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**MORAL PANICS AND NEWSPAPER
REPORTING IN BRITAIN: BETWEEN
SCEPTICAL AND REALISTIC
DISCOURSES OF CLIMATE CHANGE**

Volume 1 of 2

M L Ruiu

PhD

2019

**MORAL PANICS AND NEWSPAPER
REPORTING IN BRITAIN: BETWEEN
SCEPTICAL AND REALISTIC
DISCOURSES OF CLIMATE CHANGE**

Volume 1 of 2

Maria Laura Ruiu

A thesis submitted in partial fulfilment of the
requirements of the University of
Northumbria at Newcastle for the degree of
Doctor of Philosophy

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Design & Social Sciences

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Abstract

This thesis provides the first attempt to empirically apply the moral panic framework to study British newspaper reporting on climate change by drawing upon a unique dataset of 958 news articles over three decades (1988-2016). It is original in the sense that it illuminates the "missing link" between media reporting on climate change and think tanks' denial strategies. By adopting mixed approaches, this work explores both news articles and think tanks' documents and shows how moral panics can help explore rival discourses, and the strategies adopted by powerful actors to "defend" their interests by inflaming confusion. The main implications can be identified in the use of moral panics as a valuable tool for exploring conflicts in which powerful interests are involved, and in better understanding how the "denial machine" works. I argue that in the British context, the politicisation of newspapers' narratives around climate change causes a fracture between two groups characterised by specific dominant traits, which in turn correspond to moral panic attributes. However, even in the context of "conflicted moral panics", one direction prevails, which in this case is the more conservative narrative. This can only be understood by simultaneously observing the processes of construction of each single narrative and their comparison. Therefore, simultaneously considering the two narratives, the overall "confusing image" resulting from both conflicted panics ("centre-left vs centre-right"), and the multidimensionality within the same politicised narrative, might favour a "status quo instance", which reflects the economic, political and social status quo. The interconnections between conservative think tanks and the oil industry, and in turn their influence on dictating the sceptical "story line", suggest that the media "voluntarily" reflect elite power conflicts. These results inform on those elements that inflame hostility and resistance to climate change acceptance. Policy-making that aims to promote "intervention-oriented" approaches should take into account these results, especially in relation to the dialectics between the forces at play.

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“Satisfaction lies in the effort, not in the attainment, full effort is full victory” (Gandhi)


Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the Faculty Ethics Committee on October 16, 2018.

I declare that the Word Count of this Thesis is 86121 words

Name: Maria Laura Ruiu

Signature: 

Date: 18 July 2019

Introduction

This thesis aims to explore the application of the moral panic framework in relation to climate change-related messages as "mediated" by British newspapers, drawing upon a unique dataset of news articles over three decades. Throughout the thesis, the polarisation between left-leaning and right-leaning newspapers is highlighted and explained using the moral panic framework developed by Cohen (1972) and Goode and Ben-Yehuda (2009). As will be discussed in this work, the adoption of the moral panic theoretical framework can help explain the tendency (especially in the USA, but also in the UK) of right-leaning newspapers to either deny or partially deny climate change, and left-leaning newspapers to confirm the existence of the phenomenon and the gravity of its consequences. In short, this thesis argues that examining climate change messages in the media using the moral panic lens illustrates the similarities and the differences between these two contrasting narratives. This focus is unique in that it departs from previous research that tends to focus on outlining the characteristics of each single politically oriented group. The present work will simultaneously explore both the single narratives and the overall picture to see if a "storyline" prevails among the different positions expressed by these contrasting communities (centre-right and centre-left, each of them giving specific directions on how to deal with climate-related issues). In this vein, the constitutive elements of the moral panic framework will provide the tools for identifying the main ingredients of the construction of the climate narratives. Only a limited and controversial debate exists around the adoption of the moral panic framework to investigate climate change, and it focuses either on theoretically discussing its application, or on specific narratives (e.g. documentaries). This thesis provides the first attempt to operationalise the moral panic framework to study newspapers' reporting on the issue. This means that it will help inform how the media frame climate discourses, which in turn, might influence both public opinion and policy-making activity. This work also contributes to the climate change literature by extending the moral panic framework to explain the increasing polarisations in the media. In fact, the literature shows that both the current political debate and the public understanding of climate change are "crystallised" also due to the "confusion" promoted by media narratives, which support a "status-quo" instance, meaning "no-intervention" especially in terms of implementing preventive measures that might be harmful for both global and local economies. Moreover, exploring the influence of right-wing think tanks on media reporting is an important "missing link" in the literature to understand how they try to direct climate change policy-making and public opinion on climate change.

Specifically, the overall aim of this thesis is to investigate if and how the moral panic framework (Cohen, 1972) may be used to investigate climate change polarisation in media reporting since the emergence of the climate change-issue in the public debate in 1988.

To answer this overall question, this thesis examines the moral panic framework in relation to media reporting about climate change and draws upon a unique dataset of British news articles over

three decades. These data are then used to investigate the application of the moral panic framework from a media perspective to answer the following research sub-questions:

1. Are climate change articles (958 articles) between the years of 1988 and 2016 from 8 newspapers (grouped per political orientation) consistent with a moral panic framework (see chapter five)?

2. Does the moral panic framework help explain the characteristics of rival climate change narratives in British newspapers (i.e., those who see the harm in anthropogenic climate change versus those who deny climate change) (see chapters five and six)?

3. How do contextual factors (specifically political orientation of newspapers and think tanks' narratives) influence the construction of different realities assembled into these polarised and rival narratives (see chapter seven)?

To explore these questions over an extended period from 1988 (emergence of the climate change issue in the public debate) to 2016, the thesis adopts a quantitative and qualitative methodology, and it is structured in seven chapters.

The first chapter provides background information about advances in climate science. This will provide insights about the process of mediation (in which the media play a relevant role) from science to the public and policy-makers. These insights will be also used in the analysis sections to explore if newspapers' narratives embrace (or by contrast deny) scientific certainty around climate change, and how uncertainty can be instrumentally used to question both the phenomenon per se and climate science validity. Moreover, reflecting on the instrumental use of uncertainty to portray a conflictual character of the scientific debate, this chapter also highlights the main traits of climate denialism. They will be useful to understand what characteristics of these "denial" strategies are reflected in British newspapers' reporting (see chapter six). This is important to the moral panic approach because it helps explore the polarisation between two contrasting moral panics, one reflecting scientific certainty, and another focusing on scientific uncertainty as a folk devil, which hampers effective action.

The second chapter will introduce the moral panic concept and its evolution to explore its applicability to the climate change issue in the presence of contrasting positions. It also provides an overview on the limited literature available on the possibility of applying the moral panic framework to study climate change communication. Contradictory results emerge from the application of this framework to the study of some media products (such as e.g. documentaries and children stories). However, the resulting dialectic between "good" and "bad" moral panics supports the hypothesis of a polarisation between contrasting forces, which in the case of newspapers' reporting might be identified in the tensions between sceptics' and advocates' narratives. Note that both terms "sceptics" (around the reality, causation and gravity of climate change) and "advocates" (disseminators of climate science findings) are used in this work echoing the climate change debate terminology (see Schmidt, 2015). Finally, the process of media framing of climate change (and how it is rooted in a

political economy dimension) will show the multiplicity of forms that media narratives can assume also in relation to the political orientation of the media.

Chapter three will apply a moral panic lens to review the specific literature on media communication of climate change (with special attention to those studies focusing on the UK). Focusing on the identification of claim-makers, main contents, and media framing of climate change, it will contribute towards fulfilling the overall aim of this work, which is to apply the moral panic framework to investigate climate change polarisation in media reporting. In this regard, the three main features that emerged in the second chapter, related to "Who" the actors involved are (through the identification of the "interlocutors"), "Why" (through the identification of economic-political influences on climate narratives), and "How" (through the framing process) moral panics originate will be applied to the interpretation of the media narratives. The identification of the main frames already used in the context of media reporting on climate change, in combination with the theoretical framework of moral panic, will contribute towards constructing the analytical framework adopted in the empirical section.

