, [they] don't want to be perceived […] as biased. So, you're going to cover, say, a free-trade agreement with China and write the facts, and then what you'll do is you'll give the reader a sense of what the issues are, like a quote from an auto-union leader saying, 'Oh, they don't like this free-trade agreement,' and you might get another quote from a high-tech person who likes the agreement, and you let the reader decide whether or not they support the policy. But it doesn't work like that in science. In science, if you're doing a story on gravity you're not going to get a quote from a physicist and another from a local chapter of an anti-gravity society. You know, the facts are the facts. So sometimes people mix up that science is not a policy. And whereas in policy

> everyone has an opinion – some may or may not be informed as much, but they can have an opinion. Science is not so much opinion based; it's based on evidence.

While McBean and Weaver expressed a sense of general responsibility for being media-active, at least some of their media activities had been a motivated response to these perceived short-comings in the media's handing of scientific issues. Weaver states,

> As a scientist you want to correct the factually inaccurate stuff that's out there. At some point I recognized, hang on here, if you're just acting in reactive mode, the problem here is that they win. Because what matters in this public discourse is when you're trying to avoid policy to be actually put forward, you have to create a sense of uncertainty. And what better way to create a sense of uncertainty than present this debate that's ongoing? So, at some point I started to get a little more proactive than reactive, because in reactive you're just playing from their song sheet, you're not playing your own song sheet.

McBean similarly notes,

> If there were scientifically accurate reporting in Canadian media across all of the media on the status of climate change, whether you interviewed climate scientists – real climate scientists as opposed to the people they pick – that we would feel less the need for speaking out on the issue. If there were no deniers and if our government was actually taking action on climate change, I wouldn't be volunteering or pushing myself at it. But because there is a strong – and I'm assuming well-funded – group of climate sceptics who are still gaining a fair amount of media attention – particularly in the *National Post*, we feel that we should be speaking out.

However, McBean notes that he has become more reserved in directly engaging the media,

> I had tried to, on occasion, rebut these things, but my impression is that those kind of media are so biased, that they will use your rebuttal to strengthen their arguments, and will report in a way that doesn't do you any advantages.

Each of the interviewees were asked about their views on media-engagement in relation to advocacy, either in terms of specific climate change policies, or more general political activities. Weaver said that media engagement does not imply advocacy; it can be more narrowly understood in terms of science communication: "It doesn't have to be advocacy by engaging with the media – it's a responsibility [to convey your work], right?" Asked specifically about what motivated him to become politically engaged, Weaver replied,

> Science can never tell us whether society should or should not deal with it, it can only inform the deliberations, the discussions. […] But, here I spent my career working in a field, identifying the problem, quantifying the problem, and no one's dealing with it. So, what do you do? You can either give lectures about it – or get involved and try to make a difference. And that's how I ended up in the political framework. And recognising the political environment needs […] some

evidence-based decision making. Not decision-based evidence-making, which is far too prevalent in our political systems.

It was the perfect storm; the Fifth Assessment Report was coming out. There's no way I could go through another IPCC assessment. I love the process, but I'm tired of writing papers about this problem, I really am. I mean we don't need to know that the permafrost carbon feedback is positive – [which] means that we were underestimating the kind of warming in store – to know that we need to transfer our energy systems to ones that are clean and have nothing to do with carbon. So, rather than continue to plunge into that science […] it felt an appropriate time to make a transition. And it's been so rewarding that I'm happy I did it.

McBean states,

> I've been called a 'climate change advocate.' […] As a scientist I have responsibilities, but I also feel that as an informed citizen I have responsibilities. I am a parent, a grand-parent. I live in Canada, I'm a citizen of it. I chaired, and I'm involved with committees that meet all around the world. I've been to Africa, I gave lectures on climate change at the University of Dar Al-Salaam in Tanzania. And when you go to these places, you see the impacts of changing climate on poor people. So, I don't feel badly to – and I think I can do it credibly – be both [a scientist] and a spokesperson of the issues of policy relevance. I end almost all of my public talks with a slide that says, 'climate change is an issue of international and intergenerational equity and ethics.' And up pops a picture of my grandkids – I've got four of them. And I say, 'We have to deal with this issue.' So I have become an advocate.

The third interviewee is more cautious about advocacy:

> I think there's lots of reasons [a scientist would become an advocate], some of which are good reasons, some of which are bad reasons. Some believe that there's a crisis, that we're just heading towards a cliff, and [they feel that [they] just have to speak out. I think there's the honest advocate, or at least, well-intentioned advocate who crosses the line, because they just feel that they have to. […] I think the heart of the issue is how much should scientists engage in advocacy. […] We have to look at the science, not just in terms of what's interesting, but in terms of what matters. And that's a different a very different way of looking at science. Most scientists are not trained to look at what matters. They're looking for [out of] curiosity for things that can lead to PhD theses, and papers. But then there may be a lot of interesting things that […] don't matter. When you are asked to do a [policy relevant scientific assessment], you have to focus on what matters, but, there's never any advocacy. You're doing science which is contributing to policy, but you're not in anyway, crossing a line, you don't have to be an advocate.
>
> So that's kind of the classic paradigm, right? The scientist does the science, they publish it in their normal way, in the journals. But then they will maybe write these reports that will analyse it in a maybe unconventional way, that will try to frame it in a way that might be useful for the policy makers. […] But scientists are also human beings and citizens and if they feel that people aren't taking the science seriously enough, they're going to say something. […] Somehow people have to be able to where two different hats and maybe separate those hats [in order to] make it clear when they're speaking as an individual versus as part of a scientific group. […] I don't think you can tell scientists to stop being advocates, that would be crazy, but you have to be able to somehow separate the advocacy role from the sober consensus reports which do not

get into advocacy.

6.3.2 Gaps, Arenas, or Boundaries?

Talk of a "gap" between the science and the media has been commonplace (Maille, Saint-Charles, and Lucotte 2010; Peters 2013; Reddy 2011; Schmidt 2009). As various researchers have noted, this alleged gap is not a practical or interpersonal one, denoting a lack of contact between scientific and journalistic actors (Einsiedel 1992; Peters 2013). As seen in the survey of scientists as claims-makers in the previous chapter, scientists routinely engage with the media. With Weaver and McBean, media interactions are viewed as a responsibility, one required by their roles as scientists. Other studies of scientists' motivations for engaging with the media find that a sense of moral or professional duty is common (Besley et al. 2018; DiBella, Ferri, and Padderud 1991, Nisbet and Markowitz 2015; Peters 2013).

Hans Peters Peters notes that in addition to the "gap" metaphor, one also encounters the notion of different "arenas" demarcating internal scientific research and broader public communication, especially that which occurs through the media (2013, 14013). Peters finds that this "two-arena" conception is prevalent amongst scientists. According to this view, each arena is governed by its own set of epistemic and communicative rules. The scientific arena concerns knowledge creation and validation, and these activities are excluded from the public arena of the media. Furthermore, the entrance of scientists into the public arena requires that knowledge production occurs in the scientific arena first. This upholds something akin to the "canonical account" described by Bucchi (1996) or the "dominant view" described by Hilgartner (1990) in that public communication is typically regarded as "popularization."

In the interviews, this two-arena view is conspicuous. For example, it is stressed that peer-reviewed scientific literature is distinct from media discourses: "if you want to make a scientific argument, the way to do it is to publish a paper in a peer reviewed scientific journal." For Weaver to try and carrying out this knowledge production and validation in the press would be "absurd." There are thus assumed epistemic boundaries between these two arenas. The epistemic norms embodied in peer-reviewed publications fulfills a sort of unidirectional gate-keeping function.

Both Weaver and McBean remarked that some scientists do not have a "natural inclination" to adopting to media norms; this might serve as a barrier to some scientists in entering the media arena. But, as others have noted, even scientists who lack these skills are still routinely brought into the media arena. On the other hand, the scientific arena is much more restrictive the other way. While scientists routinely enter the media realm, the very standards that allow them to do so also function to prevent

the media or the public from entering the arena of scientific knowledge production and become validators of scientific knowledge.

To speak on scientific matters in the media arena, it is a prerequisite that scientists prove themselves in the scientific arena. Developing an adeptness with the communicative norms of the media is secondary. Moreover, scientists should not bypass the scientific arena and go straight to the media arena. This is codified in the so-called "Ingelfinger rule" which holds that research findings should be communicated to the public only after they have been published in a peer-reviewed scientific journal (Kieran 1997). Peters finds that this view holds for a majority of US and German neuroscientists, though it varies between disciplines (2013, 14103).

In this way, while scientists enter the media arena and adopt many of its norms – in employing the right kinds of language, understanding different criteria of relevance, etc. – they also resist them. They thus do not become fully-fledged media actors. For example, as Maille et al. observe in their study of health and environmental scientists' attitudes towards the media, scientists rejected, at least in principle, the media's orientation towards "sensationalism" and publication deadlines, which they viewed as antithetical to the careful analysis and discussion required by their subject matter (2010). A majority of scientists surveyed believed that journalists adherence to these pressures led to inaccuracies. (Notably, many science journalists themselves regarded these norms as hindrances, pointing to the heterogeneity of media actors and practices; journalists are not necessarily those enforcing norms, but rather feel they are structural constraints largely related to the profit-motives of the media). Similarly, Boykoff and Boykoff find that such journalistic norms run up against the principles that scientists bring to their own work. Both journalism and science are oriented by notions of objectivity, but they manifest in different ways (2007) (see also section 4.1.1). While the rules of scientific peer-review encourage dissent and conflict, the overall function of this process is to distill agreement by subjecting research to repeated rounds of criticism. In contrast, the journalistic norms of personalization, dramatization, and balance function to highlight disagreement and controversy in a way that many scientists find problematic. As Weaver states, "Media 101 that tells you must heed both sides of the story and you look into the controversy because controversy sells."

It is precisely the media's business orientation, and the attendant concerns about accuracy, that places the media arena outside of the value-free ideal. In response, scientists routinely try to resist or evade the unwanted pressures of the media by importing their own norms into the media arena. There are thus "explicit expectations about who should represent science in the media and how" (Peters 2013, 14106). It is ideal that leading scientists do the communication, that their comments are reserved and

precise, that they focus on science, that they act as upstanding representatives of the scientific community, and that they only engage with reputable media outlets.

It is important to note that these various norms are neither wholly idealistic nor realistic. They have efficacy; they guide scientists' interactions with the media. On the other hand, there are routine transgressions. For example, while the interviewees subscribe to something like the Ingelfinger rule, regard for its importance is not unanimous, and scientists have been found to bypass peer-review and bring findings and scientific knowledge-claims directly into the media arena. (Bucchi 1996).

A sort of paradox emerges from these movements. Take, for example, that one of the key reasons that scientists engage with the media in the first place is to correct what they see as inaccuracies in the presentation of scientific knowledge, which they view as threats to the credibility of science (Boykoff 2007; Maille et al. 2010, Peters 2013). Both Weaver and McBean expressed that this was among the motivations for their media interactions. In Peters et al.'s survey of scientists' attitudes on the media, a majority felt that they should be able to review articles in which they are quoted prior to publication (Peters et al. 2008). Thus, this kind of media engagement is oriented precisely towards shoring up the integrity of scientific knowledge and blocking the influence of certain media values, and challenging the media's capacity and competency for communicating such matters. Thus, one kind of media-science boundary is breached so as to further reinforce other boundaries between the two arenas. This can be read as analogous to the Catch-22 in which Nelkin's ecologists found themselves: "faced with the question of whether it is best to work inside the system in hopes of preventing destructive decisions, or to remain outside, relatively powerless but at least maintaining integrity" (1977, 83).

6.3.3 Crisis Situations

All of this needs to be read through the lens of the "politicisation" of climate science – the ever-expanding set of matters-of-concern surrounding and emerging from climate change. Massimo Bucchi invokes the term "crisis situation" to describe moments of intense scientific conflict – often linked to the potential of a paradigm shift – during which scientists cross traditional science-media boundaries. Bucchi focuses on "internal tensions" amongst scientists, but suggests that one can potentially also look at the conditions for these boundary transgressions "not only within the scientific community, but also within the public stage and within the general framework of their mutual relations" (1996, 383). I suggest that here one can see how "crisis situations" can be understood in this broader scope of the social, political, and technoscientific crises presented by climate change.

The ecologists in Nelkin's case felt "thrust into the political arena," as result of the social and political exigencies placed on their expertise by growing environmental concerns – concerns, of course, which in part emerged out of ecology (1977, 75). Many were reluctant to face the demands implied by their research, but were compelled by a sense of social, and indeed, moral, responsibility. This mix of reluctance and responsibility is expressed by each of the interviewees to varying degrees. Interviewee three expresses a higher degree of reluctance: a move towards advocacy involves "crossing a line." But this transgression can be justified as necessary by exigencies – "heading towards a cliff."

In this way, questions of risk appear crucial in understanding the advocacy roles adopted by scientists. Roger Pielke (2007) observes that in cases of where there is a high degree of consensus about risk, scientists can play relatively straightforward roles as "science arbiters" by providing scientific analysis to increase the accuracy of information used to address the risk. He calls these contexts "tornado politics," situations in which immediate threats generate shared goals (to survive a tornado). This also assumes that empirical analysis can yield a risk assessment with relatively low uncertainty, or that the parameters of the risk assessment are narrow (the potential path of the tornado). In situations where there is low consensus about risk and/or risk assessment is steeped in uncertainty, scientists are more likely to play advocacy roles, pushing for a line of action that reflects their values. In cases where risk assessment reflects very high degrees of value dissensus, science arbitration might prove entirely ineffectual. Pielke calls these contexts, "abortion politics," where increasing scientific accuracy does little or nothing to clarify policy positions.

Climate change greatly complicates this distinction in that whether or not a crisis exists is precisely the issue that is being contested. Thus, value consensus or dissensus about risk is not a taken-for-granted starting point, but a condition that emerges from deliberation, which crucially includes the voices of scientists. The advocacy roles taken on by Weaver and McBean are in response to the view, informed by their scientific expertise, that a crisis is at hand, but that their risk assessment is not being sufficiently heeded. Weaver expresses the desire to take on a science arbiter role or participate in what Pielke calls "honest brokering" (presenting a range of scientifically informed policy options based on probability estimates), but what prevents him from being effective in this regard is dissensus about risk. It is observed that a defining characteristic about risk assessment (and the potential for high degrees of disagreement in assessing risk) is that it invariably involves value judgements, which do not depend on scientific facts (Giddens 2011). But when the very probability estimates about risks are being doubted along partisan lines, this reveals that the value judgement in question is whether or not scientific analysis is important in informing risk assessments. Given certain social and political exigencies,

"tornado politics" could become "abortion politics," and scientists will play a role in determining which issues turn out as one or the other.

In these regards, critical discourse analyses of scientists in the media, especially in terms of how their roles as authorised speakers are empowered or challenged, could richly focus on questions of risk and how the notion of a climate change crisis is supported or contested. It would also be interesting for future research to explore the relationships between scientists' fields and their advocacy activities. Some studies have found relationships between scientists' disciplines and their engagement activities, engagement is defined rather broadly (Jensen 2011; Peters 2013). One might hypothesise that scientists whose work is closely related to questions of risk are more likely to become advocates.

On the other hand, both Weaver and McBean express a long-standing motivation to pursue societally relevant research, and thus it might be the case that social values influence what kinds of disciplines scientists enter, which in turn has implications for their advocacy roles. McBean earned his doctorate in the 1960s, and began working for Environment Canada, a government research institution, in the 1970s. Albeit in a different national setting, McBean was very much a product of the emerging social and political import place on ecological knowledge. This institutional context, in which his expertise is being explicitly directed towards policy-relevant questions, might account for his attitudes towards social responsibility; although, McBean notes that he is unsure from where this feeling of social responsibility arises.

While McBean was deeply embedded in a policy-oriented institution, each of the interviewees, had at various points in their careers been recruited to produce “policy-relevant” scientific assessments. In addition to his work at Environment Canada, in the late 1970s, McBean was enlisted to work on a national committee on acid rain. Weaver participated in the Second Assessment Report of the IPCC in 1995. Interviewee three was involved in the WMO’s Ozone Report in 1998. Interviewee three reflects on how these exigencies lead to scientists doing work in an “unconventional way” – by looking at “what matters” to policy makers. Here one may infer a kind of boundary-crossing precedent. In terms of their career trajectories, policy-oriented scientific work preceded media engagement, sometimes quite immediately. As noted above, Weaver’s first overt instance of media engagement was linked directly to his work with the IPCC. Some existing research supports these connections: Bauer and Jensen (2011) hypothesise relationships between scientists’ policy engagement and media engagement, while Besley et al. (2018) find that scientists who are inclined to see engagement activities as efficacious in bringing about good policy are more inclined to engage the media. While such questions are beyond the scope of

this study, the connections between scientists' views on social responsibility, disciplinary background, policy-oriented research, and media engagement presents a promising area for further research.

6.4 Double Standards of Expertise

As I noted in section 4.5, the motif of sound vs. politicised science – and related conceptions of "pure science" and "objectivity" has been a predominant motif in each of the newspapers (though especially in the *National Post*). The attacks on Weaver in the *National Post* are ostensibly arguments about how Weaver has foregone his objectivity, being corrupted by political advocacy – advocacy conveyed by statements made in the media. Weaver's public and media engagements are being censured not by other scientists, but by non-scientist media-actors (in this way, the epistemic norms in question are not merely "internal" scientific matters, but enforced from the outside-in, so to speak). And these journalists and columnists are precisely the kind that are widely seen by scientists as lacking the necessary disposition to weigh in on scientific matters. Thus, the boundaries meant to delineate proper scientific activities in the media arena are hardly straightforward, to say the least.

To this point, it is important to recognise how similar arguments about politicisation have been mirrored on both the concerned and sceptical "sides" of these debates. It is clear that notions of politicisation deeply shape the *Post's* treatment of climate scientists, and climate change in general. Similarly, Montgomery's article in the *Globe* about Tim Ball and other climate sceptics trades on the notion that much of the overt climate change scepticism one encounters in the media is not rooted in genuine scientific inquiry or debate, but is motivated by "public-relations companies and lobbyists" on behalf of fossil fuel companies and other industries who perceive climate change regulations as economic threats, or ideological leanings.[211] It is also significant that Weaver himself draws boundaries of legitimate science and practice according to notions of politicisation. While Weaver's views on the IPCC had been misconstrued by the *National Post*, he did nonetheless speak about the IPCC "dangerous[ly] crossing [a] line" into advocacy.[212] And curiously, Corcoran's accusation that Weaver's

[211] Though, it is also important to note that Montgomery's article, for example, does not take on the same tenor as those in the *Post*. Of Ball, Montgomery writes, "He is a warm, likable character, and there is no reason to believe he is not sincere in his concern for science and public policy." He goes on to add, "Dr. Ball's adversaries acknowledge that skeptical inquiry serves to make the science better. They just wish he would conduct new research and practice his skepticism on the pages of the peer-reviewed journals." Overall, Montgomery presents Ball not as intentionally deceitful, as the *Post* implies of Weaver, but as part of an organised scepticism campaign that enrolls both "sincere" and duplicitous voices insofar as they further the goal of "nurturing doubt" about climate change.

[212] Richard Foot, "Overhaul UN Climate Panel, Scientist Urges; 'Fundamental Shift,'" National Post, January 27, 2010, National edition, sec. Canada. It should be noted that Weaver contested the interpretations and implied

objectivity has been compromised by political partisanship is partly a response to Weaver's admonishment of the politicised activities of Tim Ball. Again, hardly straightforward. Clearly, these self-imposed boundaries have been insufficient to protect against accusations of "line-crossing."