Following the premises introduced in the first sections of the thesis, and since the literature highlights a political polarisation between two opposite communities (sceptics and accepters), chapter four will describe the data and methods used to answer the main research questions in this thesis. Specifically, this thesis adopts a quantitative and qualitative methodology to empirically explore the applicability of the moral panic model to British newspaper reporting on climate change between 1988 and 2016. The adoption of the moral panic framework is twofold: investigating the process of construction of the news through specific frames and the evolution of reporting over time; and investigating the applicability/relevance of the theoretical model to the phenomenon. Specifically, the research questions will be investigated through framing analysis and Corpus Assisted Discourse Analysis (CADA) of British news articles (research questions 1 and 2), and qualitative analysis of conservative think tanks' documents (research question 3). CADA facilitates the simultaneous identification of textual and contextual factors (in this case political orientation of the newspapers) by investigating the structure of the text, the selection of social actors, the linguistic choices, and discursive strategies adopted.

Chapter five will report the results from the quantitative analysis of a sample of articles (958 news and editorial articles) retrieved from 8 British newspapers over three blocs of years (1988-1997; 1998-2007; 2008-2016). It aims to explore the relations (through contingency tables and regression analyses) between the variables included in each frame (identified by combining the moral panic theoretical construct and the frames emerging from the literature review on media reporting on climate change) and the political orientation of the newspapers, in the light of three main moral panic components ("media inventory", "opinion and attitude themes", and "rescue and remedy" components), and related attributes (concern, consensus, hostility, disproportionality, and volatility). It will also consider the potential evolution in the distribution of the variables considered across the three blocs. Having identified the relations between political orientation and these variables, only those characteristics showing significance will be included in a Categorical Principal Component Analysis. This will identify how these components combine in certain dimensions defining specific

traits that can be connected to moral panics. The analysis contributes towards answering the two research questions related to the possibility of applying a moral panic lens of analysis for interpreting media communication of climate change (overall research question), and the existence of two politically polarised moral panics (research question 1). To answer these questions it will identify the connections between the moral panic traits (operationalised into specific frames and sub-variables) and the political orientation of the group of newspapers under consideration. Moreover, the Categorical Component Analysis will show how these different variables combine into specific dimensions (which in turn can be connected to moral panics). These results will also provide a preliminary answer to the second research question regarding the main characteristics of the polarised groups.

Some of these emerging aspects will be further investigated through qualitative analysis in chapter six to provide in-depth insights regarding the differences between these two polarised groups in adopting scientific frames, dramatization, religious symbols and ecological symptoms. In fact, chapter five highlights an increasing adoption of scientific frames by the centre-right group, and an increase in dramatization for both groups (and the mockery of climate change consequences by the centre-right). Moreover, even though the adoption of both symbols and symptoms do not show significant associations with the political orientation, the literature highlights a tendency of the media to portray climate change in symbolic ways. For these reasons, this chapter will focus on exploring i) the role of scientists as claim-makers, ii) dramatization as a strategy to spread moral panic, and iii) sensitisation and symbolisation processes. This analysis answers the second research question related to what features of the moral panic framework can help understand the polarisation in British newspapers' narratives by identifying the main differences between the two groups.

In connection to chapter six, which will show how conflictual forces generate confusion and multiple ways of interpreting climate change, which in turn seem to reinforce the "contrarian crusade", chapter seven will further investigate potential connections between newspaper reporting on climate change and conservative think tanks' narratives. This will answer the third research question related to the potential influence of external factors on newspaper reporting on climate change. Accordingly, the press releases issued by three conservative think tanks mentioned by the newspapers will be qualitatively analysed to compare both contents and communication styles of these public documents with those included in the newspapers. This analysis will contribute towards identifying the actors involved in activating/inflaming specific moral panics.

Finally, some conclusions will be drawn also highlighting the limits of the work, and suggesting further research especially in relation to the role played by journalists in "social constructing" the meaning of climate narratives, and the public reaction to these polarised moral panics.

Chapter 1 Definition of climate change

Key points

Chapter one briefly defines climate change to provide background information that will be used in the analysis section to explore how the scientific literature on climate change is replicated in the news media. This will expose the potential polarisation in newspapers' narratives based on either certainty or uncertainty. From a moral panic perspective, this contributes towards understanding if media narratives represent climate change as a "folk devil" responsible for societal crisis, or whether the uncertainty becomes a pretext for postponing concerted action on climate change.

After introducing the phenomenon (section one), it proposes an overview on the uncertainty as resulting from different scientific results and perspectives (section two) and how this might be instrumentally used to question both the phenomenon per se and climate science validity (section three). From this, section four considers the origin of the "denial industry" and its main strategies to communicate and promote scepticism.

1. Defining climate change

The First World Climate Conference in 1979 established that climate change was "an urgent world problem" which governments were urged to tackle (UNFCCC, 2006). Later, the publication of the First Report on climate change by the Intergovernmental Panel on Climate Change (IPCC, 1990) identified the need for framing the global climate crisis as the most urgent environmental problem. Since then, scientific discourses on climate change have been increasingly focusing on the "compatibility of long-term environmental goals with short-term economic logic" (Eastin, Grundmann, & Prakash, 2011), invoking the reduction of human impacts on a natural system incapable of dealing with the effects of industrialisation and the consequent accumulation of greenhouse gases (Crist, 2007). Hence, firstly mitigation, then adaptation, have become key-strategies both to prevent and to tackle climate change-related risks.

A number of organisations and programmes exist, which deal with climate change and try to estimate causes and consequences of the phenomenon on the earth and human systems. As shown in Table 1, the main bodies and programmes which work globally are represented by those connected to the United Nations System, such as the Intergovernmental Panel on Climate Change (IPCC), the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO), the United Nations Framework Convention on Climate Change (UNFCCC), and the United Nations Development Program (UNDP). Table 2 reports the main conferences and agreements reached worldwide around climate change-related issues. Some of them, such as the First UN Environment Conference, the Montreal Protocol and The Millennium Summit did not focus on climate change, but they were indirectly connected to it because of the establishment of some actions to prevent anthropogenic interference with the climate system. The common mission of all these bodies/conventions/agreements/programmes is to provide robust scientific insights to support

decision-makers and cooperation among nations against a "common threat". In addition to these, a variety of international, national and local (inter-governmental, governmental or non-governmental) organisations carry out research on climate change. They either work synergistically or independently in order to define strategies to tackle environmental threats, causes of environmental changes, and consequences on the human life.

Table 1. United Nations (UN) main Agencies and Programmes

Agency/ Programme	Foundation	Mission
WMO	1950	Agency of the UN specialised in studying the interaction between the weather and climate (WMO, 2016)
UNDP	1966	Specialised in: sustainable development; democratic governance and peace-building; and climate and disaster resilience (UNDP, 2016)
UNEP	1972	Agency of the UN that sets the global environmental agenda for sustainable development (UNEP, 2016)
UNFCCC	1976	It operates to reduce/stabilise greenhouse gas concentrations to prevent human impacts on the climate system (UNFCCC, 2016a)
IPCC	1988	It provides policymakers with scientific insights on impacts/risks of climate change, and adaptation and mitigation options (IPCC, 2013)

Table 2. Main Agreements and Conferences

Meeting/ Agreement	Year	Where	Main results
First UN environment conference	1972	Stockholm, Sweden	Institution of the United Nations Environment Programme (UNEP, 1972)
World Climate Conference	1979	Geneva, Switzerland	Establishment of the World Climate Programme and the World Climate Research Programme. First step towards the creation of the IPCC by WMO and UNEP (UNFCCC, 1979)
Montreal Protocol	1987 (into force in 1989)	Montreal, Canada	Restriction of chemicals use for limiting damage to the ozone layer (UNEP, 1987)
World Climate Conference	1990	Geneva, Switzerland	First arrangements for the Kyoto Protocol and the Global Climate Observing System (UNFCCC, 1990)
Earth Summit: UNC on Environment and Development	1992	Rio de Janeiro, Brazil	United Framework Convention on Climate Change ¹ ; Agenda 21 ² ; UN Convention on Biological Diversity and the UN Convention to Combat Desertification (UNFCCC, 1992)
Conferences of the Parties: UNCCC (COP 1-2)	1995	Berlin, Germany	COPs are formal meetings of the UNFCCC Parties to assess progress in dealing with climate change (UNFCCC, 2016b)
	1996	Geneva, Switzerland	

¹ Developed countries agree to return their greenhouse gas emissions to 1990 levels.

² Non-binding action agenda to be implemented at local, national, and global levels.