Weaver's libel case against the *National Post* adds another degree of complexity. The case was ruled in Weaver's favour in February 2015. The judge in the case found that numerous substantial factual errors had been made in the columns about Weaver. Moreover, the selection of words and tone of the articles, in conjunction with the misstatement of facts were found to support an inferential meaning, intended by the columnists, that Weaver was "untrustworthy," "unscientific," "unethical," and "incompetent." In her decision, the judge ruled the columns defamatory.[213] With regards to the specific article, "Weaver's Web," she concluded its intended meaning was to portray Weaver "as engaged in willful manipulation and distortion of scientific data for the purpose of deceiving the public in order to promote a *political agenda*" (emphasis added). Of the *Post's* comments on Weaver in general, she wrote, "The inference of these comments in the context of Climategate and the alleged manipulation of data lead the ordinary reader to believe Dr. Weaver has been deceitful and is promoting his scientific views to satisfy his personal gain." She continued, "The plaintiff's integrity and credibility as a professor and scientist was called into question, thereby damaging his personal and scientific reputation."[214]

In sum, the lawsuit was predicated on alleged boundary transgressions which, if thought to be true, would undermine Weaver's credibility as a scientist. Crucially, that this could be the case assumes that these norms are widely held not only in a professional context, but publicly as well. And among the alleged transgressions, politicisation appears. (Of course, this points to a very specific consequence of politicisation, namely the "willful manipulation of data," which is more fundamentally the breach of scientific norms. And Weaver's defense depended upon – in addition to challenging specific factual errors – the more general assertion that no such breaches had occurred).

Both Weaver and McBean have exhibited a willingness to disregard certain traditional boundaries associated with canonical and dominant models of science communication, as well as those linked to the "value-free" ideal. Each think that the view that public or media engagement jeopardises scientific impartiality is "old thinking." And both are, in specific and broad ways, politically active scientists. In 2015, Weaver was elected to British Columbia's Legislative Assembly, representing the

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readings of his comments in this article, which was partly the basis of the four columns at the subject of the libel lawsuit. Specifically, Weaver rejected that he had explicitly "called on Mr. Pauchuri [the then IPCC head] to resign." See 2015 BCSC 165 Weaver v. Corcoran, accessed October 14, 2017.

[213] The *Post* was ordered to issue a retraction of the articles at issue and pay $50,000 in damages.

[214] 2015 BCSC 165 Weaver v. Corcoran.

riding of Victoria as a member of the Green Party. McBean has openly engaged in various forms of advocacy. Neither believes that this ultimately has a bearing on the quality of the scientific work they produce.

On the other hand, the moves between different arenas – scientific, policy, public, media, politics – are not unrestricted. Indeed, they are managed by rigorous norms in their own right. Take for example, the critical importance of peer-review; while scientists can speak to the media, it is not a place to present "scientific arguments," but rather to communicate or translate them, or frequently, correct them, as media sources are still frequently seen as a risk to scientific accuracy. Similarly, while it "would be crazy" to stop scientists from being advocates, such advocacy must be strictly demarcated from "sober scientific analysis." Thus, some traditional boundaries have been rethought, while others hold.

One of the many peculiarities of the *National Post's* treatment of Weaver and other climate scientists is that they ostensibly hold these scientists to stricter standards than those to which the scientists hold themselves. The charge against Weaver is that he has been corrupted by politics; his political advocacy is in itself sufficient to dismiss his scientific views. Specific instances of scientific wrong-doing (e.g. manipulated data) or incompetence (e.g. evidence of careless errors in scientific research) is not required to be shown. In this way, the value-free ideal – specifically, political neutrality – has taken deeper hold in a public media arena than amongst scientists.

This ostensible rule enforcement becomes more peculiar in the context of media-actors' validator roles. The two-arena model not only places restrictions on scientists making original scientific knowledge-claims in the media, but is also meant to keep non-scientist actors – journalists, columnists, the public – from entering the scientific arena. As discussed in the previous chapter, actors in these newspapers – and columnists at the *National Post* in particular – routinely breach this boundary. They become primary validators of scientific knowledge, making first-hand arguments about the reality of anthropogenic climate change, which are not subject to peer-review in scientific journals.

One might conclude that there are different sets of norms and boundaries at play here. As discussed in section 4.6, commentators at the *Post* dismiss not only that a consensus scientific view on climate change exists, but reject consensus as a valid scientific norm.[215] They point instead to individualistic conceptions of science, whereby truth is accessible by anyone who can objectively interpret evidence.[216] Similarly, the *Post* may hold more strictly to the distinction between sound and

[215] Terence Corcoran, "Climate Consensus and the End of Science," *National Post*, June 16, 2006, National edition, sec. Financial Post: Comment.
[216] Christopher Monckton, "Aristotle's Climate; His Fallacies Exemplified by Warming Hysteria," *National Post*, April 21, 2012, National edition, sec. FP Comment.

politicised science than even the scientists they chastise. Thus, these media discourses and the treatment of climate scientists could be seen as a matter of competing images of science. In many ways this is the case, but it would be a mistake to view this as a conflict between principled philosophical positions.

Take Corcoran's claim that Weaver is a "civil servant." Corcoran asks, rhetorically, "Under what bureaucratic regime do civil servants -- members of the government -- sign letters urging the government to take action?" Here the implied responsibilities of the grant-receiving scientist are impossible, and points to another deep contradiction in the way scientists are treated by the *Post*. What is the role of such scientists in this formulation? In virtue of receiving government funding for their research, is it thus incumbent on such scientists to acquiesce to government climate change policies, regardless of whether or not they consider any of the scientific knowledge they produce? Is all scientific knowledge produced by government grants to only support the aims of the ruling party? But surely *this* is politicised science!

On the other hand, the *Post* actively published a letter by 60 sceptical scientists – some of them academics at public Canadian universities – which explicitly sought government action (or inaction). The *Post* also routinely gives space to these same scientists to offer scientific views that have not been subjected to peer-review, or to repeat claims that have been challenged, if not dismissed, by subsequent research (which goes unmentioned). And many of these same scientists also engage in overt political advocacy. The *Post* does not level accusations of "politicised science" against them. Double standards are at play.

The *Post* also routinely gives space to scientists and other experts to offer novel knowledge-claims have not been subjected to peer-review, or have been published but challenged or critcised by subsequent research – which goes unmentioned. Moreover, many of these same scientists – among those 60 sceptical scientists who signed the open letter published by the *Post* – also engage in overt political advocacy.

The legal parameters of Weaver's case add several layers of complexity to the ways that scientific boundaries are imagined, established, maintained, and challenged, especially in the broader public arena of the media. However, it is not within the purview of my analysis to examine these legal specifics. At the very least, the ruling that the *Post's* columns about Weaver meet specific legal criteria for defamation suggests that Weaver faced personal attacks that exceeded legitimate or fair criticism of his scientific work or his role as a scientist. Here the question of disingenuousness again reappears (see sections 4.9 and 5.3).

6.5 Conclusions: Shifting Boundaries, Rhetorical Tactics

How are the boundaries of "sound science" established (or challenged) in these newspapers with regards to the media activities of scientists? The answer is ambiguous, if not contradictory. On the one hand, alleged transgressions pertain to the kinds of knowledge claims being offered – that scientists who are active in the media are making "political" statements, rather than merely speaking strictly on matters of science. However, according to older conceptions of the proper activities of scientists, the very act of being media-active is itself a transgression. Even if this is no longer held to be the case, the instances examined here reveal that the media are a key means to broader public engagement activities, and in the case of climate change these activities often involve advocacy. Thus, a crucial dynamic of the scientist-media interaction is how these newspaper sources can facilitate boundary transgressions.

In this regard, being a media-active scientist is precarious, as these newspapers both actively recruit and rely on interactions with scientists, but also subject them to a shifting set of boundaries. These partly depend on the kind of validator role being assumed, which itself is contingent on the specific needs and aims of the newspapers. A novel finding here is that while other studies find that rhetorical boundary-work tended to be harnessed to uphold expert vs. lay knowledge or scientific vs. popularised communication divides, in these newspapers "politicisation" rhetoric is often being appropriated by non-scientists to challenge scientists. Thus, ideals of "sound" or "value-free science" become publicised – scientists are not merely holding themselves to these standards, but they are being subjected to them in (an important part of) the public sphere. In the case of the *National Post*, accusations of boundary-transgressions often manifest as personal attacks on the integrity and character of individual scientists. This suggests that as scientists become more engaged in advocacy they face increasing risks of personal attacks (also see Mann 2015). The extent to which this is the case remains an open question, as do the broader effects of these attacks on the public credibility of scientists, and whether advocacy in itself hurts the credibility of scientists (Kotcher et al 2018). Each of these questions would be interesting for future studies to tease out in more detail.

I find that accusations of boundary transgressions are often levelled ad-hoc for tactical reasons, without apparent consistency from one scientist to another. Incidences of contestation where scientists are explicitly admonished for (unscientific) impropriety appear to align less with general patterns of behaviour, and more with the specific knowledge claims made by these scientists. In the context of climate change scepticism in the *National Post*, this is especially significant. When compared to the concerted coverage of "sceptical" scientists in the *Post*, it is apparent that "advocate" or "activist" scientists are being attacked because they uphold anthropogenic theories of climate change, not

because of alleged "unscientific" behaviour *per se*. Thus, talk of "politicisation" and broader images or ideologies of science is often, if not chiefly, a disingenuous rhetorical tactic. The rancorous and *ad hominem* rhetoric bound up with alleged boundary transgressions is similarly part of a strategy to undermine the prevailing theory of anthropogenic climate change.

From an STS perspective, this outcome is also ambiguous. It would be a rather mundane conclusion, to point out that the value-free ideal or the imagined boundaries between sound vs. politicised science come apart in many ways. These ideals and boundaries have been viewed as philosophically suspect and thus largely rhetorical. That the *Post's* appeal to ideals of value-free or "sound science" exemplify a pejorative and insincere rhetoric does not necessarily mean that more sincere entreaties to such ideals make them any less rhetorical or philosophically suspect. That values permeate science is tautologous. As is the term "politicised science", as all science is political in some sense. However, these climate change discourses suggest that the ideals of science can take on many different dimensions, especially as they serve as a premise for boundary making. If one tries to salvage the normative thrust of these ideals, they are meant to protect against certain kinds of values, or if not kinds, then specific values – and specific politics.

Not all science is political in the same ways. Just as Patrick Hamlett (2003, 112-130) notes that the jump is very small from recognising that all science is socially constructed to imagining ways to reconstruct it, the recognition that all science is political is a liberating one. Acknowledging the inescapable political nature of scientific knowledge, the question then becomes, in what ways should science be political?

Science is mobilized in the name of particular interests, or in public debates, or for specific projects, all of which involve political boundary work and social constructions, and all of which are contingent and situated. Some mobilizations are desirable, others damaging. Some are likely, others latent, but none are inevitable. GMO research is not destined to be co-opted by dominating corporations, nuclear research is not destined to become a focal point of foreign policy and international relations, and climate change action is not destined to be stalled by certain kinds of cynical and unjust politics. Thus, concerns about certain kinds of politicisation of science are not unreasonable or naive. Notwithstanding intractable philosophical issues, and not forgetting the complex nuances of science revealed by constructionist analyses, science is about producing useful and robust accounts of the world.

The possibility that science can be co-opted for nefarious or selfish purposes is a real and persistent concern. Pharmaceutical companies downplay the risks of drugs, oil companies cover-up the

extent of ecological disasters, and governments justify inaction on climate change with the authority of scientists willing to be enlisted for these ends. The frequent inability of status-quo social, cultural, political, and economic systems to effect ethical considerations about these issues is what compels advocacy from scientists. This is what makes some constructions, some boundaries, some politics, more desirable than others. What kinds of politicised science might serve us best is the question I turn to in the concluding chapter.

7 Conclusions

Here I want to return to the core questions of this project: (1) Why has climate change been represented in these newspapers in the ways it has? (2) What effect do these representations have in shaping issue of climate change? What answers can be offered? What further questions remain?

It should be unsurprising that the answers to both questions are not straightforward. The causality of media representations is complex and multifaceted (if one even has the confidence to speak of causes). In these newspapers, climate change coverage is related to and influenced by myriad factors, from agenda-setting media sources (3.2), to pervasive media norms (4.1.1), to editorial direction (4.3), to the discursive competition of competing actors (5.5), to the professional prerogatives of scientists (6.3).[217] Each of these factors intersect with and feedback onto others. This points to the tight reciprocity between the two core questions: the determinants that offer answers to question (1) are themselves the effects that offer answers to question (2). For example, the representations of climate change found in these newspapers reflect political or ideological positions (4.3.1), while also further reinforcing these positions (4.7.1; 5.3.1). Similarly, these representations are on the one hand the result of contestations between interested actors trying to respond to climate change, while on the other, the resulting representations become determinants of future responses.

Below I will tease out these conclusions in more detail by returning to the six conceptual categories and related sub-questions that I outlined at the onset of this analysis. I conclude with two reflections that speak my reconstructive mandate: What normative directions does this project offer?

7.1 Do Media Actors Define Science?

Here I have only considered a relatively narrow part of the media component of the networks formed around climate change – the journalists, columnists, and editors, and the texts they produce. Future STS work examining the role of the media in technoscientific controversies would do well to look at the technological components involved – for example, the changing role of the media in an online, digital world.

But even in this relatively narrow scope, it is clear that the media play defining roles in shaping the issue of climate change. When climate science comes out of the lab and becomes "politicised," the media are fundamental (4.2). It both traces and shapes this movement and enumerates and promotes

[217] I include the relevant sections bearing on these conclusions in parentheses.

the actors involved. This is readily apparent when examining the way climate change has been construed as a scientific controversy (5.2.6). Controversy studies in STS have tended to examine relatively narrow disputes between relatively discrete core-sets of scientists. Often these controversies remain more or less confined to the traditional contexts of scientific knowledge production – university labs, academic conferences, and the pages of peer-reviewed journals. Sometimes these disputes spill out into public view. Climate change is a remarkable case because of how much its disputes have spilled out. It has not been my task to evaluate the status and nature and grounds of disagreement amongst practicing climate scientists (a few studies have approached this question from an impartial STS perspective (Edwards 1999; Demeritt 2001; Lahsen 2005); more have examined this question normatively (e.g. Anderegg et al. 2010)). Instead, my interest has been the active role that media actors play in wresting definitional control of climate change from scientists (chapter 5). These media actors have the unique role of serving as claims-makers in their own right – on both matters of fact and matters of concern – and validating (or invalidating) the claims of other speakers. In climate change debates, much has been said about the responsibilities of scientists, but the representational power of media actors has allowed them to downplay concerns about their own responsibilities. There is ample evidence in this study that these media actors, especially the columnists at the *National Post*, have shirked their responsibilities and held themselves to quite different standards than the scientists whose authority they challenge (6.4 and 6.5).

Overall, it is clear from this study and others that the range, dimensions, and contours of the debates surrounding climate change has been profoundly shaped by the coalitions of actors brought together by and through the media. Furthermore, this study shows even a small coalition can have considerable impact, supporting other research that has found that public climate change debates – and especially sceptical discourses – have been defined by a relatively small number of speakers (Brulle 2013; Elsasser and Dunlap 2013; Oreskes and Conway 2011). However, there remain questions about the scale of effects. These issues of scale are part of what makes climate change such a perplexing problem. It is a global phenomenon, but it will have variable local effects, and thus demands action with different scopes. Understanding the dynamics of climate change debates in a Canadian context matters because local responses matter – to proposed pipelines or fossil fuel extraction, for example. It is evident from the defining role of major critical discourse moments that many of the debates found in these newspapers are responses to international events (3.4). Similarly, these events define the responses of local actors (6.2 and 6.3). But, reciprocally, local concerns define broader responses like

participation in international climate treaties. An important direction for future research would be to trace the influence of the media discourses and actors examined here beyond the Canadian setting.

7.2 The Media as a Site of Scientific Controversy

This study also points to a complication of supposed media-science boundaries. On the one hand, distinctions remain: the scope and degree of controversy and debate within a scientific arena – amongst a core-set of contributory experts and within peer-reviewed scientific literature – takes an entirely different form than the way that climate change is represented in these newspapers, in particular within the pages of the *National Post*.

On the other hand, it is clear that for an increasing number of scientists, the media arena does not constitute a foreign realm that one must periodically infiltrate in order to protect against border breaches, but rather, has become a regular site of scientific practice. Boundary metaphors may still usefully describe certain aspects of these practices, but the images they invoke are less those of fortified walls, and more those of business travel and customs forms. Scientists can travel back and forth across jurisdictions, but they must declare the purpose of their visit and observe local laws and customs (6.3).

It remains an open question as to how exactly scientists themselves conceive of these practices. Are they "extra-scientific"? From the small sample of scientists profiled here, it is clear that they conceive of their media-engagement activities as a fundamentally different sort of practice than their scientific research, but nonetheless view it as an important part of their professional responsibilities, though there is ambivalence about whether it constitutes a required skill. Other studies have found a similar ambivalence; professionally, expectations of media-engagement are becoming more prevalent, but these expectations are not always enthusiastically adopted. Thus, there may be changing and conflicting images of "ideal" scientists involved here – for example: the rigorous and disciplined observer and analyst of nature, the societally conscious and responsible expert, the pragmatic and efficient professional. It also appears that these different expectations and attitudes are discipline and institution dependent, complicating any general conceptions of what it means to be a scientist.

Moreover, while boundaries between science and the media have become more porous, some border-crossings are encouraged, while others unwelcome. In many ways, metaphors of incursions (or perhaps unwanted migration) persist. While scientists have increasingly entered the media arena, many have tried to impose restrictions on the kinds of activities and discourses that are permitted there. The kind of discourses permitted in the media arena are different mode of knowledge making and communication. Different standards are at play. The media arena is not to be a site of proper scientific

deliberation – the presenting and evaluation of evidence, the testing of hypotheses, the synthesis of explanations for natural phenomena. These processes are only to take place in the scientific arena. Scientists who do not abide by these regulations – especially in bypassing peer-review – are seen as committing a gross infraction against scientific norms (6.3.2). Moreover, in these newspapers we see routine border-crossings by media actors. These actors do not enter the scientific areas practice and communication – they do not do research or publish scientific papers – but they attempt to infiltrate its epistemic realm. In particular, the columnists at the *National Post* regularly offer what they hold to be legitimate scientific knowledge claims: interpretative reviews of existing scientific research and alternate explanations for climate change (4.4; 4.7.1; 5.2.5; 5.3). Not only do they view these claims as legitimate contributions to debates on climate change; they believe them to be superior to the views of the scientists they criticise. There is thus much work that can be done in exploring the many ways the media shape the practices of scientists, or indeed, the media becomes another locale where science is done.

All of this presents significant normative implications for STS studies of scientific controversies. To what extent does climate change represent a legitimate controversy? Designating, or re-iterating, that conflicting scientific knowledge-claims constitute a scientific controversy can suggest, intentionally or inadvertently, that a genuine scientific debate exists.[218] Presumably, STS would merely respond to "self-generated" scientific controversies defined by scientific actors. But if media actors become defining players in scientific debates, and if the media shape the research and knowledge-producing practices of science, it is not at all clear what a self-generated scientific debate (and the core-set of actors defining it) might look like.

Amongst most credentialed climate scientists, the claims of the columnists at the *National Post* are viewed as utterly illegitimate. But there are also a minority of scientists who bolster and participate in making these claims, which might be read as implicit endorsement (5.2.7). And crucially, in terms of broader public conceptions of climate change, claims like those offered in the *Post* are viewed as legitimate scientific positions. The collective relevant literature suggests that the media are far more influential in shaping public understandings of climate change than peer-reviewed scientific research (especially given that the public, like the media, does not adhere to the consensus view) (e.g. Wilson 1995; Boykoff 2007; Kahlor and Rosenthal 2009). If, from an impartial constructionist STS perspective, science is what people take to be science, where is climate science produced, and by whom? Does the symmetrical social construction metaphor do this state of affairs justice? Others have found

[218] Consider (Boehmer-Christiansen 2003) for the case of climate change, and for broader implications of STS being recruited to legitimise scientific controversies, (Edmond and Mercer 2006; Fuller 2006; and Lynch 2006).