Table 2. Main Agreements and Conferences

Kyoto Protocol and COP 3	1997 (entered into force in 2005)	Kyoto, Japan	Developed countries agree to reduce emissions by an average of 5% by the period 2008-12 (variations on targets among countries) (UNFCCC, 1998)
COPs 4-6	1998	Buenos Aires, Argentina	Progress in dealing with climate change (UNFCCC, 2016b)
	1999	Bonn, Germany	
	2000	The Hague, Netherlands	
Millennium Summit	2000	New York, USA	Enduring environmental sustainability by 2015 (Foundation, 2000)
COP 6 (Jul 2001)	2001	Bonn, Germany	Progress in dealing with climate change (UNFCCC, 2016b)
Marrakesh Accords and COP 7	2001	Marrakech, Morocco	Agreements on: forest management; Cropland management; Grazing land management; and Re-vegetation (UNFCCC, 2001)
COP 8	2002	New Delhi, India	Progress in dealing with climate change (UNFCCC, 2016b)
Earth Summit: World Summit on Sustainable Development	2002	Johannesburg, South Africa	Johannesburg Declaration on Sustainable Development: identification of worldwide threats to sustainable development (UNFCCC, 2002)
COPs 9-14	2003	Milan, Italy	Progress in dealing with climate change (UNFCCC, 2016b)
	2004	Buenos Aires, Argentina	
	2005	Montreal, Canada	
	2006	Nairobi, Kenya	
	2007	Bali, Indonesia	
	2008	Poznań, Poland	
UN climate summit and COP 15	2009	Copenhagen, Denmark	Copenhagen Accord: support to mitigation, adaptation, financing, technology, forests, measurement, reporting and verification (UNFCCC, 2009)
World Climate Conference	2009	Geneva, Switzerland	Definition of a global framework to link climate predictions and decision-making (WMO, 2009)
UN summit and COP 16	2010	Cancun, Mexico	Lowering the maximum temperature to 1.5 degrees; Creating a Green Climate Fund to support projects, programmes, and policies in developing countries; Implementing cohesive action on adaptation and mitigation (UNFCCC, 2010)
COP 17	2011	Durban, South Africa	Progress in dealing with climate change (UNFCCC, 2016b)
The Doha Amendment and COP 18	2012	Doha, Qatar	Amendment to the Kyoto Protocol (UNFCCC, 2016b)
UNC on Sustainable Development, Rio+20	2012	Rio de Janeiro, Brazil	Sustainable Development Goals; Sustainable development financing strategy; Green economy policy guidelines; Strengthening UNEP;

Table 2. Main Agreements and Conferences

			Facilitation mechanism for technology transfer; Voluntary Commitments & Partnerships for sustainable development (UNFCCC, 2012)
COPs 19-20	2013	Warsaw, Poland	Progress in dealing with climate change (UNFCCC, 2016b)
	2014	Lima, Argentina	
Paris Agreement and COP 21	2015 (entered into force in 2016)	Paris, France	Limiting the temperature increase to 1.5 °C above pre-industrial levels; Increasing adaptation capacity; Financing strategy to limit greenhouse gas emissions and increase climate-resilient development (UNFCCC, 2015)
COP	2016	Marrakech, Morocco	Progress in dealing with climate change (UNFCCC, 2016b)

One of the first definitions of climate change was provided by the World Meteorological Organization (WMO) in 1966. This definition referred to "climatic change" as all forms of climatic variability on a time-scale longer than 10 years (Hulme, 2015). This first attempt to describe the phenomenon highlights how the causes of change were not yet clearly identified. From this moment and onward, climate change has raised global interests. In fact, in 1977 "climatic change" also became the name of an academic journal. Simultaneously to these events, firstly the term "global warming", and then "climate change", started to be used in scientific articles (Broecker, 1975; Russell, & Landsberg, 1971). The effects produced by CO₂ (derived from human activities) on climatic change became a focus for scientists, who increasingly highlighted the anthropogenic contribution to the phenomenon. The first IPCC Scientific Assessment (Houghton, Jenkins, & Ephraums, 1990) referred to climate variations as a result of both natural and human activities, but did not give a specific definition of the phenomenon. However, the report aimed to investigate the relationships between human activities and climate change. In the second Scientific Assessment, the IPCC (1995) adopted the definition given by the UNFCCC, where climate change referred to a change of climate that is attributed "directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability". This assessment also started to refer to two key strategies in terms of adaptation and mitigation. These definitions distinguished between preventive strategies, which intervene on the sources of the problem, and adaptive strategies, which respond to consequences both by reducing negative impacts and by identifying positive opportunities from changes (IPCC, 2001). Since the publication of the third Scientific Assessment, the IPCC has adopted the definition of climate change as "statistically significant variations of the mean state of the climate or of its variability, typically persisting for decades or longer" (Baede et al., 2001). This definition also attributes a clear contribution of human activities on climate. This brief overview shows that advances in climate science have increasingly confirmed firstly the existence of climate change, then its anthropogenic causes and need for action through both adaptation and mitigation. The next section analyses the uncertainty as a constitutive component of climate change (deriving from both different scientific approaches and unpredictable consequences); and the role-played by scepticism (in terms of contributing towards increasing uncertainty around climate change). This will

help understand and explain how scientific consensus and uncertainty around climate change are reflected in newspapers' reporting, and if this causes a rupture between two distinct forms of moral panics.

2. Dealing with uncertainty in climate change communication

Climate change can be interpreted as a mediating topic that generates forms of reciprocal dependency between different spheres of society (in particular, politics, science, and mass media) (Rhomberg, 2010). At the same time, the communication mechanisms between these different spheres might be influenced by several factors (such as e.g. different communication styles and languages, different aims, different audiences, and flow of information across different nodes). Therefore, each passage from science to the general public might somehow transform the original messages. The literature on public perception of climate change confirms a widespread confusion surrounding the comprehension of the phenomenon also in relation to a limited capacity of scientists to effectively communicate a "genuine" uncertainty (which inevitably characterises their findings) firstly to policy-makers and secondly to the public. The IPCC First Assessment Report in 1990 identified some significant areas of uncertainty regarding: the effects produced by greenhouse gases on the increase of global average temperature and mean sea-level, the entity of natural variations, the prediction of climate change at regional levels, and the timing of the expected climate change (McBean & McCarthy, 1990). Even though the Second Scientific Assessment (IPCC, 1995) recognises that natural ecological systems, socio-economic systems and human health are all sensitive to climate change, it confirms those uncertainties highlighted by the first report, regarding the difficulty of quantifying the impacts of climate change and the related effects on human societies. The IPCC explicitly refers to uncertainty as "an expression of the degree to which a value (e.g., the future state of the climate system) is unknown" (Baede, 2015). From these preliminary reflections, the uncertainty issue tends to depend upon a number of factors (see also Rice, Gustafson, & Hoffman, 2018) related on the one hand to the prediction of the exact evolution of the phenomenon; and on the other, to the impacts of climate change (not only on natural/physical environment, but also on the socio-economic and technological capacity of dealing with changes), and recalls another complex issue related to the application of scientific findings to policy-making.

The literature about the application of scientific results to policy formulation refers to scientific uncertainty as one of the most difficult aspects to be tackled (Bradshaw & Borchers, 2000). As underlined by Dessai and Hulme (2004), the debate about how to deal with the uncertainty of future scenarios regarding policies implementation has produced different approaches. On the one hand, some scholars argue that policy analysts assign subjective probabilities to the effects produced by different emissions scenarios (Schneider, 2001). Other scholars, meanwhile, emphasise the problems associated with estimating which scenario is likely to materialise (Grübler & Nakicenovic, 2001; Refsgaard, van der Sluijs, Brown, & van der Keur, 2006). The difficulties of policy-making, under conditions of uncertainty, is exacerbated by the media, which tend to distinguish those scientists who believe that climate change is happening and will have significant consequences, and those who are

more sceptical (Akerlof et al., 2012; Boykoff, 2013; Freudenburg & Muselli, 2010; Rahmstorf, 2012; Tosse, 2013). However, as clarified in the next section, this minority of sceptical scientists have been frequently found to be supported by oil corporations (Levy & Rothenberg, 1999). Nonetheless, this discrepancy contributes towards increasing confusion not only in terms of policy-making, but also in the public perception of the phenomenon.

Beyond a direct communication from scientists to both policy-makers and the public, a process of mediation, related to the media understanding and representation of the problem, should be taken into account. In fact, as highlighted by Hulme (2009), public and policy discourses about climate change are influenced by frames, imagery and the related symbols, and (media) narratives around the risks associated with the phenomenon. Moreover, the multiplicity of conflicting messages increases the number of different interpretations of the phenomenon, which in turn might contribute towards inflaming disagreement. In fact, further interpretations of the variety of scientific perspectives are provided by intermediate mediators, among whom journalists (and the media) play a significant role (Berglez, 2011; Brüggemann & Engesser, 2014, 2017; Brüggemann, 2014; Engesser & Brüggemann, 2015; Gibson, Craig, & Harper, 2015; Lück, Wozniak, & Wessler, 2015). This means that the media may even generate new controversies that did not exist before.

As highlighted by a number of scholars, the media represent an "integral part of the process of social problem definition" (Trumbo, 1996), and fundamental means for the general public to gather information about science (Cody, Reagan, Mitchell, Dodds, & Danforth, 2015; Dahlstrom, 2014; Rahmstorf, 2012; Smith, 2005). In his analysis of the risk society, Beck (1995, 1999, 2000) often recalls the relevant role played by the media in promoting circulation, interpretation and knowledge about environmental risks. Therefore, the discourses around climate change-related risks rely on scientific logics, but also on media frameworks (Rhomberg, 2010). However, information to be included in such communications are complex and involve a number of dimensions. In particular, these are represented by the difficulty of combining media communication style and the uncertainty that characterises climate change; the capacity of scientific research of reaching the wider public; and the relationships between communication and change in terms of people's attitudes and behaviours. These three points are strongly interconnected. In fact, according to Moser & Dilling (2004), the biggest challenge for scientists is to translate a very uncertain and complex situation into clearer and simpler information as required by the public and the media. From this, some frictions might be generated between scientific findings and media translation of them due to the emphasis on the uncertainty (see also Bailey, Giangola, & Boykoff, 2014; Kuha, 2009), especially about the actions needed. Finally, communication, which is not based on clear causes and solutions, might generate misunderstanding and fear in people, who in turn might lose either confidence in science (and policy-making) or interest in the phenomenon.

The communication of climate change-related issues might also become an important ingredient for new policy-implementation either reinforcing or weakening public support for new policy-measures (Hulme, 2009). Accordingly, findings obtained by Zehr (2000) in analysing popular press articles about global warming show that scientific uncertainty was a dominant topic in the US press between 1986 and 1995 and it was constructed by presenting controversy amongst scientists, thus

suggesting no need for action due to the confusion around the real nature of climate change. His results also show that the communication circle (and intermediate passages from one source to another) between a multiplicity of players (scientists, policy-makers, communicators and the public) might contribute towards increasing misunderstanding and scepticism around the phenomenon. In fact, certain levels of uncertainty about climate change might derive from a number of factors, but this does not necessarily mean that there is a widespread scepticism within the scientific community (Poortinga et al., 2011). However, as further discussed in the next section, uncertainty might become a pretext for promoting confusion and scepticism in the public debate. This is an important aspect to consider when analysing media narratives from a moral panic perspective, because they disseminate information that might support or contrast certain types of action, trying to drive the public understanding (and the policy-making reaction) in certain directions.

3. Between "Belief" and "Scepticism"

Uncertainty is a constitutive feature of climate science, and it has become one of the main themes explored by scholars. The debate on climate change not only relates to the scientific uncertainty about specific aspects of the phenomenon, but also the exact degree of scientific consensus surrounding it. Since 2014, a dispute between some scholars has highlighted disagreement on the number of scientists and studies that estimate a relation between global warming and human activities. In fact, as Tol (2014, 2016) argues, previous studies (Cook et al., 2013, 2016; Oreskes, 2005) were too optimistic regarding the number of papers and scholars that confirm this connection. Moreover, a report presented to the UNCCC in Cancun, in December 2010, highlighted that more than 1000 international scientists were sceptical about man-made global warming (Morano, 2010). By contrast, in Cook et al.'s study, 97.2% of authors who were asked to rate their own papers endorsed the consensus. As chapter seven (related to the analysis of think tanks' documents) will show, these disputes can be instrumentally used as evidence of a lack of consensus around climate change. In fact, these controversies play a key role in inflaming the media debate around the reality of climate change, also bearing in mind that they are frequently triggered by conservative think tanks such as in the aforementioned case of Richard Tol³. For example, *The Telegraph* used the critique advanced by Tol to underline that "climate science has become 'too green'" and suppresses those articles that are not in line with anthropogenic global warming (Knapton, 2014).

However, beyond these controversies, it is possible to argue that the majority of climate scientists agree that human activity is contributing to climate change (Anderegg, 2010; Boykoff & Boykoff, 2004; Doran & Zimmerman, 2009). Climate change sceptics' objections mainly regard the "hysterical" and "exaggerated" tones adopted by climate scientists and environmentalists (Corner, 2010). In fact, sceptics usually refer to mainstream scientists as alarmists and discredit climate science for not treating the phenomenon as a controversial issue (Antilla, 2005). The label "climate

³ Richard Tol was advisor to the Global Warming Policy Foundation, which, as further discussed in chapter four and chapter seven, is a UK think tank founded in 2009 by Lord Lawson to question climate change-related policies (Dunlap & Jacques, 2013).

scepticism" emerged in 1995, when a journalist, Ross Gelbspan, published a book on climate scepticism (Painter & Ashe, 2012). From this, a number of labels have been coined to classify different degrees of sceptical/denying positions such as "climate change deniers", "climate/climate change/global warming sceptics", "climate change contrarians" (Jaspal, Nerlich, & van Vuuren, 2016). Lahsen (2013) identifies three main tendencies in climate science: "mainstream scientists" (who demonstrate human-induced climate change), "mainstream sceptics" (who believe that human action might affect climate change, but they perceive mainstream scientific evidence as exaggerations), and "contrarian scientists" (who categorically deny evidence of anthropogenic climate change). Beyond a general definition of sceptics, who are criticised by mainstream scientists for being unscientific (McPherson, 2014), a number of new labels have been coined to describe specific attitudes of sceptics, such as "greenhouse scepticism", which specifically questions the relation between increased greenhouse effect and global warming (Jaspal et al., 2016); and "lukewarmers" (P. Matthews, 2015), who agree that human activity contributes towards warming the planet, but it might be beneficial rather than damaging.

Therefore, different degrees of scepticism can be identified in relation to its sources (e.g. scientists, politicians, media, and public), intensity of "negation" (from partial to total disagreement), and main concerns (related to either climate change in general, or specific aspects of the human-climate interaction)⁴.

The multiplicity of attempts to classify sceptical positions indicates that "scepticism" represents an integral part of the climate change discourse. Sceptics usually defend their "mission" as promoting critical thinking by adopting scepticism as a method, rather than a polarised position (Corner, 2010; Skeptic, 2016). By contrast, Dunlap and McCright (2010) refer to a strategy of "manufacturing uncertainty" used by the "denial machine" to overshadow the need for environmental regulation. One of the main criticisms of the sceptics' position is that sceptics fail to consider both the scientific evidence around the risks associated with global temperature rises (Parris, 1998), and the importance of uncertainty as a driver of progress (Corner, Whitmarsh, & Xenias, 2012). In addition to this, some authors argue that the majority of sceptics' groups (in particular in the US) are supported by economic organisations which share interests in pursuing the exploitation of natural resources (Antilla, 2005; Rahmstorf, 2012). As highlighted by Parris (1998), a number of opponents to the existence of climate

⁴ In categorising sceptical reactions to climate science, Rahmstorf (2005) distinguishes three different types of sceptics: "trend sceptics", who deny that the global temperature is rising; "attribution sceptics", who deny human causes of climate change; and "impact sceptics", who deny catastrophic impacts of climate change (although they recognise its anthropogenic causes). In a similar attempt, Hobson and Niemeyer (2013) identify five different discourses related to sceptical positions: "Emphatic Negation" (denial of climate change); "Unperturbed Pragmatism" (there is enough time to design appropriate adaptation strategies); "Proactive Uncertainty" (something should be done despite a lack of confidence in both technological solutions and policy implementations); "Earnest Acclimatisation" (climate is a natural phenomenon, about which people should be concerned); "Noncommittal Consent" (climate change is likely to be an anthropogenic phenomenon, but the uncertainty about its consequences leads to focus on adaptation rather than on mitigation). Finally, Capstick and Pidgeon (2014) identify two main streams named "epistemic scepticism" (sceptical about climate change as a scientific and physical phenomenon) and "response scepticism" (sceptical about the efficacy of action taken to tackle climate change).

change exist such as the Center for the Study of Carbon Dioxide and Global Change⁵, the George C. Marshall Institute (<http://www.marshall.org>)⁶, and the World Climate Report⁷ (for a more comprehensive list of conservative think tanks see Jacques, Dunlap, & Freeman, 2008). In addition to these, Sharman (2014) identified a network of 171 blogs that critically review climate science findings. These groups aim to systematically review the literature produced by climate scientists to "criticise" those messages that they believe to be "too exaggerated"⁸.