"manufacture" a more useful term to connote the asymmetry that results from the way that climate change controversies have been construed (Stocking and Holstein 2008).

7.3 Mediating Social Factors

On the question of "social" determinants of scientific knowledge, the effects of the media are also salient. It is clear that scientists' media-engagements are not only "internally" motivated – sharing what they view as significant findings – but are "externally" motivated responses to the practices, norms, interests, and claims of the media. Among the chief motivators for scientists' media interactions is the desire to correct or pre-empt media inaccuracies (6.3.2). But what about "external" motivations for "internal" scientific practices? While here I do not investigate these potential effects, other studies have suggested that they may be significant. Responses to the ostensible knowledge claims of media actors - for example, the alleged "hiatus" or "pause" in rising global mean temperatures - appears to have influenced subsequent research in the scientific arena (4.7; Lewandowsky et al. 2015). In other words, climate scientists conducted original research in order to contest claims that originated outside of the peer-reviewed literature and were otherwise viewed as scientifically illegitimate. In addition to specific research questions, other studies find that a range of scientific practices have become increasingly oriented towards the logic of the media – for example, how publication metrics have begun to follow the patterns of online media interactions – views, shares, and mentions (Rödder et al. 2012). More modestly, this orientation shapes a mode of communication to which scientists find themselves increasingly having to adapt; those who are adept at this orientation, like the scientists profiled in this study, find themselves being regularly recruited by the media.

Beyond these specific media orientations, to the extent that STS is still concerned with the broader social factors bearing on scientific knowledge and practice (cultural assumptions, political interests, various "ideologies," and so on), accounting for the role of the media is at least conceptually necessary. Scientists, like all other humans, are profoundly influenced by the media. This is an empirically challenging question to study; one approach has been to include questions about (non-science related) media habits in surveys of scientists (e.g. Nisbet and Markowitz 2015). Empirical challenges notwithstanding, the crucial point is that if it is assumed that science is bound up with a host of other cultural meanings and, for lack of a better word, ideologies, it can also be assumed that the media play an important role in constituting these ideological relationships.

There are many regards in which ideologies are thought to be bound up with media representations of climate change. As I discuss at various points, the precise form and effects of these relationships are a matter of deep debate, not least because of the ambiguity surrounding the notion of

ideology (2.1.2; 4.8). Despite this, here several useful senses of ideology emerge. First, there is that which pertains to a political parallelism thesis (4.3.1; 5.3.1). Here the connotation is to political ideology, generally taken to be a conceptual alignment with certain taken-for-granted political values, interests, and aims; the typical referents are right vs. left politics, conservatism vs. liberalism, or other short-hands like neo-liberalism, socialism, and so on. In the commentary in these newspapers, political parallelism is conspicuous. The progressive politics of the *Toronto Star* aligns with a concerned and activist position on climate change, while the social and fiscal conservativism of the *Post* corresponds to an overt scepticism. The *Globe*, the presumed centrist newspaper, typically expresses a more "balanced" view. This adds support to numerous studies that find such political alignments shape representations of climate science, both within the media and in broader political discourses and coalitions (e.g. Brulle 2013).

I should also reiterate that here there is a novel and perhaps surprising finding about Canadian politics. While the Canadian political landscape is often assumed to be more moderate and less polarised than the American one, the climate change debates across these newspapers appear to be substantially more dichotomised than in major American publications (4.4.2). While climate change scepticism had apparently declined or become more subtle in the American context during the study period, in the Canadian context extreme forms of scepticism persisted. It would be fruitful for future research to investigate whether this polarisation holds across a range of issues, technosceintific or otherwise, or whether climate change is unique in this regard.

7.4 Shared Ideologies of Science?

My concern with what I call cultural images of science points to another sense of ideology. In these newspapers, then, there are discernible – sometimes overt – expressions of ideologies of science (4.5.1). The collective commentary of these newspapers conveys a view of science as a source of authoritative and, for all intents and purposes, objective knowledge. But the source of that authority and the way that objectivity is assessed rests on different assumptions and put to quite different ends.

Most significantly, the *National Post's* scepticism is (ostensibly) not predicated on a fundamental doubt about the epistemic authority of science, but on the (alleged) fallibility of scientists. Indeed, the columnists at the *Post* who most predominantly write about climate change abide by what could appropriately be called an extreme positivistic view of science. Such a view underlies their routine and pejorative allusion to "politicised" science (4.5; 5.2.5). And in the face of the politicisation of science, the *Post's* columnists present themselves as the truly objective protectors of genuine science. Their view of

science is an individualistic pursuit whereby anyone with a non-ideological disposition and intellectual integrity and skill can access the objective facts about climate change. This view is necessary for them not only to uphold the knowledge-claims of an extremely small percentage of dissenting scientists, but to present themselves as more objective – more scientific – than the professional climate scientists they claim are wrong (5.7).

The *Globe* and the *Star*, for their part, also uphold the authority of objective science, but that authority is to be granted in virtue of the institutions from which knowledge about climate change emerges. It is precisely the collectivity of scientists' work that gives science its authority, and as such, it is conveyed as a communal endeavour. This appears to be a fundamental difference underlying the authority that the *Star* and *Globe's* columnists and editors grant the IPCC and the importance they give to the consensus view, while the *Post* thoroughly rejects both. Nonetheless, the motif of sound vs. politicised science is also frequently found in the *Star* and *Globe* – from their point of view, it is the sceptics who have become politicised, and this politicisation accounts for their adherence to fringe views that have been rejected by the majority of the climate science community (6.2).

7.5 Unpersuasive Rhetoric

The symmetrical asymmetry of politicisation accusations – each "side" in these debates accuses the other being corrupted by politics – is one of the more curious features of these discourses. The impasse that is reached suggests a common trait of rhetorical appeals to the authority of science: they are easily appropriated for whatever end one wishes. Precisely why this impasse is reached is not a question I have endeavoured to answer here, but existing research suggests, in a bit of self-referentiality, that part of the reason is political polarisation (Fisher, Waggle, and Leifeld 2013; Hoffarth and Hodson 2016; McCright and Dunlap 2011; Zhou 2016). In the face of the extreme polarisation that surrounds climate change, the rhetorical authority of science appears to be rather unpersuasive. To what extent climate change media discourses beget or reinforce this polarisation is a question for further research, but this again supports the conclusion that debate framings and strategic appeals to the authority of science ultimately diminishes the very authority that is sought.

Given this, there is a perhaps surprising lack of reflexivity on behalf of the columnists from these newspapers about their own implication in the politicisation of science. It is in these newspapers that one finds clear records of the politicisation of climate change (4.2). This is to say that climate change is virtually never represented as a stand-alone natural phenomenon, to be understood solely or even primarily through the lens of scientific objectivity, but one connected to environmental and economic

consequences, affected human communities, political campaigns, elections, international conferences, developments in business and industry, corporate interests, technological innovation, and the many threads connecting all of these together. What are newspapers other than journals of the day-to-day politics of society? (No wonder ideology is such an enticing concept for understanding the media). Thus, the image of climate science that emerges in these newspapers is precisely that which Latour finds when he opens up his daily: an integral and inextricable component of complex technoscientific networks. It is most curious that columnists for these same newspapers try to detach science from the politicisation that is so thoroughly mapped out in their pages.

7.6 A Loss of Authority?

Various scholars have been critically concerned with the ways that the ideologies of science conveyed through the media reinforced the authority of science, especially its broad cultural authority amongst the public (5.2.3). The prevailing view has been that the media are authority-oriented, and thus does not challenge science in a substantial way – as Nelkin puts it, "there has been no systematic critique of science in the media." These concerns align with work in STS which has sought to interrogate, and indeed, challenge the narratives about science that underlie its authority (Shackley and Wynne 1996; Latour 1987). Does this view account for the representations of climate change examined here? Are the images and ideologies of science conveyed in these newspapers ultimately authority-bolstering?

As I argue throughout this essay, these media representations do not altogether reinforce the authority of science. While science writ large and abstractly as an epistemic project is still predominantly presented as a source of authoritative knowledge, as I note above, the basis and implications of that authority are expressed differently - as an individualistic means of accessing truth, or as a product of a community of experts. Thus, the authority of scientists is often treated as distinct from the authority of science; the former is contested on several fronts.

As "authorised speakers" on climate change, scientists have had to compete with a wide range of actors (5.2.1). Other studies have found that the "definitional control" that scientists exert over climate change has declined significantly since it first emerged as a major news story and the findings here strongly support that conclusion (Carvalho and Burgess 2005). The role of media actors in particular in contesting scientists' authority has been substantial. Journalists and columnists have exerted greater "definitional control" than scientists over climate change in these newspapers, demonstrated here by the pronounced and prevalent contrarian discourses in the *National Post*. Similarly, the more equivocal positions in the *Globe and Mail* reveal the degree to which debate framings prevail, which conflict with

the robust agreement amongst scientists, highlighting the issue of "balance-as-bias." Even the *Star*, whose representations of climate science align with the consensus view, cannot only rely on the validation of scientists, but is routinely forced to respond to the way climate change has been defined by sceptical media actors, and exert its own definitional authority.

This relative loss of authority for scientists both results from and prompts the many crossings between supposed science-media boundaries (6.3.2). Traditionally, the authority of scientists in the media arena, or in the broader public arena, had been predicated on the view that they came from another realm. In their attempts to reassert definitional control over climate change, scientists have increasingly entered the media realm, not just reactively, but proactively (they do not just respond to the perceived illegitimate claims of climate sceptics, but try to active define the message and pre-empt media strategies – this part of a larger reaction to the more pronounced role of media actors as authorised speakers for climate).

The ultimate effects of the *Post's* contrarian discourses and attacks on climate scientists on the larger authority of science and scientists is not altogether clear. The public tends to view scientists - especially those working at public institutions - as among the most trustworthy sources of information on climate change (though levels of trust appear geographically dependent) (Buys et al. 2014). However, studies have found an overall loss of public trust in scientists in recent years (e.g. Leiserowitz et al. 2013); the media have been found to play key roles in effecting these “legitimacy crises” (Bolsen, Druckman, and Cook 2015; Carvalho and Burgess 2005; Hmielowski et al. 2014; Ladle et al. 2005). In the specific case of climate change, a decline in public trust in scientists has been linked to contrarian discourses which convey science as contentious (Hmielowski et al. 2014). These trends appear to exhibit a sort of political parallelism, with publics relying on conservative newspapers being more likely to distrust scientists in general (Kim 2011), and faced with competing knowledge claims, the public will trust the scientists who appear to share their values (Nisbet et al. 2015; Siegrist et al. 2000). Gordon Gauchat conducts a crucial long term study on these questions, and finds that when stratifying by group according to political persuasion, general public trust in the scientific community in the United States between 1974-2010 has remained relatively stable, with the notable exception of those who self-identify as conservative (2012). At the beginning of the study period, conservatives expressed the highest levels of public trust; at the end, they had the lowest.

Does the *Post* generate mistrust – and ultimately a loss of authority – of science and scientists? Survey data would help answer this question, but based on existing studies and the scope of its sceptical and contrarian discourses there is cause to seriously consider the risk. The *Post's* simultaneous appeals

to the authority of science and its attacks on specific climate scientists and scientific institutions rests on a distinction between science as an independent means to objective knowledge (secured by following the proper rules, logics, and procedures), and fallible and ideological corrupted practitioners who have failed to conduct science properly. Thus, while the *Star* and *Globe* defer to the consensus view, the IPCC establishment, and to the prevailing theories in the peer-reviewed literature, the *Post* consistently undermines them (4.4; 4.6). What this indicates is that an alleged reverence for "genuine science" on an epistemological level does not imply respect for science's cultural, institutional, and political authority, especially given certain imaginings of the context of that authority (within a socialist, environmentalist, anti-capitalist conspiracy, often alleged by the *Post's* columnists). With regards to the public trust in science, cultural, rather than epistemic, authority appears the more relevant concern (see Bauer, Allum, and Miller 2007).

In this way, the *Post*'s columnists undermine what Sheila Jasanoff calls the "elitist view of expertise" (2003) This view holds that experts possess certain competencies – namely theoretical understandings and tangible research skills – for making sense of specific subject matter that non-experts do not. The authority of expert knowledge-claims is based on the assumption that they are more likely to meet a set of epistemic standards – accuracy, robustness, rigour, thoroughness, explanatory power, etc. – than non-expert claims. In short, expert knowledge is substantively superior to non-expert knowledge, and certain subject matter is considered the exclusive purview of experts. Jasanoff notes that this vision of expertise contributes to legitimacy crises of public trust, because rather than leading to a deferential attitude towards experts amongst the public, it can lead to alienation. Barred from participating in deliberations on "expert issues," the public can become hostile towards "elitist" knowledge-claims.

The *Post*'s climate change discourses challenge this conception of expertise. On the one hand, its columnists ostensibly uphold a view of science as a special kind of knowledge that is produced through applying specific rules of inquiry and analysis. But they clearly reject the class of elites who produce knowledge about climate change, in rejecting the consensus view. Moreover, the *Post*'s columnists try to participate directly in deliberations on physical explanations of climate change. This finding supports other research showing that in certain cases, the media compete directly with scientists in making knowledge claims about "scientific" issues, thus undermining scientists' elite and exclusive right to speak on such topics (Weingart and Pansegrau 1999). This is exacerbated by the *Post*'s claims that the scientists who uphold the anthropogenic theory of climate change are wrong, and thus implies that their education, professional experience, and ability to conduct and publish scientific research is

insufficient to grant them either epistemic or cultural authority (4.5.1; 4.7.1; 5.6; 6.2). Indeed, the *Post*'s columnists' overall implied (and at times explicit) position is that the majority of climate scientists are incompetent or perpetrating intentional fraud.

It's very difficult to view the *Post*'s positions here as anything but disingenuous (and its notions of science untenable) (4.9; 5.8). The critiques the *Post's* columnists make cannot be understood as a sincere effort to hold scientists accountable to some ideals of science. And the experts that the *Post* employs as primary validators of knowledge about climate change do not uphold the purported ideals of "sound science" any more rigorously than those it attacks; often they engage in precisely the kinds of "politicisation" (or more egregiously so) that supposedly undermine the consensus view (6.4). And certainly, in offering their own claims about climate change, the *Post*'s columnists do not meet their own purported standards of scientific knowledge. The predominance of extreme contrarian positions are not expressions of genuine scepticism, nor do *the Post's* debate framings accurately construe the kinds and scope of disagreement amongst climate scientists (4.7; 4.8). Instead, these are duplicitous sceptical strategies used to obfuscate and discredit the consensus on anthropogenic climate change (4.8). In these ways, the *Post's* treatment of climate change can be understood as both a result of and participant in broader climate change scepticism campaigns or the "climate change countermovement" which have ultimately been successful in preventing action on climate change (4.1).

These practices contribute to what Jasanoff calls the "relativist view of expertise" (2003). This can be linked to the "dueling-experts" motif, which promotes a contentious, combative, and dichotomous (or as in the case of the *Post*, a pluralistic conflict) image of scientific practice and knowledge production. This image of science is one in which alternative or contrarian knowledge claims are always producible from the same set of scientific evidence, that the experts promoting these knowledge claims are equally credible; or more cynically, that it is always possible to recruit expert knowledge and scientific rhetoric to support whatever viewpoint or interest to which one is already predisposed.

Jasanoff notes that this view of expertise is linked to ongoing legitimacy crises, and leads to scepticism of scientists' motivations. This is because, like many forms of relativism, a relativist view of expertise is also an instrumental view of expertise. Under this view, expert opinion is sought in order to support specific pragmatic ends – pre-conceived positions or policies – while inconvenient or incompatible views are ignored or avoided. The relativist view of expertise is thus opportunistic rather than deferential. This approach to expertise ultimately leads the public to be suspicious of expert claims, as there appears to be no consistent, principled reason to defer to expert advice, other than to serve

some specific political or economic interest. At best, this view of expertise bolsters the authority of specific experts in specific contexts – when their views are politically expedient, for example – but the net effect is to undermine the authority of scientific experts in general.

Thus, the *Post*'s validation practices may have contradictory effects in terms of the authority of scientists. The *Post*'s columnists rely on experts to validate their views (whilst reciprocally validating these claims-makers' expertise), but their recruitment of expert claims-makers is highly selective and instrumental, and is based on standards and principles that run contrary to the validation practices employed by the expert communities themselves.[219] Moreover, the validation of the climate change scepticism in the *Post* demands the rejection of the authority of a majority of climate change experts. The *Post*, then, does not defer to scientific experts based on the consistent recognition of substantive measures of expertise – credentials, research activity, publication record, standing within a community of peers – but recruits them selectively and opportunistically (5.9 and 6.4).

7.7 A Return to Norms?

There are some reflexive and normative consequences of all this. First, which mobilisations of expert knowledge-claims serve "public constituencies" cannot be taken-for-granted, but are a fundamental point of contention in climate change debates. STS scholars, then, need to carefully consider which public constituencies they mobilise around. Secondly, this analysis demonstrates that in addressing this question, setting the "bounds" of deliberations, and the "parameters" of expert influence over the public is itself a deliberative process which depends on expert analysis – those with expertise in STS, media studies, and public understanding of science. Finally, the finding that sceptical media discourses undermine the authority of science can sit uncomfortably with the authority-challenging disposition of much STS work. In the same vein, in revealing the many ways science can be politicised, this project too has political implications.

For the most part, normative work on the media's role in in climate change debates – and in communicating and covering science in general – have upheld substantive, realist, or "elitist" views of expertise. Journalists and columnists are frequently regarded as ill-equipped to competently report on scientific research, lacking the requisite expert skills and understanding possessed by scientists (Bell 1994; Henderson-Sellers 1998).[220] Studies that have examined columnists who make overt knowledge

[219] Weingart and Pansegrau observe that, in general, the media select scientist authorities for different reasons than the "internal mechanisms" of science (1999)

[220] Indeed, it is often journalists' worries about their own scientific literacy that leads to "balanced" reporting on scientific issues (see Dunwoody and Peters 1992).

claims about climate change have typically pointed to their scientific inaccuracy and other signs of the columnist claims-makers' scientific misunderstandings (Brulle 2013; Elsasser and Dunlap 2013). On the other hand, work in STS has been wary of elitist views of expertise, carrying out projects that implicitly or intentionally seek to challenge scientists' exclusive authority (Jasanoff 2003, Wynne 2003, 2008). There are, of course, many studies that pay attention to such STS work and take a constructionist approach to exploring the media's role in climate change debates, challenge uncritical bolstering of scientists' authority, recognise a diversity of claims-makers (and normatively, the *need* for such diversity), and problematize simplistic notions of "distortion" or "inaccuracy." But even among these, the normative tilt upholds the legitimate expertise of climate scientists and calls attention to the problematic knowledge-claims of media actors (Antilla 2005; Boykoff and Boykoff 2004, 2007, Boykoff 2007, 2011; Carvalho and Burgess 2005).

Jasanoff, for her part, tries to navigate between the relativist and elitist positions. She argues, "It is important […] for expert deliberations to include not only the full range of views that bear on the technical issues at hand, but also voices that can question the disciplinary assumptions and prior issue-framings of the experts being consulted." However, she recognises that work coming out of STS can "seem at first glance to lend support to relativist and instrumental constructions of expertise" which in turn can support "those wishing to question a given scientific interpretation" by finding "errors, hidden biases or subjective judgments that undercut their opponents' claims to truth and objectivity" (2003, 160). Given this, she insists that she does not wish to abandon scientific deliberations to an "anything goes" relativism and argues, "Although experts may be able to illuminate only selectively framed and bounded aspects of reality, their capacity to create meaningful representations of that reality is not in doubt."