Another relevant factor to consider in the "scepticism versus belief debate", is represented by the role of the media in contributing towards increasing suspicion or confidence in climate science by giving different amounts of attention and space to climate change sceptics and supporters (Boykoff & Boykoff, 2004; Painter & Ashe, 2012; Takahashi et al., 2017). Some literature investigated the trends in media coverage of climate change in the UK, finding that newspapers and tabloids tend to use opinion polls to portray a distort image of a public that does not support pro-environmental actions (Höppner, 2010), and an increasing presence of sceptical voices over time (Painter & Ashe, 2012). Moreover, a research conducted by Whitmarsh (2011) on public perception of climate change between 2003 and 2008 in the UK, found that around half of respondents agreed with the sentiment that the media can be alarmist about climate change, and that a large part of the public believes that experts do not agree about whether human activity causes climate change. These results might also indicate that when media communication about climate tends to use alarmist tones, this produces controversial reactions in the public. In fact, instead of activating concern about the problem, they seem to enhance the awareness that media reporting tends to both overestimate the problem and dramatize its related messages. This is also confirmed by a study conducted in the UK by O'Neill and Nicholson-Cole (2009), who found that fear-inducing and dramatic messages are ineffective for promoting engagement⁹. Therefore, the controversies around climate change appear to relate not so much to the existence of the phenomenon as to the ways to prevent and deal with uncertain consequences. It derives a sort of generalised "state of uncertainty" that is mostly attributed to the

⁵ The Center for the Study of Carbon Dioxide and Global Change publishes weekly reviews of scientific publications on the relationships between the carbon dioxide and global change (<http://www.co2science.org>).

⁶ From 1984 to 2015 the George C. Marshall Institute defended the idea that climate change impacts were over-estimated as well as the impacts produced by human activity on the phenomenon (<http://www.marshall.org>).

⁷ World Climate Report is a blog that adopts a sceptical point of view in analysing the literature and popular press on climate-change related issues (<http://www.worldclimatereport.com/>).

⁸ Additional examples of sceptics' blogs are: Climate Etc (<http://judithcurry.com/>), Climate Depot (www.climatedepot.com), ICEcap (<http://ICEcap.us>), New Zealand Climate Change Science Coalition (www.Nzclimatescience.net), World Climate Report (<http://www.worldclimatereport.com/>), Energy Depot (<http://www.energydepot.us/>), Whatsupwiththat (<http://wattsupwiththat.com/>), Newsbusters (<http://newsbusters.org/>), ecofascism.com, Market Resource (<https://www.masterresource.org/>), Noconsensus (<http://noconsensus.org/>), Bishop hill (<http://bishophill.squarespace.com/>), Science based policy blog (<http://sppiblog.org/>), Paul Chesser (<http://nlpc.org/blogs/paul-chesser>), Junkscience (<http://junkscience.com/author/greenhellblog/>), Climate Realists (<http://climaterealists.com/about.php>), The sceptic sceptic (<http://thesepoticsceptic.com/>), The climate sceptics party (<http://theclimatescepticsparty.blogspot.co.uk>).

⁹ In a slightly different way, findings from the field of environmental psychology showed that fear-based messages can motivate action against environmental problems, but only if they combine with problem-focused approaches and group efficacy beliefs (Amelung et al., 2016; Hornsey et al., 2015; Moser, 2016; Somerville & Hassol, 2011; van Zomeren et al., 2010).

"invisibility of causes, distant impacts, lack of [...] direct experience of the impacts, [...] disbelief in human's global influence" (Moser, 2010). This is an important aspect that will be considered in the analysis of media narratives of climate change, because contrasting messages ("consensus/uncertainty-oriented", and characterised by "over/under-estimation" of consequences) may induce two polarised pathways, or by contrast the predominance of one of these two contrasting directions.

4. The Origin of the Denial Industry

The previous section highlighted how the uncertainty, which is a constitutive driver for scientific advances, might be instrumentally used to promote confusion around climate-related issues so as to portray a conflictual picture of the scientific debate. In the following section, the main traits of climate denialism will be described, which in turn will be useful to understand what characteristics of these "denial" strategies are reflected into British newspapers' reporting (see chapters five, six and seven).

The sceptics' strategies to contest environmentalism and portray it as a "myth" have been studied by a number of scholars. For example, *The Limits to Growth*, which represented one of the milestones for the environmentalist movement, was counter-attacked by Beckerman's book *In Defence of Economic Growth*. The same author also published *Small is Stupid* in response to Schumacher's *Small is beautiful* (Douglas, 2007). However, individual attempts to contest the promotion of environmentally-oriented attitudes have evolved in structured organisations over time, which in turn reflect corporations and lobbyists' interests against environmental regulation. In this vein, a review of 141 environmentally sceptical books published between 1972 and 2005 (Jacques et al., 2008) shows the connection of 130 of these publications to conservative think tanks (via author affiliation, publication sponsorship, or both)¹⁰.

The roots of environmental scepticism emerged in the US in the early 1980s, due to an increasing effort of conservative forces to defend corporate interests, followed by an "anti-environmental protection" administration (Jacques et al., 2008). The resistance of conservative forces also increased with the evolution of the environmental movement into a "global phenomenon", the publication of the first IPCC Report (1990), and the 1992 Earth Summit in Rio, also supported by the decline of the Soviet Union and the spread of global capitalism (Jacques et al., 2008). The principal strategy adopted by these conservative think tanks was to base their arguments on scientific incongruences, which means systematically attacking scientific findings trying to show their inconsistency and exaggeration (Buell, 2003). The aims of these attacks were to create an image of environmentalism as a threat to both the western capitalist accumulation paradigm and human progress (Austin, 2002; Douglas, 2007; Jacques, 2006, 2008), and of the climate science as "junk science" (Dunlap & McCright, 2010; Herrick & Jamieson, 2001) to hamper/reduce government environmental regulation (Mooney, 2005). Among the main financial supporters of climate change denial, Dunlap and McCright (2010) identify corporations such as Peabody Coal and ExxonMobil, and industry

¹⁰ 19 out of 20 books published in the UK were found to have connections with conservative organisations.

associations such as the Western Fuels Association and The American Petroleum Institute. From this starting point, a number of energy, manufacturing and natural resources-dependent companies have joined these associations or created new ones such as e.g. the Global Climate Coalition (GCC), The Cooler Heads Coalition (CHC) and The Oil and Gas Climate Initiative (OGCI) (see also Influence Map, 2019). However, the authors identify an evolution from denying climate change towards acknowledging the human contribution to the problem and embracing an apparent environmentally friendly discourse. This was manifest in the withdrawal from these associations by several oil companies (Dunlap & McCright, 2010). However, companies such as e.g. Shell and British Petroleum, officially recognised the reality of climate change, but secretly continued to support campaigns aimed at increasing confusion around climate change (Mulvey & Shulman, 2015)¹¹.