This balancing act captures the underlying tension in STS engagements with expertise: how can one "diversify and open up" what were once exclusively defined as expert issues to a "wider range of views" while upholding substantive standards of discourse and deliberation? The wide range of framings, actors, claims-makers, and claims present in coverage and discussion of climate change found in this study shows that the kind of diversification that Jasanoff calls for is already occurring in many segments of the media, a key component of public discourse. This finding is worth reiterating: *contra* Nelkin, the climate change discourses in these newspapers undermine elitist views of expertise –

scientists are no longer (if they ever were) the "ultimate sources of truth" either in terms of issue-framing or specific knowledge claims about climate change.

A formative debate between Harry Collins and Robert Evans on the one hand (2003, 2007), and Brian Wynne on the other (2003, 2008), can be usefully recounted here. Collins and Evans set out to address how to identify the relevant experts to address a narrowly defined proposition – which parallels the authorisation of claims-makers in the media. The overt climate scepticism advanced by columnists in the *Post* is straightforwardly addressed by this kind of normative approach. Their primary validator roles should be questioned because they cannot be shown to have relevant expertise – through research experience or contributions – on the topics about which they offer knowledge claims (this is to simply say, that even according to expanded, more inclusive notions of expertise, newspaper columnists are not experts on climate change).

On the other hand, Wynne holds that the fundamental question is not in defining valid expertise, but to what extent an issue should be defined as "scientific" in the first place, or rather, how much priority should be given to scientific matters-of-concern over others – political, economic, social, and so on – which parallels issue-framing in the media.[221] Jasanoff, Wynne, and others are right in that deferential orientations to scientific expertise – in the media and other public arenas – should be problematised and reflected upon. And claims-makers and issue-framings – concerned actors and matters-of-concern – should be expanded. While Jasanoff does not insist that each and every view on some issue should be treated equivalently, she nevertheless advocates for "a bounded but candid deliberation among the holders of divergent viewpoints" such that it could lead to a "useful airing of the underlying principles, a sharpening of analysis, a more accountable exercise of judgment, and eventually a better assessment." Moreover, she argues that "experts should be seen as authorized to act only on behalf of their public constituencies and only within parameters that are continually open to review" (161).

7.7.1 STS and Publics

The criterion of accountability to "public constituencies" can be understood with a view to STS works that have sought to expose inequitable mobilisations of the authority of scientific knowledge. In this way, STS works are often aligned with publics that have been subordinated by such mobilisations (e.g. Scott, Richards, Martin 1990). One challenge for STS scholars has been to reconcile impartial

[221] A large part of this debate involves them talking past each other because they are focusing on different aspects of expert claims-making. Cf. Collins and Evans 2002 and Wynne 2003.

constructionist analyses with these normative orientations. The major challenge has been to outline the rationale for political alignments with certain publics (and not others).

Brian Wynne's classic case study on Northern English sheep farmers' interactions with scientists assessing and regulating the risk of Chernobyl's radioactive fallout is instructive here (1992). In terms of its normative alignments, this study can be seen to support the interests and claims of the farmers, while it challenges the authority of the scientists who sought to override the farmers' knowledge claims about the dangers to their sheep. Analytically, the case worked so well (and has become so influential) because it turned out that much of the scientific advice happened to be mistaken, whereas the farmers accurately understood many aspects of the local environment – constituting a form of specialist expertise that was disregarded by scientists. Politically, the case is compelling because it appears to provide an exemplar of what Ian Hacking calls "anti-authority by unmasking" (2001, 92). The study reveals the over-extended authority of scientific knowledge, which is tied to the regulatory power of the state, which is ultimately detrimental to relatively disenfranchised public constituencies. The case thus easily maps onto ethical concerns about the alignment of scientific knowledge with unequal distributions of political power.

David Hess notes that as far as STS scholars have been engaged in political projects, their work has been aligned with and supported "subordinated groups" (2011). This fits in with Jasanoff's, Wynne's, and other's aims of enlisting the insights of STS towards democratic ends (Jasanoff 2004; Wynne 2003, 2008). Crucially, what this orientation towards democratic justice allows is a way of politically positioning STS work in technoscientific controversies that is not predicated on presumptions of scientific truth, thus leaving space for commitments to symmetry and impartiality on epistemic matters.

Crucial to Wynne's political alignments with certain publics is a conception of self-mobilizing publics that are capable of reflexive understandings of their relationships to expert groups and scientific knowledge (Wynne 1992; Epstein 1996; Yearley 1999). In other words, deficit models do not accurately describe publics' understandings of science.[222] For Wynne, an essential issue in exploring these understandings is how public meanings and concerns are included (or more often, not included) in policy deliberations on technoscientific issues. This means that (political) STS projects should reject the

[222] But this crucially hinges on how public understanding of science is defined. In terms of scientific literacy, a metric that underlies "propositional" views of expert knowledge, there are discernible public deficits in scientific understandings, for example, about the causes and risks of climate change (Weber and Stern 2011; Leiserowitz and Smith 2010; Sterman and Sweeney 2007; Lombardi and Sinatra 2012; Whitmarsh 2009). The problem with deficit models, argues Wynne, is not that they do not accurately measure what they purport to, but that what they measure is too narrow to make sense of public understanding of science.

"propositionalism" that defines dominant institutional approaches which reduces technoscientific controversies to narrowly framed scientific questions.[223]

Wynne's rejection of propositionalism rests on a distinction between science as a research knowledge culture and science as "an aspirant public authority knowledge" (2008, 24). A public's deficiency (or proficiency) in the former is not a cause for excluding or including them from deliberations on technoscientific issues. Instead, it is the way they problematise the latter – by presenting concerns and interpreting meanings of technoscientific issues that defy propositionalism – that admits them to public deliberations. For Wynne, this is precisely what public deliberations are about.

Wynne finds that the sheep farmers are capable "extensive informal reflection upon their social relationships towards scientific experts, and on the epistemological status of their own 'local' knowledge in relation to 'outside' knowledge" (1992, 281). Assessments that measure some form of "scientific literacy" cannot capture these broader forms of public understanding of science. More crucially, these understandings effectively reject precisely the kind of propositionalism that Wynne finds so problematic. Thus, another reason – perhaps the crucial reason – that Wynne's sheep farmers are so appealing is that they represent a public that is capable of the kinds of reflections that STS expertise can generate.[224] It is these kinds of publics – who undermine the "dominant institutional cultural ideology" that exerts "instrumental scientistic" parameters on public scientific issues – with whom Wynne aligns (2008, 28). Thus, it just so happens that Wynne's conception of how public deliberations should be constituted, and the reflexive publics who (should) partake in these deliberations, would lead to a situation in which Wynne's own critiques would be admitted to the framing of technoscientific issues.[225]

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[223] Wynne uses the term "propositionalism" as a pejorative to describe the demarcationist project undertaken by Collins and Evans (Collins and Evans 2002; Wynne 2003). Collins and Evans envision narrowly circumscribed questions (e.g. Have anthropogenic greenhouse gases caused the observed increase in global mean temperatures?) that would be subject to expert deliberation. The narrower the question (i.e. the "proposition"), the narrower the range of experts that would be qualified to speak on the matter. While Collins and Evans make room for many kinds of questions and scales of relevant expertise, Wynne critiques this project as reductionist, and prone to excluding precisely the voices that would make technoscientific deliberation more democratic. Plaisance and Kennedy (2014) offer a pluralistic conception interactional expertise that aims to expand the range of potential experts beyond what Collins and Evans had in mind, but this too is open to Wynne's critique of propositionalism.

[224] What if the government scientists in Wynne's study have been correct, and their regulations on sheep farming entirely justified? What if the farmers had been wrong and the sale of their sheep for consumption would have put the public at risk? Or what if the farmers had willingly acquiesced to the authority of the scientists? Would the case study have become so formative?

[225] And while I have not done an exhaustive review of the literature (this would be a good future project), anecdotally I would estimate that this is probably the norm for politically and publicly engaged STS.

Hess explores the ways that STS scholars can be politically aligned by setting up a relatively extensive taxonomy of different publics. Following the move away from deficit models of public understanding, Hess moves beyond conceptions of the public as primarily denoting a "lay opinion public" and points to "mobilized publics" which are "formed when networks of organizations and individuals make alignments between their sectional interests and the general good" (2011, 629). Complicating Jasanoff's criteria that experts be held accountable to their public constituencies, Hess notes that there can be many mobilized publics in action at once, each "claiming to speak for the society as a whole and its "public interest": that is, what the public is, needs, and should have." Among these mobilized publics, Hess defines two important sets: "counterpublics," which emerge to contest "official publics." The chief difference between counter and official publics are the kinds of mobilized networks that comprise them. Official publics consist of and reflect the interests of various societal elites, while counterpublics are made up of subordinate groups.

Hess also points out that any alleged essential conflict between between experts and the public is simplistic; in theorising the ways that publics are constituted, he notes that publics do not stand in opposition to scientific experts, but instead enroll them, or are partially constituted by them. Thus, publics of science are located "not only outside the scientific field but also partially within the scientific field" (2011, 630). Crucially, Hess notes that despite STS scholars being predominantly concerned with the official authority of scientific experts, and in particular how this conflicts with the lay-opinion public and counterpublics, scientists themselves are not necessarily always mobilized alongside official publics. In this way, one can legitimately speak of "scientific counterpublics" – and also allows for political coalitions of publics, scientists, and STS scholars. These are formed when "when scientists adopt a public position by arguing that an alternative research program would be of broad public benefit, in contrast with the existing dominant paradigm, and when they become connected with broader agendas for policy change" (Hess 2014, 129).[226]

The case of climate change greatly complicates the scientific-authority-challenging motive of much STS work, and the political alignments made towards subordinate groups. Climate sceptics are a group that seem to fit rather precisely Hess' definition of scientific counterpublics: A prevailing narrative amongst sceptical scientists and sceptical voices in the media is that they represent a subordinated, silenced group. On this reading, official scientific institutions like the IPCC have colluded with various

[226] In an earlier definition Hess defines scientific counterpublics thus: "Scientists who are located in subordinate positions in their respective research fields generate publicity by addressing a broader public audience about the public-interest implications of agenda conflicts in their respective research fields" (2011, 630).

other actors in dominant positions of power to undermine alternative readings of climate. And these divergent scientific understandings are held to have "broad public benefit" – or at least, they would protect the public from "disastrous" climate change policies that would "destroy the economy" and subsequently lead to severe declines in quality of life. Indeed, as revealed in previous chapters, numerous sceptical pieces in the media have put forth almost exactly these kinds of arguments (4.5, 4.6).[227]

Taking Jasanoff's criteria of public accountability, the columnists and editors at the *National Post* would likely construe their work as contributing precisely to these kinds of "candid deliberations" and reviews of the accountability of climate science and scientists. It is not difficult to interpret the discourses and representations in these newspapers as questioning "the disciplinary assumptions and prior issue-framings" of climate change debates. Solomon's "The Deniers" columns can be read precisely as a diversification of claims and claims-makers, as can many of the guest columns written by a diversity of (ostensibly relevant) experts.

Thus, in the case of climate change, exactly what concerns and meanings are being excluded from public deliberation? In what ways has the "imposition" of a "hegemonic scientism" reared its "dictatorial" head (Wynne 2008, 26)? It seems as if the dictatorship of institutional scientism has been relatively powerless to enforce its meanings and concerns on the public. And does this democratisation of technoscientific deliberation look anything like what STS scholars might have had in mind?[228] It is precisely this radical openness to public meanings and concerns, that makes climate change appear as an antithetical case to the kinds of exclusionary propositional deliberations that Wynne opposes, and, more broadly, confounds STS' anti-authority inclinations (Lövbrand, Pielke, and Beck 2011).

Hess grapples with this precise issue (2014). Though he is acutely aware of the pluralistic, heterogeneous nature of publics, Hess accepts the conclusions of many of the studies cited in this project, and places the responsibility for the emergence of denialism primarily with traditionally powerful elite groups, namely the media, governments, and industry. Thus, Hess implies that sceptical scientists and the mobilized publics they align with do not form a *bona fide* scientific counterpublic, mainly because they are, in some sense, inauthentic. But nor do they form an official public, so Hess further sub-classifies counterpublics: alternative, which mobilize subordinated scientists or research

[227] Peter Foster, "Let the Climate Debate Begin," *National Post*, November 25, 2009, National edition, sec. FP Comment; Peter Foster, "Inside Dionomics," *National Post*, January 17, 2007, sec. FP Comment.
[228] On what STS scholars might have mind in terms of democratisation, and the issues latent therein, see Durant (2010) and Lövbrand, Pielke, and Beck (2011)

programs, and countervailing, enlist dominant scientific understandings to support relatively disenfranchised political positions. On this reading, climate activists form a countervailing counterpublic.

Pointing to the inauthenticity of illegitimacy of climate change scepticism points to a deep problem in the way much STS work has conceived of and aligned with publics. While Hess holds that despite there perhaps being some *sui generis* public scepticism of ACC – indicated by letters to the media, online comments, e-mails to politicians – for the most part it is the result of denial campaigns engineered by "industry funded groups." So, sceptical members of the public cannot be seen to express a subordinate, alternative view of mainstream science according to a reflexive understanding of expert knowledge and a legitimate concern with scientific authority, but rather, they are largely deceived by the messaging interest groups for whom climate change action is undesirable.

Similarly, Wynne recognises that the traditional basis (the epistemic rectitude of science as research knowledge culture) for the public authority of science still has great efficacy. In the media sources here, these "ideologies of science" are common. In particular, the *National Post's* columns on climate change convey a rather positivistic view of science (as do those in each of the newspapers to some degree) (4.6). It can be supposed that to a large extent, the public accepts distinctions between sound and politicised science, positivistic conceptions of scientific objectivity and truth, and even the value-free ideal. They are "dupes" to the dominant cultural ideology of science (Durant 2008). But does this not return us to deficit models and lay-opinion publics?

7.7.2 A Return to Deficits?

Hess' classifications of different publics are astute in how they undermine any simplistic "experts vs. the public" distinctions. The broad set of actors that this study examines shows just how difficult it is to neatly define publics. Are the columnists in these newspapers public citizens? Or a sort of expert authority? What about the scientists? Are they activists, advocates, policy makers, or experts?

In the case of climate change, the various "mobilised publics" are not homogenous groups; rather, they are coalitions of people with varying degrees of social, cultural, political, communicative, economic, and epistemic power. And while scientific experts ostensibly hold a great deal of the latter, the dynamics of power in and between these publics does not lead to any predictable outcomes. Different forms of power can conflict or combine with others in the pursuit of certain goals: seen here in the ways that the authority of the media can recruit or reject the authority of scientists. The result is sets of competing mobilised publics, each comprised of a diverse and fluctuating range of actors: politicians, policy makers, journalists and columnists, "lay" citizens, activists, business and corporations,

financiers, legal authorities, and experts of all kinds. Insofar as STS scholars are compelled by political engagement, it entails adding oneself to these coalitions.

So, to speak of "deficits" – in knowledge and understanding (and perhaps most crucially, reflexivity) – one does not need to suppose some fundamental power differential between different kinds of actors, nor an inherent conflict between experts and "the public." As this study has amply demonstrated, media actors with considerable public authority exhibit deficiencies in critical understandings. The same can be said about those with immense political and financial power. And the same can be said about experts. Indeed, Wynne's, Jasanoff's, and many others' visions of the public and political responsibilities of STS is predicated on the view that it is scientists that possess deficits in reflexive understanding – about the public, about their own expert authority, even about the broader roles of science in society (Durant 2010, 2011).

In understanding publics as multivalent coalitions, Wynne's distinction between between science as a research knowledge culture and science as a form of public authority knowledge, while conceptually useful, breaks down. These are quite obviously dependent on each other, both ontologically and epistemologically. This is to say, whatever (apparently non-propositional) meanings and concerns emerge in the kinds of public deliberations Wynne envisions are dependent on the validity (and accuracy, and dare I say, truth) of propositional claims – validity not just as experts see it, but also as publics see it. Wynne recognises that propositionalism is a means of enacting public scientific authority, but this is neither chiefly rhetorical (in some pejorative sense), nor necessarily an indication of publics' (unreflexive) acquiescence to the "dominant cultural ideologies" of science (though it might be – more on this below). I do not want to put too fine a point on it, but if it turns out that the sceptics are right about the propositional question, then most meanings and concerns about climate change evaporate.

Sometimes matters of concern define what matters of fact are sought, but often the converse is the case; all technoscientific controversies involve criss-crossing between each. Thus, a pressing question in the case of climate change is the degree to which issues of public meaning and concern are dependent on propositional questions (and vice versa). It is clearly the case from the diverse framings and discourses in the *Star* that the resolution of the propositional question of anthropogenic climate change does not solve questions of meanings and concern; but it does define a set of possible concerns. Conversely, it does not appear coincidental that the more predominant business framings in the *Post* and *Globe* coincide with greater degrees of scepticism about the proposition that climate change is

caused by human activities (3.3.2). Or that political-parallelism appears so clearly in the editorial positions of each of the newspapers (4.7.1).

This issue is conspicuous when considering how issue-framing is itself a form of claims-making, and one that can be mobilised and engaged tactically and strategically. For example, there is no doubt that climate change involves a multitude of "political" concerns, but as seen in these newspapers, political framings can be strategically mobilised in order to produce over-arching debate framings which overgeneralise specific points of disagreement. It is not merely conflicting knowledge-claims about CO2 concentrations, temperature records, and solar cycles that define climate change debates, but the very issue-framings themselves. Thus, the "propositionalism" that Collins and Evans promote – the clear definition of "selectively framed and bounded aspects of reality" to be deliberated by appropriate experts – can be (intentionally) undermined by the diversification of issue-framings (along with the expansion of claims-makers).

Thus, framing public deliberations as matters of concern and meanings rather than narrow matters of scientific fact does not remove questions of legitimacy, validity, or even deficits; instead, it expands the set of understandings and knowledges that one needs to evaluate. While "deficits" as a metaphor may evoke unwelcome connotations, it expresses the crucial view that certain knowledges and understandings held, shared, and communicated (or lacked) by publics will allow them to interpret richer (or narrower) meanings from technoscientific controversies, and ultimately allow them to participate more fully (or limitedly) in public deliberations. This will lead to outcomes with greater and lesser degrees of "broad public benefit." Such a presumption underlies most knowledge producing projects, including those conducted by STS scholars. What kinds of understandings can STS produce that will help address issues like climate change?

Or, to start more narrowly, what kinds of understandings does this project offer that might help address issues like climate change? To start, it helps evaluate the bounds of public deliberation – indeed, it lays out a crucial starting point for such deliberations: sincerity. Much scepticism has been shown to be connected to powerful groups, who employ a range of focused and deliberate tactics to foster public and regulatory confusion about climate change to serve narrow financial and political, rather than public, interests. The *Post's* connections to players in the "climate change counter-movement" and tactical scepticism campaigns are grounds for suspicion (4.8). That is, we can say, as Oreskes and Conway do, that some "sceptics" are deliberately trying to mislead; publics constituted by these "sceptics" should be met with wariness. This is a point that should be reiterated forcefully: many (if not

most) climate change "sceptics" are not sincere. Here the value of analysing the constitution of actor coalitions is shown.

However, in other instances, like many of the pieces in the *Post*, scepticism cannot be shown in any direct way to be motivated by powerful groups or a desire to intentionally mislead (this distinction is often empirically impossible to make, lest the analyst is privy to personal statements of intention by climate change sceptics). Thus, the question of duplicity still looms. The crucial question to be addressed here: how can legitimate scepticism be expressed?

Given that discourse analyses cannot definitively answer the question of intent, standards might be set on the discourse itself. This is to say that it does not ultimately matter whether or not a deliberate intent to mislead can be demonstrated, all one needs to show is that the claims – the attempts at public deliberation – are misleading. This may be incidental, but it can still be understood as disingenuousness, as sufficient care to contribute meaningfully to public climate change debates – the standards of which increase with the media's powerful validator role in setting the terms of these debates – has not been taken. The *Post's* widespread use of hyperbolic and ad-hominem nature of the rhetoric found in columns, and the demonstrable omissions and misleading interpretations of climate change research suggests that the newspaper's columnists and editors are not genuinely concerned with contributing to a "useful airing of the underlying principles, a sharpening of analysis, a more accountable exercise of judgment, and eventually a better assessment," (Jasanoff 2003, 110). So, such attempts at "deliberation" can be considered out of bounds, and thus excludable.[229]

In the realm of public deliberations in the media, scientific accuracy need not (or cannot) be the primary or only measure to assess misleadingness (though it is arguably necessary), given its elusiveness and inaccessibility to most participants, the broad range of concerns involved, and that the question of scientific accuracy should be a potential point of deliberation. Markers of discourse – framings, argumentation, and rhetorical strategy – especially as these occur systemically, can serve as crucial measures of the legitimacy of climate change media discourses. Similar discursive elements may be similarly useful in other (non-media) realms of discussion. This demonstrates the value of careful and systematic discourse analysis.

[229] The point may be largely moot in practice – clearly, sceptical discourses are already admitted to actually existing public deliberations. But from the point of view of normative STS, we should not feel compelled to push for the inclusion of such voices – and insofar as STS can influence public debates over climate change, normative analyses of scepticism should be offered to inform these debates.

7.8 Fostering Reflexivity

Innumerable deficits in knowledge and understanding have been identified in climate change debates, along with innumerable interventions to alleviate these deficits. We must resist the urge to imagine that any of these is foundational, or that any specific strategy will be sufficient. Climate change is too large and complex of a problem. But noticeably absent from these debates, especially insofar as they have manifested in the media, are precisely the kinds of reflexive understandings that STS fosters.

Take conceptions of ideology and politicisation of science. Concerns about the effects of political ideology on climate science are expressed in each of these newspapers. And in these cases, the concepts are applied "asymmetrically": politicised science stands in contrast to "sound science," and ideologies account for the misunderstanding and misrepresentation of science. In the *Star*, the claims and activities of climate change sceptics are accounted for in terms of their economic, ideological, and political interests. For the *Post*, the ideologies of consensus climate scientists and the "political mandates" of the IPCC and the UNFCCC lead to a distortion of science, or as is often asserted, the widespread promotion of a false theory of climate change.

An irony emerges here. There have been long-standing apprehensions about STS' anti-authority inclinations. This is essentially what the so-called "Science Wars" were about, and more recently, anxieties about a "post-truth" world (Hacking 2001; Lynch 2017). One such apprehension was that the understandings of politicised science that STS has developed with empirical and conceptual richness could be appropriated to dismiss matters of fact and matters of concern. But there is nothing new in these media discourses: politicisation and ideology are viewed as enemies of scientific truth and applied in the same asymmetrical way they have been used for the last century. To the extent that the sceptics at the *National Post* believe what they say, they have not abandoned the traditional epistemic authority of science, they have claimed to speak with it. They are not relativists, they are positivists. And they certainly are not reflexivists. In these media discourses, politicisation has been wielded to dismiss specific knowledge claims, but it rarely provides the basis for a more reflexive and realistic understanding of knowledge about climate change.

The irony of the situation is that if these sceptics worked with STS understandings of politicisation, they would be less sceptical, not more, about the matters of fact and matters of concern surrounding climate change. They would be more sensitive to the nuances, contingencies, and messiness of producing good scientific knowledge. They would not hold climate science up to impossible standards. And they would be more appreciative of the significance of scientific consensus.

Moreover, if they exhibited reflexivity about their rhetorical uses of the politicisation of science, their discourses would be less hyperbolic, less reactionary, less inflammatory, and more sincere. Just as concerned scientists worry about the effects of "alarmism" in public climate change discourses, one would imagine that sincere sceptics would reflect on the role of the obvious campaigns to obfuscate the issue of climate change. But in the *National Post*, there is never a denunciation of such strategies and tactics, only participation in them. Its columnists are even unreflexive or obfuscatory about their own discursive power as media actors. That they can present themselves as objective voices on climate change suggests either ignorance, hubris, or deliberate disingenuousness.

Influencing such media actors might be overly ambitious and optimistic. It is unlikely that calls for reflexive and critical understandings of scientific knowledge will be taken up by columnists who promote sceptical views. But other, still ambitious, but slightly more realistic interventions might be possible.

Media studies shares a disposition with STS in that they both strive for, encourage, or imply, reflexivity. This reflexivity does not always take place "internally" – in which analysts take into account the "subjectivities" of their own work whilst simultaneously analysing those of their actors. But as sociological knowledges concerned with the way the world is categorised, represented, communicated, and interpreted, they have reflexive consequences for those imparted with these knowledges. Thus, studies find that "media literacy" is an important factor in public understandings of climate change (e.g. Cooper 2011). Ideally, those imparted with rich understandings of the various means by which the media produce narratives and meanings about climate change will be able to assess those representations more critically – not just outwardly and asymmetrically, dismissing some media and consumers of media as "biased" – but by recognising that all media sources operate according to certain systemic norms and assumptions, that taken together, make certain worldviews, values, aspects of reality more or less salient – including those sources upon which they themselves rely.

STS has always strived to promote a similar kind of reflexivity, but perhaps the impetus has become more pressing. Publics might be capable of reflexivity, but the success of the sceptical strategies of the likes of the *National Post* suggests that many of them do not exercise it. Idealistically, politicisation rhetoric would hold less sway if the kinds of critical understandings of science that STS produces were more prevalent amongst publics. In this way, both STS' anti-authority inclinations and concerns about their effects have been somewhat misplaced. In the case of climate change, the issue of the authority of science does not map on to experts vs. the public distinctions, but relates to competing publics – coalitions including both experts and non-experts of all sorts. And these publics recruit a

certain kind of authority of science whilst contesting others' right to do so. Many try to speak with the authority of science without any concern if what they say is actually supported by the best available scientific research, the very factor that should presumably grant their claims (a narrowly-defined, accountable) authority in the first place. The problem has been less that experts as a general demographic group have had too much authority, and more that the kind of authoritative knowledge that they trade in is readily (mis)appropriable, easily strategically enlisted to support any interest, and contributes to a lack of accountability – not just from experts, but also between publics. As evidenced by the discourses in these newspapers, this kind of authority of science remains broadly intact. STS has lots more work to do.

Epilogue: Climate Change and the Media since 2013

This study examines media coverage from a formative period in the development of climate change as a pressing technoscientific issue. But since this dataset was collected and this project undertaken, there have been major changes in the media landscape and in the international climate policy arena. Here I want to briefly attend to some of these developments and consider what they might imply for future studies of climate change in the media, and ultimately, for future action on climate change.

First, some comments about the sources I have examined. It might be remarked that, as newspapers, they represent an increasingly outdated medium. It is certainly the case that readership of print newspapers has been on a steady decline over the past several decades (indeed, these trends go back to the 1950s following the widespread adoption of television) (CMI 2011; Edmonds 2015). Even during the short period under study from 2006-2013, Canadian print newspaper circulation declined from 37% of households to 23%. With the widespread growth of digital media in the past two decades, traditional newspaper companies have been increasingly focused on online content, which has become their new business model. However, while the medium of delivery has changed, traditional legacy news sources continue to have strong agenda-setting effects, at least in terms of content production (Veltri and Atanasova 2017). But future research will need to account for the ways that digitisation has shaped salience and framings. For example, while traditional print newspapers played a crucial role in establishing salience – and hence the importance of stories – through editorial layout, especially on that of the cover page, online formats are less restrictive in this regard. While the physically represented webpage can still prioritise some stories over others, online media is less constrained by the limitations of space (though perhaps more constrained by limitations in available journalistic labour). Moreover, increasing numbers of people are accessing news through applications that aggregate stories from multiple websites, and can either receive articles in basic chronological order, or tailor news delivery to their own preferences.

It can also be speculated that digital formats may have an effect on the actual content and the kinds of climate change discourses that emerge. It has long been recognised that the news media is oriented towards controversy. What is not yet clear, but often anecdotally speculated, is whether the effects of a digital business model, with pageview-based advertising revenues and a prioritisation on reader engagement, has increased controversial pieces. The old adage is that “controversy sells” – now media companies are furnished with hyper-detailed metrics of precisely how much it sells.

Beyond legacy news media, there has also been the advent of new media forms like Facebook and Twitter, as well as a proliferation of online opinion magazines and blogs. It is not clear to what

extent these new platforms have displaced, reinforced, or supplemented traditional media in recent years. Understanding the role of these new media in climate change debates has several important implications. There are many signs that controversy over climate change is being constituted in different ways and by different actors than it had been when the issue first came to public prominence. Relatedly, it is not clear what effects these new media forms have had on the terms of climate debate, in terms of end-user exposure to climate change discourses, the unique discourses they generate, and the coalitions of actors they bring together and represent. These all present fruitful questions for further research.

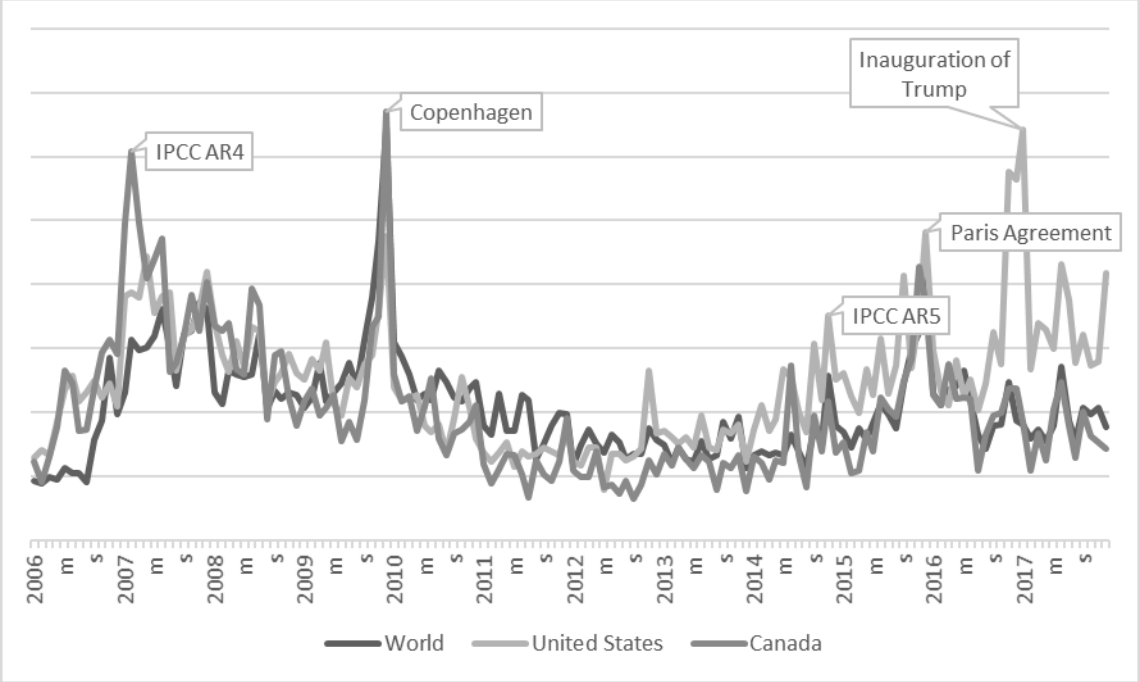

Figure E.1: Relative monthly frequency of global, American, and Canadian climate change coverage, 2006-2017[230]

Second, there are the media trends themselves (Fig. E.1). In 2014, the IPCC published its Fifth Assessment Report. Despite offering more precision and higher confidence in its findings, it received substantially less media attention than AR4. Similarly, the Paris Climate Conference in December 2015, in which the Paris Agreement was reached, failed to generate the same attention as Copenhagen. Research has already started to attend to the reasons for these differences (Collins and Nerlich 2016; Ford and King 2015), but more work is needed. However, while the peaks reached in 2007 and 2009 have not been replicated, since the lowest point of coverage in 2012, there has been an upward trend.

[230] The figures for world coverage have been scaled down to more closely show the relative trend patterns.

Similarly, there has been an upward trend in public concern for climate change over the same period in both Canada and the United States (though this concern is divided along political lines, with scepticism still prevalent amongst conservatives) (Brenan and Saad 2018; Environics Institute 2015; Saad 2017). The exact relationship between these trends is not yet clear, but one might speculate that it shows a response to three consecutive years of global mean temperature records in 2014, 2015, and 2016.

A remarkable spike in American coverage comes in November 2016 to January 2017. It is not coincidental that this aligns with the period from the election of Donald Trump to his inauguration. In terms of total articles, this marks the all-time greatest amount of American climate change coverage, exceeding both the peaks in 2007 and 2009.[231] Another considerable spike occurs in June 2017 when Donald Trump announced that the United States would withdraw from the Paris Agreement. While these events led to increases in both global and Canadian coverage, there is a very large relative difference in output in the different national and international contexts. This is noteworthy because climate change coverage trends have shown remarkable agreement up until these points, regardless of geographical setting. The causes of this disparity are as yet unclear, though clearly the election of Donald Trump has been a formative critical discourse moment for climate change. Comparatively, the election of Prime Minister Justin Trudeau in 2015, whose Liberal government plans to implement a carbon tax, did not generate a unique Canadian spike in coverage. Anecdotally, much of this coverage has been a response to Trump's alignment with climate change scepticism (or denialism), and his administration's efforts to dismantle regulation and policy.[232] Moreover, the majority of the US upswing in coverage can be attributed to the *New York Times* and the *Washington Post*, two newspapers that have taken predominantly concerned stances.

Despite forceful backlash, the federally directed process of dismantling environmental regulations in the United States is well underway, and this seems likely to continue into the near future (until 2020, at least).[233] As the United States is a (perhaps *the*) major player in global climate politics, this will undoubtedly have significant impacts on international climate change policy.

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[231] However, these figures show total climate change articles, rather than frequency of climate change coverage as a percentage of total articles of any kind. These high figures could be the result of higher article output in general, perhaps owing to digital formats.

[232] Coral Davenport, "E.P.A. Chief Doubts Consensus View of Climate Change," *The New York Times*, December 22, 2017, sec. Climate, https://www.nytimes.com/2017/03/09/us/politics/epa-scott-pruitt-global-warming.html; Coral Davenport, "Donald Trump Could Put Climate Change on Course for 'Danger Zone,'" *The New York Times*, January 20, 2018, sec. U.S., https://www.nytimes.com/2016/11/11/us/politics/donald-trump-climate-change.html.

[233] Coral Davenport and Eric Lipton, "Scott Pruitt Is Carrying Out His E.P.A. Agenda in Secret, Critics Say," *The New York Times*, January 20, 2018, sec. U.S., https://www.nytimes.com/2017/08/11/us/politics/scott-pruitt-epa.html.

Meanwhile, atmospheric CO2 concentrations continue to rise, hitting the somewhat arbitrary but highly symbolic level of 400ppm in the fall of 2015, and have been increasing ever since. Climate scientists set this as a target at which CO2 should be stabilized in order to prevent global mean temperature increases that would have serious impacts. It is startling that the years 2014-2017 have been the four warmest on record (NOAA 2018).

However, the recent renewed media interest in climate change may be a cause for muted optimism. A much closer examination of the discourses in these and other American newspapers is needed, but on the face of things, it appears as though Trump's obstinacy and obstructionism on climate change has spurred substantial resistance. Those concerned with effective climate change communication have long been aware of a "backfire effect" by which messaging with too alarming of a tone would end up increasing scepticism, rather than provoking action (Nisbet 2009; McDonald 2009; Zhou 2016). Is it possible that extreme contrarianism has backfired? These questions and the need for research into the relationships between climate change and the media are as pressing as ever.

Appendices

Appendix A: Sample Sizes for the *Globe and Mail, Toronto Star,* and *National Post*

Table A.1 Sample Size for Each Newspaper

	Globe and Mail	*Toronto Star*	*National Post*
2006	*107*	*113*	*106*
2007	*99*	*103*	*107*
2008	*100*	*103*	*94*
2009	*102*	*106*	*102*
2010	*102*	*109*	*96*
2011	*104*	*109*	*102*
2012	*110*	*108*	*95*
2013	*102*	*94*	*95*
Total	*826*	*845*	*797*

(Drawn from total number of articles listed in Table A.2; see Chapter 3, n.4 for sampling method)

Appendix B: Total Number and Percentage of Climate Change Articles in the *Globe and Mail*, *Toronto Star,* and *National Post*

Table A.2 Total Number of Climate Change Articles

	Globe and Mail	*Toronto Star*	*National Post*
2006	975	787	746
2007	1974	1635	1284
2008	1471	1111	884
2009	1402	807	946
2010	1175	577	605
2011	753	439	424
2012	613	434	295
2013	902	541	608

Table A.3 Total Number of Articles of Any Kind[234]

	Globe and Mail	*Toronto Star*	*National Post*
2006	86195	57716	70454
2007	83781	59967	59638
2008	79116	56225	59541
2009	69511	49463	53726
2010	92429	47815	54589
2011	74616	43888	51167

[234] As the Factiva data base requires a search to show numbers of entries, the total number of articles was estimated using neutral search terms “and” and/or “the” and/or “a.”