The effort made by conservative groups to promote anti-environmentalism is shown by their funding to research institutes especially in the USA, such as e.g. The Heritage Foundation (right wing think tank established in 1973), the American Enterprise Institute (established in 1938), the Cato institute (established in 1977), the Heartland Institute (established in 1984), and the Science and Environment Policy Project (established in 1989) (Gelbspan, 1997). The latter was founded by a physicist Fred Singer, who also contested the environmental tobacco smoking effects on humans' health (Oreskes & Conway, 2008), and founded the Non-Governmental Panel on Climate Change (NIPCC) in 2004 to criticise the official IPCC reports (Dunlap & Jacques, 2013), which in turn is annually hosted by the Heartland Institute. All these institutes recruit or sponsor scientists, who often are not expert in climate science, to produce literature that contests mainstream findings (Austin, 2002). However, one of the initiator of this structured counter-attack against climate science was the George C. Marshall Institute, which represented an "inspirational model" for other conservative think tanks. Since its foundation (closed in 2015), the institute emphasised (through mass media and its own communication channels) the uncertainty around climate change, which attempted to disprove that global warming was real and is primarily caused by human activity, and which challenged the notion that it would result in damaging effects (Lahsen, 1999; Oreskes & Conway, 2008). Moreover, several studies and investigative journalism have shown the connections between some scholars, politicians (see e.g. Austin, 2002; Jacques et al., 2008; Lahsen, 1999, 2005; Mooney, 2005), the media (see e.g. Austin, 2002; McCright, 2000, 2003) and these conservative think tanks and corporations. In fact, a mixture of journalists, academics and think tanks' spokespersons justify their attacks on environmentalism and science by using a scientific basis. More specifically, some figures such as the Danish political scientist and statistician Bjørn Lomborg¹², Fred Singer, meteorologist at the University of Virginia, Richard Lindzen, Professor of Meteorology at the Massachusetts Institute of Technology, are recognised to be "academic focal points" for sceptics (Douglas, 2007). Moreover,

¹¹ Although fossil fuel companies have publicly denied their contribution to climate change for long time, in the 1980s several organisations, such as e.g. Exxon Corporation (1980) and Shell (1988), had already produced internal reports that acknowledged the link between fossil fuel production and rising temperatures.

¹² Author of "The Skeptical Environmentalist" (2001) and director of the Copenhagen Consensus Center (CCC), which was financed by Paul Singer's conservative foundation in 2013. CCC funders were also linked to organisations funded by the Koch brothers (Readfearn, 2015).

journalists such as Melanie Phillips (*Daily Mail* writer since 2001, after her long experience at *The Guardian*), Peter Hitchens (*Mail on Sunday*), and writers such as Michael Crichton are identified in the frontline against environmental policies (Douglas, 2007; Oppermann et al., 2011). Reflecting on their strategies of building resistance to environmentalism, while at the same time promoting the "free market" as the best mechanism for generating economic growth, Douglas found similarities with anti-socialism/communism strategies. In a similar way, and echoing Buell (2003), Dunlap and McCright (2010) argue that the US conservative movement substituted the "red threat" with the "green threat" after the fall of the Berlin Wall and the decline of the Soviet Union. Moreover, Oreskes and Conway (2008) refer to climate science as a "victim of the cold war", given that denials portray a picture of environmentalism as a threat to capitalism (a "totalitarianism ideology") that implies restrictive regulations. This is also confirmed by journalists' descriptions of environmentalism as an "orthodoxy" (Phillips, 2006, p.19), "a totalitarian regime" (Leake, 2008, p.7), and "unshakeable faith" (Bellamy, 2004, p.12). Another example is represented by the tendency to describe climate change as natural and potentially solvable by industrial growth, such as in the following case: "natural disasters are just that: acts of nature that have no human cause but whose effects may be reduced by industrial development" (Clark, 2005, p.23).

Moreover, politicians (especially in the US and belonging to the Republican Party) have promoted denial of climate change in favour of free-market mechanisms, also by appointing individuals affiliated to oil companies to key governmental positions¹³ and inviting sceptical scientists at Congressional hearings on climate change (McCright & Dunlap, 2003). Their direct connections with the aforementioned institutes have been revealed by several studies (e.g. Douglas, 2007; Jacques et al., 2008; Dunlap & McCright, 2010; Oreskes & Conway, 2008). This means that the "denial machine" has increased its connections over time by influencing different spheres and sectors of the society. In fact, as reported by Rahmstorf (2005), pressures from organisations such as Frontiers of Freedom (FF), the Science and Environmental Policy Project (SEPP), and the Global Climate Coalition contributed to the US exit from the Kyoto Protocol (Hope & Savage, 2019).

All the characteristics of the denial strategy listed so far reflect the five-step process described by the Union of Concerned Scientists (2007) in exploring the similarities between the climate change denial campaign and Tobacco campaigns to deny smoking-related health risks. The five steps include: i) "manufacturing uncertainty" through the constitution of coalitions (such as e.g. the Global Climate Coalition) and internal scientists to publish in-house articles; ii) activating "information laundering" by funding research institutes (such as e.g. the Cato institute and Frontiers of Freedom) that constantly cast doubts about scientific evidence; iii) "promoting scientific spokespeople" who become official scientific voices of denialism (such as e.g. Frederick Singer, John Cristy, Patrick Michaels, Willie Soon and Sallie Baliunas, and Frederick Seitz); iv) "shifting the focus of the debate"

¹³ See e.g. the case of Gale Ann Norton, United States Secretary of the Interior (2001-2006) under President George W. Bush. She was co-chair of the Coalition of Republican Environmental Advocates, which in turn was funded by corporations (e.g. Texaco) and organisations (e.g. the Chemical Manufacturers Association and the National Coal Council) that include lobbyists for petroleum and car industries (Austin, 2002; Jacques et al., 2008). Moreover, her deputy was a mining industry lobbyist (Shank, 2002).

on the uncertainty that makes it difficult to plan strategies of action (hence supporting delay in action); v) influencing "political decisions" and "actors" (e.g. the authors found that between 2000 and 2006 Exxon/Mobil gave more than \$4 millions of dollars to candidates and parties in the USA). All these steps aim to promote the idea that the science is not settled, and that proper solutions cannot be defined in relation to the high degree of uncertainty around a multiplicity of aspects related to the phenomenon.

As further analysed in the next chapters, the importance of framing climate-related issues is an integral part of the promotion of scepticism among the public by corporations. For example, in an unpublished memo in 2002 Frank Luntz (advisor of the Bush's administration) advised republicans to use the term "climate change" instead of "global warming". This related to the fact that "'Climate change' has less frightening connotations than 'global warming'" (Luntz, 2003, p.142), suggesting that there was a need to frame climate-change related issues in a way that did not increase public concern (Saunders, 2017). His note aimed to support the idea that climate change is a natural phenomenon, and since humans are not responsible, there is no need for restrictive policies (Lakoff, 2010). Then, Luntz reinforces the idea that "environmental policies should take into account the economic impact", hence prioritising economic growth instead of a "not urgent" environmental protection. From this point, several studies have shown how framing the climate change in certain ways and using specific terminology might produce different reactions and concern (see e.g. Myers et al., 2012; Nisbet, 2009; Whitmarsh, 2009)¹⁴. This is also the reason why in May 2019 *The Guardian* published a style guide that recommends the use of specific vocabulary, which favours "climate emergency/crisis breakdown" over "climate change", and "global heating" over "global warming" (<https://www.theguardian.com/guardian-observer-style-guide-g>). The guide sustains that these terms reflect the severity of climate change as described by climate science (Carrington, 2019).

The features identified in chapter one about the overall scientific consensus on climate change contested by a minority of scientists (mainly connected to conservative think tanks and corporations) who question either the causes or the consequences of climate change, and instrumentally use uncertainty to generate scepticism around the reality of phenomenon, will be taken into account in the empirical sections of this work.

Summary

The First World Climate Conference in 1979 established that climate change was "an urgent world problem" to be tackled through governments' intervention. Despite the number of organisations, scientists and programmes at play, a "systematic uncertainty" characterises the climate science debate. While uncertainty is a constitutive feature of science, in the climate debate it is instrumentally used to promote confusion and scepticism among the public. In turn, this might also influence public support for new policy-measures. The multiplicity of attempts to classify sceptical positions indicates that "scepticism" represents an integral part of the climate change discourse. In

¹⁴ Villar and Krosnick's study (2011) produced additional insights in this direction by finding that in the USA "global warming" was more "appealing" for Democrats, and "climate change" for Republicans. Moreover, Schuldt, Konrath and Schwarz (2011), and Schuldt, Roh and Schwarz (2015) found similar differences in the USA in relation to respondents' political orientation.

this debate, the media play a relevant role in selecting the voices who speak for the climate, in selecting information to be communicated, and in framing messages in certain ways that promote (or not) engagement and specific orientations. If at the beginning of the climate debate, scepticism mainly questioned the existence and the causes of the phenomenon, nowadays, the controversies shifted towards the ways to deal with uncertain consequences. Finally, the ways in which scepticism expresses its positions in the media debate can be different: it can explicitly attack the mainstream science, but it can also be implicitly contained in the kind of frames and tones adopted by the media. This means that, for example the use of sensationalism and dramatization can contribute towards supporting the idea that mainstream scientists too exaggeratedly consider the consequences of the phenomenon and try to disseminate panic. This is an important aspect to consider in a moral panic perspective, because contrasting messages ("consensus/uncertainty-oriented", and characterised by "over/under-estimation" of consequences) might cause either the raise of two polarised positions, or the predominance of one of these two contrasting forces.