2012	64763	44966	49819
2013	58788	49399	53095

Table A.4 Percentage of Climate Change Articles

	Globe and Mail	*Toronto Star*	*National Post*
2006	1.13	1.36	1.05
2007	2.35	2.72	2.15
2008	1.86	1.97	1.48
2009	2.01	1.63	1.76
2010	1.27	1.21	1.11
2011	1.01	1	0.83
2012	0.95	0.97	0.6
2013	1.53	1.1	1.14

Appendix C: Coverage of the University of East Anglia's Climate Research Unit E-mail Theft

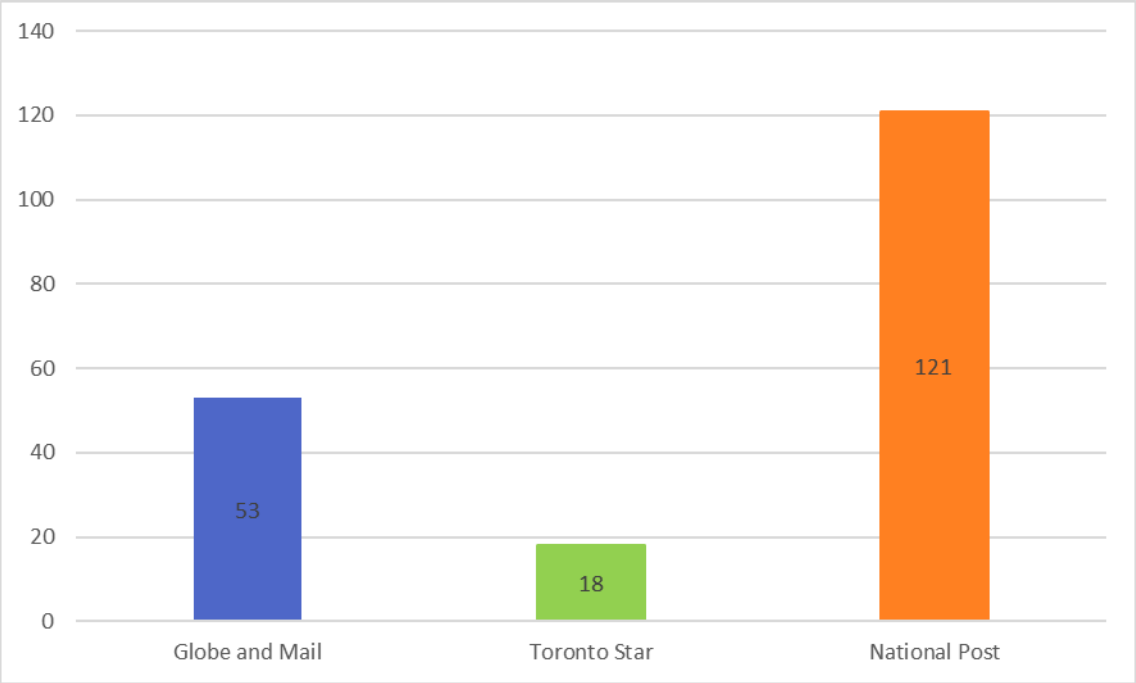

Figure A.1: Number of stories about CRU e-mail theft, 2009-2011
(Search terms:" Climategate" OR "University of East Anglia" OR "Climate Research Unit)

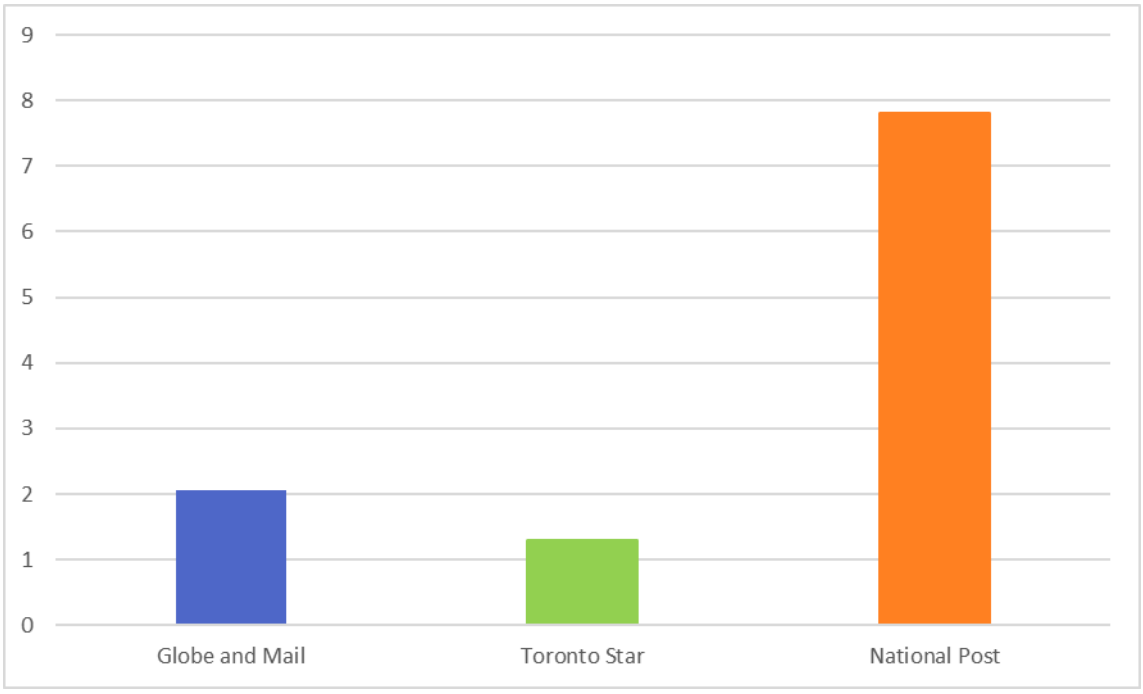

Figure A.2: Frequency of stories about CRU e-mail theft, 2009-2010 (as percentage of total articles about climate change, see Table A.1 for N)

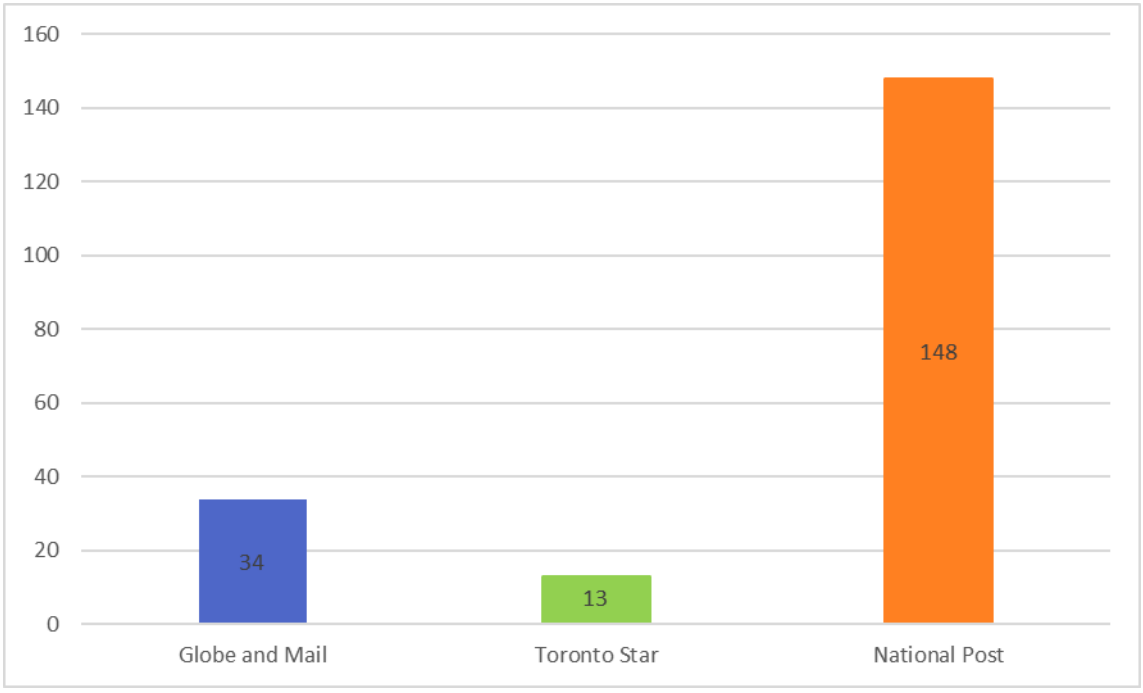

Figure A.3: Number of stories using the term "climategate," 2009-2015

Appendix D: Example of a Minor Article

Hamilton, Tyler. “The Buzz over Solar; Who Said It’s Not Easy Being Green?” *The Toronto Star*, November 13, 2006, sec. Business.

The Ontario Power Authority says there's great potential for solar power in the province, but sometimes you have to wonder whether it truly believes what it says. One of the authority's more recent discussion papers assumes that solar, for planning purposes, "has a near-term potential of 50 MW rising to 100 MW towards the end of the planning period."

A potential of 50 megawatts within the next few years and 100 megawatts by 2025 may seem like a lot, considering the poor track record of solar in Canada. But such a forecast appears out of sync with global trends and the latest local developments. The fact is solar isn't just about putting a few panels on the rooftops of homes anymore. Increasingly, investors and utilities are looking at large-scale solar power plants that over time - some say within the next 10 to 15 years - are expected to be cost-competitive with conventional fossil-fuel systems during expensive peak hours.

Take the announcement last week from Baltimore-based SunEdison LLC and SkyPower Corp. of Toronto. The companies have created a joint venture that plans over the next few years to "develop, build, own and operate up to 50 MW of solar photovoltaic farms across Ontario."

In other words, the power authority's near-term potential target has been achieved with just a single announcement. And industry experts say this is just the first of many announcements to come.

Kerry Adler, chief executive and president of SkyPower, says the decision to build solar farms in Ontario was a direct response to the province's new standard offer program, which goes into effect next week and offers to pay 42 cents for every kilowatt-hour of electricity that's generated from small solar projects - that is, any project under 10 megawatts. The 42 cents is not a "knock your socks off" price, says Adler, but it's enough so far to attract the attention of investors. SunEdison and SkyPower are planning three to five projects over the next three years, each just under the 10-megawatt cap.

If they hit the 50-megawatt target, that would represent an investment of about $450 million in the province, creating hundreds of Ontario jobs and huge momentum for Canada's burgeoning solar industry.

It can't be emphasized enough: This is a huge deal. The joint venture's first project, which will be announced within the next few weeks, will involve the installation of 50,000 solar PV panels over several hundred acres of farm land that's no longer economically viable. The studies have been done, approvals have been granted, and the mayor of the host community is apparently hyped.

"Nobody ever undertook a facility of this magnitude on the continent," says Adler, adding that future projects could be located on reclaimed industrial "brownfield" land. "What we're trying to do is set an example that I hope others will follow."

Again, for some perspective, the largest solar PV system in Canada today is a 100-kilowatt system atop the Horse Palace at Exhibition Place. The first project Adler is talking about would be 100 times larger, and would nearly equal all of the solar capacity that has been installed in Canada over the last 20 years.

Other large solar farms exist or are being planned around the planet. Two weeks ago an Australian-based company called Solar Systems said it had received $110 million in government funding to build a massive 154-megawatt solar power station in northwest Victoria. ***Australia's prime minister, John Howard, has been talking up the project to deflect criticism that he's not doing enough about climate change.***

There's even been talk - tough to say how serious - of a 300-megawatt facility in New Mexico that would be laid across 1,300 hectares of land. It would produce about as much power as an average-sized natural gas plant.

But the real action is happening in Europe. A 20-megawatt project is already underway in Spain and an 11-megawatt farm is being deployed in Portugal.

Germany, meanwhile, is years ahead of the game with the biggest solar farms already in operation. The Solar Park Gut Erlsasee near Arnstein is the largest in the world at 12 megawatts. The system is designed so that each panel tracks the movement of the sun, maximizing electricity production. SkyPower and SunEdison plan a similar approach in Ontario.

Germany's Bavaria SolarPark is rated at 10 megawatts, but it's actually composed of three separate farms. Several other multi-megawatt facilities are scattered across the country. "If you look at Canada as a country, it has more solar radiation on average than Germany does, particularly where people live. So you can see the potential there," says Jigar Shah, founder and CEO of SunEdison.

"If Germany, with its population and land mass, can achieve 700 to 800 megawatts a year worth of solar, Canada can easily achieve the same."

Shah says the solar market in North America should be able to achieve growth rates of 50 per cent a year, thanks to progressive legislation in California and Ontario's standard-offer program, which are both prompting other jurisdictions to follow. And he says the opportunities are just beginning. "I think the decade of 2010 to 2020 will be the decade of solar power."

Rob McMonagle, executive director of the Canadian Solar Industries Association, says the buzz around solar is getting louder in Canada and political support is growing. More than 270 people attended the industry's annual conference in Ottawa last week, double the attendance from a year ago.

Gary Lunn, minister of Natural Resources Canada, gave a keynote presentation, making him the first federal minister to speak at the event in two decades. An industry that two years ago was struggling to get attention is now at the centre of it. "My message is, we are the next Germany of solar, and that's simply because we've got so much catching up to do," says McMonagle.

And the SunEdison and SkyPower announcement may be just the tip of the iceberg. "I know there are other announcements coming up in the next couple of weeks," he adds. "We're getting some big interest from American companies that say we can do this."

That could be both a curse and a blessing. McMonagle wants to see these big projects emerge, but blowing past the power authority's low forecast at such an early stage could ultimately undermine the program. "It's a little bit of a concern," he says. "With their low target (being exceeded), there's a justification for cutting back the incentive." Or killing it entirely.

Such a knee-jerk reaction would be a grave mistake, particularly if Ontario is serious about building a solar industry that creates jobs and can contribute hundreds of megawatts of emission-free electricity to a province trying to clean up its image. The time will come to claw back the premium on solar. But we've got a few years yet to go.

Appendix E:

Table A.5: Excerpts from Example Sceptical, Somewhat Sceptical, and Concerned Commentary

Sceptical
I also know there is no science of the future: We may decorate reports with graphs and charts, and conjure pages of the most exquisite and arcane equations, but the very best we can offer on climate a hundred years from now is a series of sophisticated and ever-ramifying probabilities that are themselves subject to a myriad of unforeseeable contingencies. Who will undertake the difficult task of sifting the real science from the alarmist advocacy, who will draw the boundaries between climate activism and cold analysis, who will present a statement of the case, as close as reason and science today can make it, to what we actually know and can reasonably project on the basis of what we know? Rex Murphy, "Climate Police Should Chill," *The Globe and Mail*, December 9, 2006, sec. Comment Column. Given his science gaffes, and his political liabilities, the Nobel may be more of a liability, not just to Gore but to the entire global warming community. The prize has elevated junk science, gross exaggeration and outright misrepresentation to high international stature, the most prestigious award in the world, discrediting all who work honestly to find the facts and do the right thing. Terence Corcoran, "A Coup for Junk Science; Gore's 'Truth' Nets Nobel Prize," *National Post*, October 13, 2007, sec. News. The proof that the current climate summit in Copenhagen is not about environment and science, but rather about politics and ideology, can be seen in that fact that two weeks ago, some young computer programmer's conscience got the better of him and he released computer code and emails exposing the skeleton of climate change. Yet almost no one in Copenhagen is talking about it. […] Nevertheless, delegates in the Danish capital have practically glossed over the CRU "Climategate" leaks. That's partly because they refuse to let the facts get in the way of their cause, but it's mostly because Copenhagen isn't about climate change as a physical phenomenon, but rather climate change as an opportunity to regulate people's lives and incomes on a global scale. Lorne Gunter, "The Skeleton of Climate Change," *National Post*, December 9, 2009, National edition, sec. Editorial. Until a whistle-blower released a series of emails from the University of East Anglia Climate Research Unit, the prevailing public mood was that the climate science was "settled"; that there was a "consensus" in the scientific community; and that the Intergovernmental Panel on Climate Change report was rock solid, based on rigorous peer-reviewed literature. […] But we have now been allowed to peer behind the curtain of the climate science priesthood to witness a steady stream of humiliating revelations. Taken together, these new disclosures have seriously undermined the credibility of the IPCC. The much vaunted "peer-reviewed" science apparently consists, in turns, of idle speculation, the

unpublished dissertation of a student and simple factual errors. […With so many astonishing claims resting on science of such dubious quality, the only rational response is healthy skepticism. And this is now more or less the case across a broad and increasing spectrum of the public. The leaked emails have made it apparent that the science is not "settled" and that the much celebrated "consensus" in the scientific community was mere wishful thinking; that calls to "hide the decline" do not constitute scientific business as usual; and that attempts to hide the data sets from unfriendly eyes are exactly what they appear to be: instances of intellectual dishonesty.

Patrick Keeney, "Trust Us, We're Experts," *National Post*, March 5, 2010, National edition, sec. Editorials.

The Bolivian legislation, we are informed by Britain's Guardian newspaper, "has been heavily influenced by a resurgent indigenous Andean spiritual world view which places the environment and the Earth deity known as the Pachamama at the centre of all life. Humans are considered equal to all other entities." Remember this the next time someone says that the science of global warming is "settled," for many environmentalists are inspired not by science, but by spirituality -Andean and otherwise.

Rex Murphy, "Rendering Our Sanity unto the Earth Goddess," *National Post*, April 16, 2011, National edition, sec. Issues & Ideas.

In these emails individuals such as the University of Pennsylvania's Michael Mann also talk about "the cause" they feel they are advancing. Moreover, these exchanges make it abundantly clear that the experts who've been conducting climate research (and writing reports about that research for the United Nations' Intergovernmental Panel on Climate Change) have privately expressed doubts about the robustness of many of their findings.

Donna Laframboise, "Climate Crackdown; U.S. Justice Request Puts Chill on Skeptical Bloggers," *National Post*, December 21, 2011, National edition, sec. FP Comment.

The Times dodges the climate science issue with a throw-away declaration that "mainstream scientists are virtually unanimous" on the need to "decarbonize" the world economy. From what's been appearing on the science front of late, the mainstream scientists are mostly on the defensive trying to explain numerous problems with climate models that cannot explain why the alleged average global temperature has been flat over the past 15 years.

Terence Corcoran, "NYT Calls for War on Canadian Oil," *National Post*, March 12, 2013, National edition, sec. FP Comment.

Somewhat Sceptical

Already, a proposal has been tabled to allow "voluntary" quotas for countries such as India and China, the exempt majority. The purpose would be to facilitate claims of Kyoto success by the covered few, who will, again, not need to actually reduce emissions, but can then, instead, buy the right of future growth from these dirtier states, in the form of emission credits. The progression is to merely redefine and merge Kyoto and foreign aid. This will prove Montreal's legacy as the beginning of the end for Kyoto, when its parties realized they could not and would not try to match rhetoric with action.

Christopher C. Horner, "Gutting Kyoto: Thanks to the Montreal Talks, Penalties Have Become Discretionary and Emissions Reductions Have Become Merely Foreign Aid," *National Post*, January 26, 2006, National edition, sec. Financial Post: Comment.

All the parties are under pressure, however, to unveil a climate-change policy. This is because the polls show the public wants one and also because a coalition of environmental groups — "the 13 villains of doom," according to a senior Conservative — are hammering the parties to act.
Murray Campbell, "Why Campaigning in Ontario Is Still in the Phony War Stage," *The Globe and Mail*, April 12, 2007, sec. National News.

My purpose here is not to weigh in on Mr. Coxe's theory of climate change (which mostly has to do with sunspots) or those of the scientists who disagree with him. But he is worth listening to in this respect: The big money is always, always made by those willing to bet against a deeply held consensus. So if, five or 10 years from now, new evidence has thrown theories of global warming into doubt, enormous profits will be made by those putting their cash on that outcome now.

Derek DeCloet, "A Climate Skeptic's Guide to Fun and Profit," *The Globe and Mail*, December 5, 2009, sec. Report on Business Column.

Climate change is an important issue for Canadians. As such, it deserves a constructive dialogue, one based on scientific facts. One such fact is that the world needs energy. Al Gore's reference to the dramatic energy shift is out of step with recent reports from international energy bodies that show global demand for energy of all kinds is increasing, not decreasing. Another fact, according to the most recent external analysis on crude oil life-cycle emissions, is that Gore's math doesn't add up. Looking at the life-cycle GHG emissions from gasoline - from when the oil comes out of the ground and is used in cars - crude derived from oil sands is in the same range as other crude oils imported into North America (and lower than some U.S. domestic sources).

Janet Annesley, "Base Dialogue on Scientific Facts," *The Toronto Star*, November 27, 2009, ONT edition, sec. Editorial.

The comic figure is Rajendra Pachauri, the 69-year-old chairman of the United Nations Intergovernmental Panel on Climate Change. His fight to save his career over a faulty IPCC report about melting glaciers did not prevent him from publishing a novel – his first – that drips with sex and romance. With climate change science already under fire, neither of these developments will help shore up credibility.

Eric Reguly, "A Climate of Fear and Farce as Scientists Face Attack on Credibility," *The Globe and Mail*, February 8, 2010, sec. International News.

It is highly ironic that the Cancun conference agreed to create a "Green Fund" for "climate aid" at the same time that countries in a position to contribute to this fund could see their economies bear the greatest brunt of emissions restrictions. (Not to mention that this fund has boondoggle written all over it, with no guidelines or oversight on how the money would be spent.) The bottom line: countries cope with changing climates far better with deep pockets than with empty ones. And as long as voters have trouble filling their own pockets, climate change is going to take a back seat on the electoral agenda. The Canadian government should stay the course, and not be deterred by the naysayers.

Tasha Kheiriddin, “Stay the Course,” *National Post*, December 14, 2010, National edition, sec. Editorial.

A few years ago, Mr. McKibben decided he had to organize. So he founded a group called 350.org, whose name is based on the claim by climate scientist James Hansen that any atmospheric concentration of carbon dioxide that exceeds 350 parts per million is unsafe. (It's currently about 385 ppm.) They've called the proposed pipeline a “1,500-mile fuse to the continent's biggest carbon bomb.” If it gets built, they warn, “it's game over for the planet.” Or maybe not. In the larger scheme of things, Keystone isn't that big a deal. Energy expert Vaclav Smil says the entire Keystone system would move just over 6 per cent of current U.S. crude oil consumption.

Margaret Wente, “Harvard vs. the Heartland; In States Relying on Manufacturing and Resource Extraction, Folks Care Far More about Jobs than about Global Warming,” *The Globe and Mail*, January 21, 2012, sec. Comment Column.

The Pembina Institute said it was disappointed the panel chose to exclude the environmental impact of oil sands development. However, the report, by an independent panel that approached its task with an open mind, calls into question the alarmism of pipeline opponents. Rather than escalating threats, they should recognize their strategy is failing.

Claudia Cattaneo, “Pipeline Clears Hurdle; Backing for Northern Gateway Gives Clarity,” *National Post*, December 20, 2013, National Edition, sec. News.

Concerned

Now, however, much of the momentum has been lost. The Conservatives continue to question the science of climate change while opposing any significant action to reduce emissions and falsely pitting one environmental objective (clean air) against another (stopping global warming). Vague comments about a "made-in-Canada" approach combined with positive noises about joining the United States and Australia in an alliance that has no targets at all is hardly a solution.

Desiree M. McGraw, “Confronting Climate Change,” *National Post*, August 1, 2006, National edition, sec. Editorials.

A few weeks ago, before the direst report yet on climate change, a climate scientist told me he thought the process had gone too far, there was nothing to be done about global warming. So what happens? I asked. He said emphasis would shift to adaptation. We are now seeing it. On Tuesday, Margaret Wente wrote here, “like it or not, we will have to adapt.” This is far too impressive a word for doing nothing, which it amounts to. As the sea level rises and coastal cities start to go under, you move inland, i.e., adapt. What's the alternative: sitting there as the tide comes in and covers you? Is this a policy? Then so is moving your hand off a hot stove. It's nothing, it's a reaction, it's refusing to act and calling it a policy! I can't begin to count the ways I loathe this term in this context. It lets people who allowed things to get this far off the hook. Just a year ago, when the Conservatives came to power, they cancelled climate-change programs, sacked staff and rejected Kyoto goals. Now they turn around and say the science is “undeniable,” but the damage is largely done. In the charming way of people with power, in politics or media, they never admit they were wrong, even when they “accept responsibility.”

Rick Salutin, “Adaptation Equals Doing Nothing,” *The Globe and Mail*, February 9, 2007, sec. Comment Column.

The newer report focusing on risks to human health will address temperature-related illnesses, vector and rodent-borne diseases, effects of water and food contamination, air pollution health effects, extreme weather events and social and economic changes. That this report, too, will be released stealthily raises serious questions about the government's willingness to inform the public about climate change and to take timely measures to limit the harms it can cause. Rather than attempting to keep it under the radar, the government should give it the fanfare due to a major study intended to help shape public health planning and policy development.

“Give Them Their Due,” *The Globe and Mail*, July 24, 2008, sec. Editorial.

Today 56 newspapers in 45 countries take the unprecedented step of speaking with one voice through a common editorial. We do so because humanity faces a profound emergency. Unless we combine to take decisive action, climate change will ravage our planet, and with it our prosperity and security. The dangers have been becoming apparent for a generation. Now the facts have started to speak: 11 of the past 14 years have been the warmest on record, the Arctic ice-cap is melting and last year's inflamed oil and food prices provide a foretaste of future havoc. In scientific journals the question is no longer whether humans are to blame, but how little time we have left to limit the damage. Yet so far the world's response has been feeble and half-hearted.

“Star Joins Global Climate Crusade; One World, One Voice As the Copenhagen Summit Kicks off Today, 56 Newspapers in 45 Countries Have United to Demand Action. The World Must Kick Its Carbon Habit and We’ll Have to Change Our Lifestyle. The Transformation Will Require a Historic Feat of Engineering and Innovation. Our Survival Depends on It,” *The Toronto Star*, December 7, 2009, MET edition, sec. News.

Just because the Harper government refuses to show leadership on climate change doesn't mean Canadians can't contribute to initiatives to cut greenhouse gasses. Around the world there are already hundreds (if not thousands) of non-governmental projects under way to help cut carbon emissions. Everyone, from scientists to schoolchildren, is participating. As government foot-dragging continues, amplifying grassroots energies offer the best short-term hope for meaningful action.

Don Tapscott and Anthony D. Williams, “Information the Answer to Carbon Education,” *The Globe and Mail*, December 30, 2010, sec. Report on Business: Canadian.

It's hard to be sure how many polar bears remain. Scientists believe the Baffin Bay polar bear population is decreasing, but because the bears live in genetically distinct groups and migrate over vast distances through northern Canada and Greenland, it is difficult to know what the count is. One estimate suggests 20,000 to 25,000. Still, even with questions about Monnett's scientific conduct, climate change continues and the polar bear remains under environmental pressure. The ice caps the bears depend on are shrinking, despite climate-change naysayers. Monnett's miscalculations should have no impact on our concern about the creatures of the north. They're part of what makes Canada special.

“Saving the Polar Bears,” *The Toronto Star*, August 8, 2011, ONT edition, sec. Editorial.

Every August, Prime Minister Stephen Harper visits the Canadian Arctic, an excellent idea for which he deserves congratulations. And yet every year, something quite odd occurs. Mr. Harper goes and sees how the geography of the Arctic is changing rapidly, makes policy announcements about defence procurement and economic opportunities flowing from these geographic changes, but almost never speaks about what's causing the changes: climate alterations. It's odd because few places on Earth are experiencing more clear evidence of climate change than Canada – the loss of Arctic ice, permafrost changes, mountain pine beetle infestations, extreme weather, a warmer climate – and yet the government seldom, if ever, speaks about the issue.
Jeffrey Simpson, "Canada, of All Places, Should Get It," *The Globe and Mail*, July 27, 2012, sec. Comment Column.

Sometimes a scientific study so exhaustive, so authoritative and so alarming arrives in the public discourse that it simply cannot be ignored. And sometimes the timing and content of such a study merely confirms what should be evident to any thinking person anywhere on this planet. Such is the case with The National Climate Assessment, a draft of which was released in Washington Friday and is open for public comment beginning Monday, 1,000 dispiriting pages distilling the work of more than 300 scientists and experts. It is the largest study of the real-time effects of climate change ever released in the U.S., but it should be required reading worldwide, particularly in Ottawa where the Stephen Harper government has made this country infamous for its formal repudiation of the Kyoto accord.

Tim Harper, "Ottawa's Indifference to the Environment Can't Be Ignored," *The Toronto Star*, January 14, 2013, ONT edition, sec. News.

Appendix F:

Table A.6: Sceptical Commentary in the National Post (137 total, N = 797; see also Figure 4.6)

Title	*Author*	*Date*
A Dream of Smores	Editorials	January 18, 2006
The Mad Algorithms of Scary Al Gore	Peter Foster	April 28, 2006
Tory Approach to Kyoto Still Beats Grits'	Peter Foster	May 24, 2006
Climate Consensus and the End of Science	Terence Corcoran	June 16, 2006
Last Days of The Hockey Stick	Terence Corcoran	June 23, 2006
Ottawa Gripes but NCC Delivers Goods	John Ivison	July 7, 2006
Green Leaders: Three Chief Executives Who Embraced Environmental Causes Neglected Their Firms' Core Business Needs. Now Shareholders Are Feeling Green	Steven Milloy	September 13, 2006
PM Postpones Rally 'That Wouldn't Be Right': An Insider's Week in Ottawa	Julie Smyth	September 16, 2006
New UN Child Abuse Case	Editorial	November 14, 2006
U.S. Senate Gag Order for Exxon	Editorial	December 5, 2006
UN Hurricane Deniers: News Release	Editorial	December 14, 2006

Give Third World Gift Of Capitalism	Peter Foster	December 22, 2006
Freedoom To Pursue	Peter Foster	January 3, 2007
Perfect Oil Storm: Alberta's New Premier Is Reviewing Oil Royalties While Stephane Dion Wants to Scale Back Resource Write Offs	Jack Mintz	January 10, 2007
Inside Dionomics	Peter Foster	January 17, 2007
The Limits of Predictability	Lawrence Solomon	January 19, 2007
A Day with Stern and Suzuki	Peter Foster	February 21, 2007
Little Miss Apocalypse: David Suzuki's Willing Use of Children to Promote His 'Ecophobic' Terror of the End of the World Is Reprehensible	Peter Foster	February 28, 2007
From Fringe to Force	Linda Frum	March 3, 2007
A Few Watts Short of an Idea; Ontario Move to Outlaw Light Bulb Short-Sighted	Terence Corcoran	April 19, 2007
Call Their Tax Why Not Tie Carbon Taxes to Actual Levels of Warming? Both Skeptics and Alarmists Should Expect Their Wishes to Be Answered	Ross McKitrick	June 12, 2007
From Chaos Coherence	Lawrence Solomon	August 15, 2007
The Aerosol Man Lawrence Solomon	Editorial	September 1, 2007
A National Energy Pipe Dream	Editorial	September 22, 2007
A Coup for Junk Science Gore's 'Truth' Nets Nobel Prize	Terence Corcoran	October 13, 2007
Crunch the Numbers: Kyoto Doesn't Add up	Bjorn Lomborg	November 1, 2007
Climate Change by Jupiter	Lawrence Solomon	November 10, 2007
Contaminated Data Hot Cities Not CO2 Cause Urban Thermometers to Rise	Ross McKitrick	December 5, 2007
Lightcrime	Peter Foster	April 2, 2008
Climate Blowback The CO2 Crusade Only Generates Hostility against the West Benny Peiser	Editorial	April 8, 2008
Hide Your Name on Wicked Pedia	Lawence Solomon	April 19, 2008
Risky Climate Plan Canada Has the World's Toughest Greenhouse Rules	Diane Katz	April 22, 2008
Environmentalists Confound Again Symbolism Not Science behind 'Threatened' Status	Don Martin	May 16, 2008
Climate Change Collapse	Stephen Moore	June 7, 2008
Cuba's Bootprint	Peter Foster	June 21, 2008

Cap-and-Trade Is Not a Market Mechanism	Diane Katz	June 27, 2008
The Folly and Lesson of B. C.'s Carbon Tax	Maureen Bader	October 11, 2008
The Worst of All Worlds	Bjorn Lomborg	October 17, 2008
Green Shift: A Loser Worldwide	John Williamson	October 23, 2008
Ig-Nobels for Obama Is Barack Obama Really a Science 'Visionary	Steven Milloy	October 31, 2008
Athabasca's Woes	Peter Foster	November 1, 2008
Now for the Real Shock Doctrine; Obama and the Rise of Disaster Socialism	Terence Corcoran	November 25, 2008
Climate Rains on Aussie Drought	Peter Foster	January 9, 2009
Detroit's Hybrid Nightmare	Peter Foster	January 14, 2009
The Bad-Idea Quartet	Editorial	January 22, 2009
Copenhagen: Already Dead?	Terence Corcoran	May 12, 2009
Fuelish Policy	Peter Foster	May 20, 2009
Petro-Canada's Grand Delusion	Peter Foster	May 30, 2009
MIT's Unscientific Catastrophic Climate Forecast	Kesten C. Green and J. Scott Armstrong	June 17, 2009
Oil and the Minds of Men	Peter Foster	September 5, 2009
UN Climate Fantasies	Editorial	September 10, 2009
Be Wary of 'One-Party Autocracy	Michael Barone	September 15, 2009
Growth First Climate Later Nations Make Clear the Priority	Terence Corcoran	September 23, 2009
Bailing out the Bailouts	Terence Corcoran	October 2, 2009
The Weather Exploiters	Peter Foster	October 16, 2009
The Manley 'Conspiracy	Peter Foster	October 21, 2009
A Record of Conservative Achievement	Adam Daifallah	November 19, 2009
Let the Climate Debate Begin	Peter Foster	November 25, 2009
The Climate Believer vs. a Global Warming Skeptic Not Mankind's Defining Crisis	bjorn lomborg	December 3, 2009
The Skeleton of Climate Change	Lorne Gunter	December 9, 2009

Apocalypse When? Our Enemies Are Contemplating Attacks Worse than 9/11	cliffordd may	December 17, 2009
A Year a Long Time in Money and Politics	William Hanley	December 19, 2009
Green Is the New Red	Lorne Gunter	December 30, 2009
The Crumbling Davos Agenda	Peter Foster	January 27, 2010
Keeping Canadian Students in the Dark on Climate	Lawrence Solomon	January 30, 2010
Fish in a Budget	Terence Corcoran	February 5, 2010
Trust Us We're Experts	Patrick Keeney	March 5, 2010
Earth Day's Kick in the Ash	Peter Foster	April 21, 2010
Naked Aussie Tax Grab	Peter Foster	May 5, 2010
Why We Don't Vote	Lorne Gunter	May 14, 2010
The Master of Green Socialism	Peter Foster	May 28, 2010
The Gulf 'S Well of Political Woe	Peter Foster	June 4, 2010
Missing Smog Dead Claims of Thousands of Victims Fail Basic Statistical Tests	Peter Shawn Taylor	June 16, 2010
Catastrophism Collapses	Lawrence Solomon	July 3, 2010
It's Official There's No Consensus on Climate	Lawrence Solomon	July 10, 2010
AMERICA'S DARK DAYS The U.S. Needs a Change of Course-- & Someone to Lead It	conrad black	August 28, 2010
Ecuador's Eco Blackmail	Peter Foster	September 29, 2010
U.K. Spending Cuts Foretell Our Future	Terence Corcoran	October 21, 2010
The Last Global Warming Conference Ever?	Rex Murphy	December 4, 2010
Whatever Happened to Muscular Capitalism?	Peter Foster	January 26, 2011
Playing the Environmental Shame Game	Editorial	February 3, 2011
Ontario Burns up More Green Cash	Terence Corcoran	February 25, 2011
The New Impossible Energy No-Fly Zone	Editorial	March 17, 2011
The Gulf War	Peter Foster	March 30, 2011
Rendering Our Sanity unto the Earth Goddess	Rex Murphy	April 16, 2011
Lost in the Corporate Borealis	Peter Foster	April 23, 2011
Global Cooling in the Wind	Lawrence Solomon	May 4, 2011
Greens 'Lost' as Growth Prevails	Terence Corcoran	May 6, 2011
Science Good Markets Bad	Peter Foster	May 7, 2011
U.K.'s Phony War on Carbon Emissions	Terence Corcoran	May 21, 2011

Norman Myers' Sinking Ark	Peter Foster	June 15, 2011
Greenpeace Karaoke IPCC Report Is Based on Greenpeace Renewables Plan Coming Saturday	Steve McIntyre	June 17, 2011
Liberate U.S. Oil 'Drill Baby Drill' Policy Would Eliminate Dependence on OPEC	Lawrence Solomon	July 2, 2011
Global Warming Runs out of Gas	Rex Murphy	August 20, 2011
Unsettling Science New Research Suggests Mankind's Effects on Climate Have Been Vastly Overblown	Lorne Gunter	September 2, 2011
Lost in Paradigm Space with Keynes	Peter Foster	September 8, 2011
Nota Bene	Editorial	September 29, 2011
Harper's next Stand The PM Spoke out for the Seal Hunt Now He Must Support the Alberta Oil Sands	Lawrence Solomon	October 8, 2011
A Thoroughly Political Body	Peter Foster	October 22, 2011
Just Say No to Kyoto	Tasha Kheiriddin	November 29, 2011
Kyoto Is Useless If the Sun Is to Blame Skeptical Science May Back up Tory Climate Inaction	Michael Dentandt	November 30, 2011
Nota Bene	Editorial	December 3, 2011
Climate Crackdown U.S. Justice Request Puts Chill on Skeptical Bloggers	Donna Laframboise	December 21, 2011
Mixed Messages	Peter Foster	February 8, 2012
Fakegate: The Climate Scandal That Wasn't	Lorne Gunter	February 22, 2012
No Exploding Obamamobiles	Editorial	March 10, 2012
Sustainable Scrap Heap	Peter Foster	April 7, 2012
Aristotle's Climate His Fallacies Exemplified by Warming Hysteria	Christopher Monckton	April 21, 2012
The Lost Debate Readers Resist the Triumph of Cosmic Rays over CO2	Lawrence Solomon	May 5, 2012
Green Power Failure Climate Mania Impoverishes Electricity Clients Worldwide	Lawrence Solomon	May 12, 2012
Honk If You Support the NRTEE	Peter Foster	May 24, 2012
It's about Freedom; Climate Alarmists Suffer Setback but Retain Goal	Václav Klaus	May 29, 2012
Mulcair GM Pembina and the Old Left	Terence Corcoran	June 2, 2012
No Bravo for Rio+20	Peter Foster	June 8, 2012
Climate Models Fail Reality Test	Ross McKitrick	June 14, 2012
Money Corrupts Peer-Review Process	Bob Carter	June 15, 2012
The Rio Future We Avoided	Peter Foster	June 22, 2012

The Lost Tribe of Obama Rants against the Rich Anti-Israeli Ideology Turn off Funds	Lawrence Solomon	July 14, 2012
The Motch Bros versus Obama	Peter Foster	September 12, 2012
Why Gasoline Wins	Lawrence Solomon	September 29, 2012
New Life For Carbon Taxes As An Economic Crisis Kills Climate Talks Climate Statists See An Opening	Terence Corcoran	October 2, 2012
Oil-Sands Dialogues of the Deaf	Peter Foster	October 16, 2012
The Worst Hurricanes? It Depends	Editorial	October 31, 2012
Mandating Cars People Don't Want	Peter Foster	November 30, 2012
Doha Is Dead. On to COP 19!	Peter Foster	December 7, 2012
Vital Oil Infrastructure Made out to Be Villain	Editorial	December 27, 2012
The Hottest Year?	Editorial	January 15, 2013
Extreme Media Alert	Terence Corcoran	January 24, 2013
The President's Contradictory Agenda On Everything from the Environment to the Economy Obama's Policies Do More Harm than Good	George F. Will	January 28, 2013
Celsius Not Rising Public Opinion Won't Change as Long as Temperatures Don't	Lawrence Solomon	February 8, 2013
NYT Calls for War on Canadian Oil	Terence Corcoran	March 12, 2013
Winds of Change: The Economist and Other Journalism Icons Are Beginning to Reassess Their Position on Global Warming	Lawrence Solomon	April 12, 2013
Pipeline Bullies	Peter Foster	June 19, 2013
Orwellian Climates of Fear	Peter Foster	July 5, 2013
Forest Ethics Fights for One-Way Democracy	Peter Foster	August 16, 2013
Climate Policy Is in Trouble	Terence Corcoran	September 17, 2013
Canada Scores Own Goal on Carbon Targets	Peter Foster	November 1, 2013

Appendix G:

Table A.7: Excerpts from Sceptical Columns in the National Post *(each of these excerpts come from the sample denoted in Table A.1)*

Jasper McKee, professor of physics at the University of Manitoba and editor of Physics in Canada, asked recently: "Is scientific fact no longer necessary?" Apparently it's not. "In the absence of hard scientific fact or causal relationships, a majority vote of scientists can determine scientific truth."

Perhaps, says Mr. McKee, the great scientific revolution begun in the Renaissance of the 17th century is over and the need for science is gone. "The prospects," he says, "are alarming." In the end, though, real science can only win. If real science produces truth that the consensus method cannot, any consensus will inevitably fail to hold. Until then, however, we will have to live with the likes of David Suzuki.

Terence Corcoran, "Climate Consensus and the End of Science," *National Post*, June 16, 2006, National edition, sec. Financial Post: Comment.

Educators are not dealing with "objective science" when it comes to climate change. Not only is the science of human contribution not "settled," despite the angry assertions of Mr. Suzuki, but the crucial features of this great debate are quite beyond the understanding of the vast majority of adults, let alone youngsters. It is all about ideological agendas that attempt to juice the science, cook the economics and ignore the politics, as the recent Stern review demonstrates. Most pernicious is the deliberate attempt to induce anxiety in the young.

Peter Foster, "Little Miss Apocalypse: David Suzuki's Willing Use of Children to Promote His 'Ecophobic' Terror of the End of the World Is Reprehensible," February 28, 2007.