Chapter 2 Moral Panic and Climate Change: a controversial debate

Key points

Chapter two introduces the theoretical framework adopted in this work to explore media reporting on climate change. It focuses on the moral panic concept and related criticalities (section one), by exploring its application to the climate change phenomenon (section 1.1). Moreover, it briefly explores the role of contrasting political economic positions in shaping a moral panic of climate change by highlighting some similarities between moral panics and political economy approaches (section two). All these elements contribute towards exploring the relationship between media and power, and how moral panics can help understand it. Some key components of the moral panic framework are also useful to analyse the process of framing the "threat" in the context of climate change (section three).

1. Between Moral panic and Moral Regulation

The first use of the term moral panic appears in McLuhan work in 1964 (Rohloff et al., 2013). From this starting point, the concept became a common part of academic discourse in the 1970s thanks to the work of Cohen (1972) and Young (1971, 2009). Their conception of moral panics represented the starting point for shifting the focus from the causes of social deviance to the representation/perception of and reaction to it. It is mostly recognised that the term "moral" traces a boundary between "good" and "evil", and identifies as "dangerous" every threat to the moral order; whereas the term "panic" is often associated with extreme and "irrational" reactions (Rohloff et al., 2013) to ensure safety (Garland, 2008). At the same time, Cohen's distinction between "good" and "bad" moral panics suggest that the "morality" of panics not only concerns the causes, but also the effects produced by "societal shocks". In fact, the existence of good moral panics assumes that they can be "encouraged" and "activated" for triggering changes in society (Rohloff et al., 2013).

Since Cohen's definition of moral panic as "a condition, episode, person or group of persons [that] emerges to become defined [by the mass media] as a threat to societal values and interests" (2011a, p. 1), the moral panic concept has been applied, and in turn criticised, to many different issues such as mugging (Hall et al., 1978; Waddington, 1986), single and working mothers, pornography on the Internet and state censorship (Miller & Kitzinger, 1998), AIDS (see e.g. Strong & Berridge, 1990; Watney, 1988; Weeks, 1989), paedophilia and satanic child abuse, drugs and rave culture (Thornton, 1994), immigration (see e.g. Brouwer et al., 2017; Hauptman, 2013), media violence, street crime and youth deviance (Cricher, 2003, 2008), but also environment and climate change (Rohloff, 2011a, 2013b).

Usually, the emergence of a moral panic follows three main stages, represented by an "episode substage" (Klocke & Muschert, 2013) in which an event, characterised by a dramatic character, occurs and attracts media attention. Then, the media start to construct a "new" narrative of the event by exaggerating and distorting the reality of it, predicting new "alarming" events and suggesting

actions to stop their occurrence, and connecting images and symbols that become representative of it ("inventory phase" for Cohen, 2011a). During this "magnification substage" (Klocke & Muschert, 2013), the "moral" judgement is progressively constructed against the threat (by the so called "moral entrepreneurs" who represent the "primary definers" of the problem), the causes and specific folk devils responsible for the "moral shock" ("opinion and attitude themes phase" for Cohen, 2011a). Finally, the "regulation substage" (Klocke & Muschert, 2013) responds to a "collective hysteria" in which specific social control actors and measures are identified to correct the deviance and re-establish the "order" ("rescue and remedy phase" for Cohen, 2011a). In relation to these stages, it is possible to identify three main questions concerning the moral panic debate: "Why" was a moral panic generated, "Who" activated the process, and "How" the moral panic raised, developed, and ended. These three questions (and the related phases) will help guide the critical reading of the specific literature on media communication of climate change in the next chapter. They will also be useful in terms of identifying the characteristics of moral panics emerging from the empirical analysis.

In general, the reasons why moral panics emerge are debated, but they are generally interpreted as an attempt to reaffirm the "moral order" against deviants recognised as a common threat, whilst the consequences of these panics are likely to produce long-term impacts in terms of new measures (or their reinforcement) (Critchler, 2008) and normative transformation (to "control" specific behaviours) (Goode & Ben-Yehuda, 2009). For Hall et al. (1978) moral panics represent a means through which the State reaffirms its power by reinforcing its social control. This characteristic connects the issue of "Why" to that of "Who" generates moral panics. The role of primary and secondary definers of social scares has become central in the moral panic discourse. On the one hand, the primary definers are identified in representatives of the State (Hall et al., 1978), thus attributing to the media a role of secondary reporters of the problem, which reflect the "existing structure of power". On the other hand, some authors (see e.g. Critchler, 2003) argue that the media can be primary definers because they "legitimise" the claim-makers. Finally, it is suggested that it is not possible to *a priori* classify the primary or secondary definers, instead they should be identified in relation to each specific case. Three main sources are held responsible for the origin of moral panics: grassroots communities, the elite and the middle-level interest-groups - giving rise to the grassroots-based, elite-engineered and mid-level interest group models (Goode & Ben-Yehuda, 2009). The grassroots model refers to an increasing panic that spreads from the bottom level of the society (e.g. public concern around sexual abuses by satanic cults caused by "rumours" that stereotype specific categories of people, see Victor, 1998). The middle-level interest group model considers the role of intermediate groups within civil society, such as citizen associations, activists and voluntary organisations in facilitating the spread of panic (e.g. using the pre-existing rumours to inflame public concern about satanic cults' practices to justify their persecution). The elite-engineered model sees the powerful elites as "manipulators" of the public perception (e.g. the "anti-Communist witch-hunt" promoted by political forces and corporations in the USA in the 1950s, see Victor, 1998).

In contrast to Goode and Ben-Yehuda, who emphasise a middle-level interest group perspective, Hall et al. (1978) recognised the primary role of the media in spreading moral panics, but only in

terms of reproducing the structures and relations of the ruling elite. Moreover, supporting their approach, Hunt (1997) criticises the use of the moral panic framework as suggested by Cohen and Goode and Ben-Yehuda, interpreting moral panic as a political rather than cultural phenomenon. In contrast, David et al. (2011) give particular attention to new emergent moral entrepreneurs (such as e.g. feminists), different from the traditional ones, who are outside the dominant structure of power and are capable of gaining media attention. This suggests a third interpretation of moral panics close to both the grassroots model and the middle-level interest group. These conflicting interpretations of the claim-makers indicate that there is no universal agreement about the actors who initiate the process, however, what is common to these approaches is an imposition of moral panics by specific interest-groups (from the bottom, the middle or top levels).

Three main criticisms have emerged: the negative judgment inevitably associated with moral panic; the conspiracy of specific interest groups behind the origin of moral panics; and the gap between media representation of the threat and reality.

While, in some cases, "victims" and "agents" who claim or act on the threat are more easily identifiable (such as in the case of Mods and Rockers described by Cohen), the identification of and the role played by the folk devils is frequently more problematic. In fact, some authors (see e.g. Critcher, 2003) suggest that folk devils are not indispensable for generating moral panics, given that in some cases, the counter-reaction of the folk-devils can "turn the table". For example, the folk devils might counter-organise protests (Hier, 2002b) or use micro-media (such as flyers) and niche-media (such as music and specific magazines) (McRobbie & Thornton, 1995; Thornton, 1994) for developing new sub-cultures and defending their position. In turn, this might generate conflicts between two groups ("moral entrepreneurs versus folk devils"). Accordingly, some authors suggest that moral panic researchers should focus on investigating the role of "contrasting communities" (Rohloff, 2012; Walby & Spencer, 2011). In some cases, the lack of "generalised consensus" around the threat suggests a shift from the traditional interpretation of moral panics towards a "culture war" characterised by contrasting social groups (Garland, 2008). At the same time, Rohloff (2012) argues that some forms of moral panics, such as in the case of climate change, can contribute to denial, but this does not mean that denials hamper the rise of moral panics. Accordingly, Dandoy (2015) suggests the adoption of a "field perspective" (context-based), which does not require a "generalised panic", but different social reactions can co-exist and "moral-panickers" have to be sought within each field (without excluding their connections with external actors/context)¹⁵.