The world has arguably never been in a better state in terms of the proportion of people who can look, under relative freedom, to a better future. Except, that is, for the economic destruction threatened by climate-change hysteria. […] The notion that we should "treat every hour as Earth Hour" may appeal to moralizers and masochists, but it is, as noted above, utterly irrelevant when it comes to the ridiculous pretension of regulating climate.

Peter Foster, "Lightcrime," *National Post*, April 2, 2008, National edition, sec. FP Comment.

Other significant elements are also missing from the government's economic analysis. There is also no assessment of how Canada could actually benefit from climate change, e.g., by gaining an extended growing season and a larger inventory of arable land. These are fundamental failings given the tenuous nature of climate change theory, as well as the absence of actual harm from a slight rise in temperature that registers well within the range of natural variability. Indeed, there exists considerable uncertainty about the interplay between greenhouse gas emissions and climate change.

Diane Katz, "Risky Climate Plan; Canada Has the World's Toughest Greenhouse Rules," *National Post*, April 22, 2008, National edition, sec. FP Comment.

The proof that the current climate summit in Copenhagen is not about environment and science, but rather about politics and ideology, can be seen in that fact that two weeks ago, some young computer programmer's conscience got the better of him and he released computer code and emails exposing the skeleton of climate change. Yet almost no one in Copenhagen is talking about it. […] Nevertheless, delegates in the Danish capital have practically glossed over the CRU "Climategate" leaks. That's partly because they refuse to let the facts get in the way of their cause, but it's mostly because Copenhagen isn't about climate change as a physical phenomenon, but rather climate change as an opportunity to regulate people's lives and incomes on a global scale.

Lorne Gunter, "The Skeleton of Climate Change," *National Post*, December 9, 2009, National edition, sec. Editorial.

Mr. Manley claims that only government can meet "energy and climate change challenges." But these challenges arise not from basic resource shortages or the prospect of genuine man-made environmental disaster, but from the threat of other governments specifically oil despots and -- most

egregiously -- the appalling genuine conspiracy that is global climate change policy. As we slouch towards the inevitable Copenhagen policy catastrophe, hysterical claims of the need for action without thought are departing farther and farther from the crumbling underlying science. […] Supine politicians have merely learned to intone Al Gore's mantra that "the science is settled." Governments -- including each and every Canadian government -- tell us that we must take the heavily edited word of an intensely politicized organization, the Intergovernmental Panel on Climate Change, which is a creature of the United Nations, which is in turn one of the most corrupt, incompetent and blatantly power-seeking organizations on the face of the earth.

Peter Foster, "The Manley 'Conspiracy,'" *National Post*, October 21, 2009, National edition, sec. FP Comment.

Man-made climate change has been a key element of the alleged need for sustainable development's "global governance," but the science is crumbling as fast as the issue's blatant politicization is being exposed. Rajendra Pachauri, the head of the Intergovernmental Panel on Climate Change, has always been a star at Davos, but Dr. Pachauri is now under siege in the wake of Climategate and Glaciergate, the latter of which has also embroiled him in conflict of interest allegations. Climate change has been key to another aspect of the World Economic Forum agenda: grand schemes of global redistribution.

Peter Foster, "The Crumbling Davos Agenda," *National Post*, January 27, 2010, National edition, sec. FP Comment.

The amount of federal and provincial money pouring into carbon capture technologies is hard to track. The idea, crazy as it may seem, is to capture carbon emissions from industrial and energy projects and store them somewhere, likely in vast underground facilities that costs billions to build. The whole idea is premised on climate change theory being valid and in the hope that, sometime, the value of the carbon captured can be sold on the carbon market for vast sums. With climate science in free fall and the Obama administration likely to store carbon trading in a deep vault for the next few years, there is clearly no need for Ottawa to continue to fund carbon sequestration.

Terence Corcoran, "Fish in a Budget," *National Post*, February 5, 2010, National edition, sec. FP Comment.

And that's why, Mr. Harper, your defence of the oil sands requires you to lead on climate change, too, by bringing your fellow G8 leaders up to date on global warming science. As I am confident you already know, no compelling evidence whatsoever indicates that carbon dioxide - a colourless, odourless, tasteless gas necessary for plant growth - poses a danger to the planet. The only "evidence" has come from myriad computer models, all of which subsequently failed to work. Blowing the whistle on global warming would not only be good for the Canadian economy, it would also be good politics. Although your G8 colleagues may not know that global warming is a scare whose time has passed, the majority of the citizens of their countries do - this Emperor has no clothes. Even in the United States, which has a true-believing global warming activist President in Barack Obama, most don't buy it. Even most U.S. Democrats don't buy it.

Lawrence Solomon, "Harper's next Stand; The PM Spoke out for the Seal Hunt. Now He Must Support the Alberta Oil Sands," *National Post*, October 8, 2011, National edition, sec. FP Comment.

In a meticulously referenced and deservedly praised page-turner, Ms. Laframboise, an accomplished journalist who turned to the skeptical blogosphere, demonstrates how the IPCC is a thoroughly political organization. Far from objectively weighing the best available science, it cherry-picks egregiously to support its main objective: to serve its government masters. Its lead authors are not the world's leading scientists but frequently wet-behind-the-ears graduates, and/or ardent activists.

They are also selected on the basis of gender and country "diversity" rather than expertise. The organization, Ms. Laframboise demonstrates, has also been thoroughly infiltrated by environmental NGOs, in particular the World Wildlife Fund.

Peter Foster, “A Thoroughly Political Body,” *National Post*, October 22, 2011, National edition, sec. FP Comment.

Mr. Morton this week reportedly suggested that a strategy should deal with such issues as crossborder electricity, uranium and climate change. While climate change was essentially conceived within the bowels of the UN as a justification for global industrial control, with national plans required to fit, this fortunately impossible dream is collapsing.

Peter Foster, “Mixed Messages,” *National Post*, February 8, 2012, National edition, sec. FP Comment.

Sustainable development is a mushy concept rooted in the belief that markets are unsustainable, the climate is in crisis, and that Global Salvation requires vast cabals of bureaucrats, NGOs, consultants and corporations to hatch top-down solutions. Since market prices are "all wrong," the way to a more modest anti-materialist, carbon-constrained future is through globally co-ordinated taxation and the promotion of energy alternatives. The problem is that both the science of catastrophic man-made climate change and green industrial strategy have come off the rails. […]Sustainable Development Technology Canada is another, much more expensive, boondoggle. It purports to take good ideas about alternative energy and climate mitigation over the alleged funding "Valley of Death" between the lab and the market. The problem is that any genuinely good - that is, money-making - idea will be able to find all the private-sector support it needs. The bigger issue is that there are very few good ideas in climatescare-related technologies, as the recent trail of solar bankruptcies worldwide indicates.

Peter Foster, “Sustainable Scrap Heap,” *National Post*, April 7, 2012, National edition, sec. FP Comment.

Orwell would also recognize the comprehensive demonization attached to the climate issue. All extreme weather is laid at the door of the "climate crisis," which in turn is the fault of industrial capitalist society. Those who express reasonable skepticism about either the science or the policy are decried as "deniers," i.e. cases for psychological treatment, or "shills" for a vast campaign of fossil fuel disinformation that simply does not exist. The Koch Brothers - owners of perhaps the only large corporation that dares to fund skepticism - are the equivalent of Nineteen Eighty-Four's Emmanuel Goldstein, subject to the "Two Minutes Hate" because radical warmists, like Ingsoc, cannot stand the thought of anybody holding, or being allowed to hold, alternative points of view.

Peter Foster, “Orwellian Climates of Fear,” *National Post*, July 5, 2013, National edition, sec. FP Comment.

The science is in fact more "unsettled" - the word that arguably lost Ms. Smith the most recent Alberta election - than ever. The recently released first section of the IPCC's latest assessment report is, to quote Christopher Essex, one of Canada's most eminent mathematicians, full of "hilarious bamboozling parascientific probability language." The desperation of mainstream alarmists should also be evident from their hysterical claims that the earth is "building up" heat at the rate of "400,000 Hiroshima bombs a day." This as a way of explaining away the lack of warming for the past 16 years. On top of all this is the scientific clash over the role of the sun and the warnings from some scientists of a coming ice age.

Peter Foster, “Canada Scores Own Goal on Carbon Targets,” *National Post*, November 1, 2013, National edition, sec. FP Comment.

Appendix H:

Table A.8: Number of Major Commentaries (Out of sample in Table A.1)

	Globe and Mail	Toronto Star	National Post
2006	16	24	27
2007	21	24	28
2008	14	21	23
2009	25	24	27
2010	23	22	34
2011	21	11	32
2012	24	17	38
2013	21	18	22

Appendix I: Number of Climate Change Articles Mentioning Politicisation

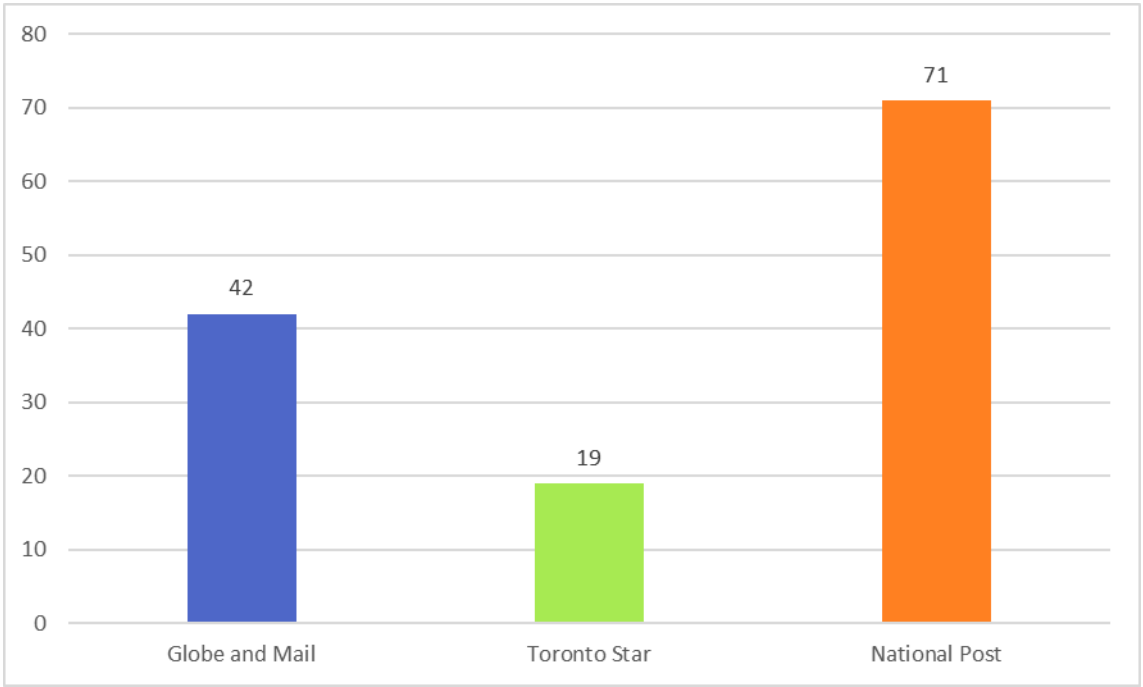

Figure A.4: Number of Climate Change Articles Mentioning “Politicisation”, 2006-2013 (search terms: politicization OR politicize OR politicized; for Ns see Table A.1)

Appendix J:

Table A.9: List of Articles or Columns Written by Members of the Competitive Enterprise Institute

Gutting Kyoto: Thanks to the Montreal Talks, Penalties Have Become Discretionary and Emissions Reductions Have Become Merely Foreign Aid	Christopher C. Horner	January 26, 2006
The Kyoto Bubble: Energy Companies Benefit from Kyoto, Energy Consumers Lose. It's No Time for Government to Get Involved	Iain Murray	February 28, 2006
Green Leaders: Three Chief Executives Who Embraced Environmental Causes Neglected Their Firms' Core Business Needs. Now Shareholders Are Feeling Green	Steven Milloy	September 13, 2006
Let's Put DDT's Detractors on Trial	Steven Milloy	September 27, 2006
Blown Away: NOAA Was Totally Wrong in Its Predictions of Catastrophe in This Hurricane Season	Steven Milloy	December 2, 2006
The New Bootleggers: A U.S. Climate Alliance Pushing a 'Cap and Trade' Emissions Regime Is Lined with Cartel-Creating Firms That Get Money for Nothing	Fred L. Smith Jr.	February 15, 2007
No Right to Impose Carbon Tariffs	Christopher C. Horner	April 16, 2008,
Ig-Nobels for Obama; Is Barack Obama Really a Science 'Visionary'? Seventy-Six American Nobel Laureates in Science Think So; The Nobelists' Assertion That the Bush Administration Has Politicized Science Is a Canard	Steven Milloy	October 31, 2008
Take Climate Change off the Agenda	Christopher Horner	February 18, 2009
This 'Earth Hour,' Leave the Lights on	Michelle Minton	March 24, 2009
The Biggest and Worst	Myron Ebell	May 20, 2009
Obama's Climate Fantasies	Myron Ebell	September 23, 2009
CRU's Climate 'Tricks,'	Myron Ebell	November 24, 2009

Table A.10 Commentary Citing the Work of the Competitive Enterprise Institute in the National Post

Tories Can't Dodge the Protocol	Terence Corcoran	January 26, 2006
Feeling the Heat over Coal: Use of Coal for Electricity Is Skyrocketing as China Catches up to the U.S. in Greenhouse Gases	Keith Bradsher and Jad Mouawad	November 8, 2006
U.S. Senate Gag Order for Exxon	Editorial	December 5, 2006
The Eco-Industrial Power Complex	Terence Corcoran	February 27, 2007
Endangered Energy Acts	Terence Corcoran	May 15, 2008
The Crumbling Case for Green	Peter Foster	March 11, 2009
First Salvoes in the Clean Energy War	No Author	April 1, 2009
Fuelish Policy	Peter Foster	May 20, 2009
Blue Bin Blues; Recycling May Have Negative Effect on the Environment: Expert	Kevin Libin	December 5, 2009
Climate Conflict; Greenhouse Gases Harm Health: EPA	Kevin Libin	December 8, 2009
Kent's Deft Touch Will Be an Asset; New Minister Will Be Key If Obama Enacts Carbon Policy	Terence Corcoran	January 5, 2011

Appendix K: Articles containing competing claims

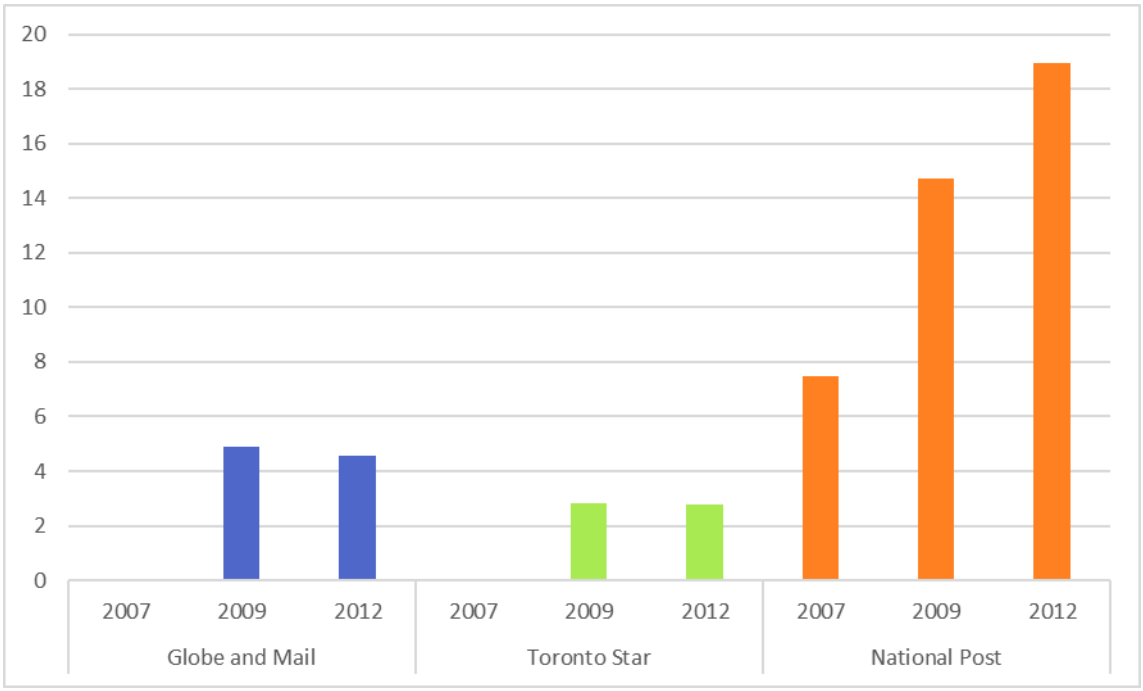

Figure A.5: Articles containing competing claims (attributed to claims-makers, as a percentage of all climate change articles, N: See Table A.1)

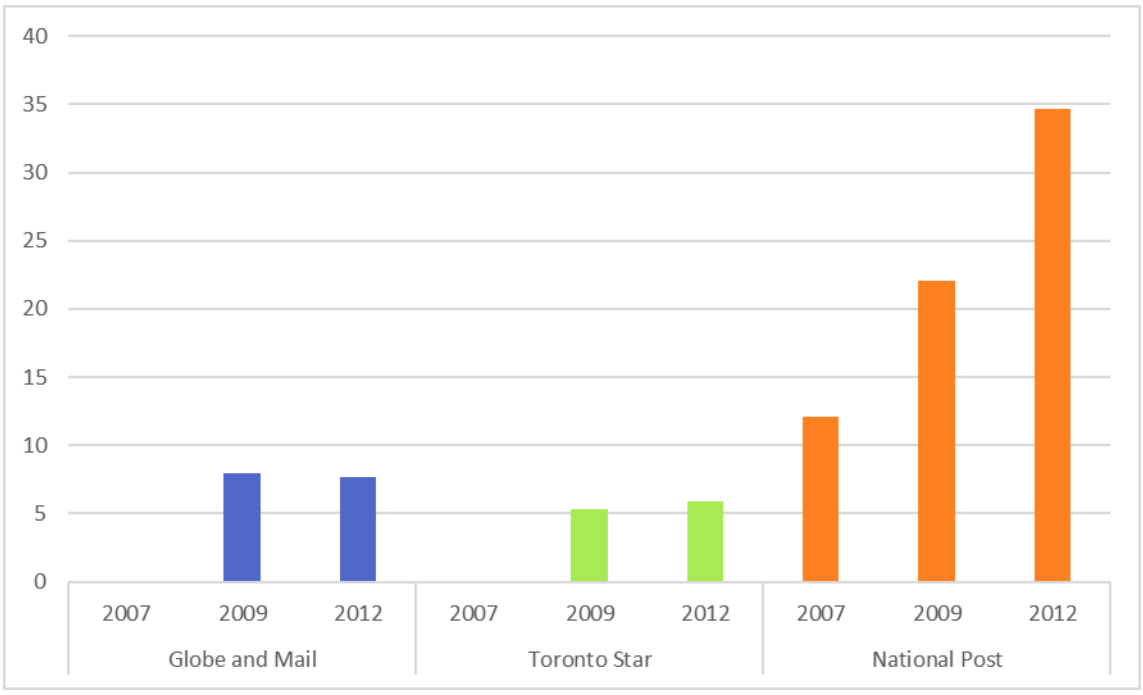

Figure A.6: Articles containing competing claims (*as a percentage of all articles with explicitly identified claims-makers,* Globe and Mail*: 2007 N=56, 2009 N=63, 2012 N=65;* Toronto Star*: 2007 N=49, 2009 N=56, 2012 N=51;* National Post*: 2007 N=66, 2009 N=68, 2012 N=52)*

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