The role of the media (and their agenda setting) in both endorsing the claim makers and constructing the image of folk devils is generally recognised to be fundamental. Critcher (2003, 2008) compares the two models of analysis proposed by Cohen (processual model) and Goode and Ben-Yehuda (attributional model) finding both similarities and differences (see also chapter four for the combination of these approaches adopted to empirically investigate moral panics in British

¹⁵ Finally, it is also suggested that the disproportionality in representing certain groups or persons as folk devils might evolve into proportionality because these people can actually become like their label in response to an increased social control and their stigmatisation (Young, 2009). In some other cases, there might be an evolution from "folk heroes" to "folk devils" (such as in the case of politicians, see Flinders & Wood, 2014).

newspaper reporting on climate change). Both approaches interpret moral panics as exaggerated forms of reaction to/perception of a problem in the public arena, characteristic of modern society, and a means for reaffirming the core values of the society. Beyond the similarities, Critcher identifies three main differences regarding the role played by the media, the agents, and the language. In Cohen's approach the media are essential "initiators" of the process, the agents (such as state agencies, politicians etc.) contribute towards constructing the issue, and the emphasis is on the "ideological discourse" behind moral panics (such as e.g. law and order). From Goode and Ben-Yehuda's perspective, the media play a passive role in transmitting views of others, and the focus shifts from the agents to the strategies adopted by the claim makers to influence the public and their "rhetoric". More specifically, he highlights that mass media, claim makers and political elites are all responsible for creating a "circuit of communication", which in turn generates moral panics. Following this perspective, the role of the public is only marginal because the public opinion is "constructed" (by the media, politicians and claim makers) rather than "activated", as if the media were themselves public opinion (Critcher, 2008). This interpretation of the public also responds to some criticisms made of the moral panic framework that assumes that the public opinion exactly reflects the media representation of it (Hunt, 1997; Miller & Kitzinger, 1998). In Critcher's view (2008), the public is instrumentally used by the media to empower themselves in the interaction with other claim-makers.

The debate around the role of the media in either supporting specific claim-making or being themselves primary definers, also echoes the discussion about the relationship between media and power (Curran, 2002) (see also section two of this chapter). This raises questions about their role as watchdogs of democracy (as highlighted by the traditional liberal theory), thanks to their independent position in the free market (Curran, 2005, 2011). However, the free market has progressively generated mechanisms of profit-oriented strategies that in turn might transform the media from watchdogs to "corporate mercenaries" (Curran, 2002), which create alliances with politicians and other powerful actors in order to defend their interests. This also means considering not only how the media frame information (and the threat), but also those actors who own the media and their relationships with the structure of power, by investigating the interests (internal and external to the media) behind certain representations of specific phenomena (such as in the case of climate change) (Doyle, 2005; McCullagh, 2002).

There exists a straightforward relationship between the issues of "Why" and "Who", and "How" moral panics take shape. Cohen identified some indicators such as e.g. increasing the size, the seriousness, and the negative consequences of a phenomenon, reporting "false" stories, and focusing media attention on a specific phenomenon while ignoring a more serious one. The combination of all these factors generate panic and consequent reactions of the public, the media and the social controllers against those persons/groups/conditions as presented by the media as folk devils (Brisman & South, 2015). The disproportionality in terms of reaction is translated into the adoption of measures that are not proportionate to the real gravity of the phenomenon (Young, 2009). This disproportionality responds to a widespread social anxiety that is in turn increased by a constant exposure to media reporting, which highlights the negative consequences of selected phenomena. From these definitions of moral panics, the importance of the media as key-actors who might pressure

politicians to act emerges (Lashmar, 2013). It is difficult to demonstrate either if journalists report specific events with an *a priori* intention to generate moral panics or if these mediated stories are only later labelled as "moral panic" generators (Lashmar, 2013). However, following the definition of framing proposed by Entman (1993), both conscious or unconscious framing judgments can contribute towards deciding what to say and how to say it (see also section three of this chapter). Moreover, the negotiation between journalists and editors (especially in the climate change context) impacts the ways in which the proposed stories fit with dominant news frames (Smith, 2005). The result might be the prevalence of stories that fit editorial standards more than the scientific reality of the issue. At the same time, Hall et al. (1978) recognise a kind of involuntary subordination of the media to powerful actors. In fact, even though reporters play a primary role in selecting and coding the news, they "faithfully and impartially" reproduce the dominant social structure because they depend on "institutional voices" for constructing their "stories" (Hall et al., 1978).

The main criticisms of the moral panic approach focus on "disproportionality" e.g. how to measure the gap between the "over-estimated" representation of and "over-reaction" to a phenomenon and the real threat (Cornwell & Linders, 2002; Waddington, 1986), the incalculability of the "new risks" (Beck, 1995), and the morality as no longer applicable to some new risks (Ungar, 1995, 2001). Responding to these criticisms, Critcher (2008) highlights that the moral panic frame should be interpreted as an ideal type that is open to different approaches, but which cannot universally fit the variety of issues that researchers investigate. In a similar way, Rohloff (2012) suggests that moral panic should be interpreted as a "sensitizing concept" that "adapts" to the evolution of the social context over time. In the attempt to respond to these critiques, some authors have proposed mixed approaches for understanding the new forms of risk. Some authors suggest incorporating the moral panic concept into a wider moralisation process (Hier, 2002a, 2008; Hunt, 1997). The moralisation is seen as a process for increasing individual/community empowerment and responsibility against risks. Collins (2013) suggests that the adoption of the Foucauldian governmentality approach might help explore the "social construction of risk issues". In fact, this approach might provide alternative strategies to understand the moral regulation beyond the "conservative ideologies" that are often attributed to the moral panic framework. In this sense, the risk should be interpreted as a means to produce "knowledge": "it defines average behaviour and probabilities and, thus, suggests what is normal and what has to be done" (Zinn, 2007, p. 13).

The next section will explore how these critiques might combine in the application of the moral panic lens to climate change. It will consider how the concept might further evolve in relation to the emergence of this "new risk". This evolution is essential to understanding why the moral panic concept is still valuable to explore "new risks" (such as climate change) even in the presence of contrasts. It also helps understand how the moral panic has been conceptualised and operationalised for the empirical analysis of this work.

1.1. Between Moral Panic and Social Scare in the environmental discourse around climate change

Goode and Ben-Yehuda (2009) countered critics who disdained the application of the moral panic concept to the "new risks", by arguing that the new risks are not totally incalculable by experts and they should be interpreted in relation to the evolution of the social morality over time. This is supported by the fact that even in the context of nuclear energy production, the effects produced by potential related incidents (e.g. Chernobyl), are less harmful than other "accepted" causes of pollution. However, the public fear of "nuclear incidents" is higher compared to other sources of pollution. According to Critcher (2003), the concept of moral panic should be revised by no longer assuming that "folk devils", "volatility" and the "public support" are essential to generating moral panics. In contrast, following Maneri (2013), the identification of specific deviants enables the definition of a community ("us") against a common "enemy" ("them"). However, the absence of folk devils contributes towards creating some similarities between the moral panic and the risk society (Critcher, 2003). At the same time, this interpretation of the concept collides with the position of Ungar (1995, 2001) who refuses to apply the moral panic framework to the new (unpredictable) risks. He suggests that the global warming phenomenon should be read in the light of "social scare" rather than "moral panic" due to the impossibility of objectively measuring the threat (Ungar, 1992, 1995). This characteristic is also highlighted by Goode and Ben-Yehuda (2009) who point out the importance of the combination of both real events and stories told by the media for generating moral panics (see also Marsh & Melville, 2011). However, the role of media reporting is recognised to be fundamental in contributing towards constructing public opinion and generating moral panics, by both "amplifying" or "de-amplifying" the phenomenon (Murphy, Dunning, & Williams, 1988). This is particularly evident when audiences have not direct experience or knowledge of the phenomenon (Hall et al., 1978), as in the case of climate change (David et al., 2011). In several works, Ungar (1998, 1999, 2000, 2003) criticises the role of the agenda setting. More specifically, he argues that, in both substantive and temporal terms, the media tends not to set the public agenda on climate change. At the same time, the author refers to the "presentation" and the "selling" of the problem by claim makers (mainly the media, but also policy-makers and scientists) as "failing" because of its "future-orientation" in terms of (uncertain) consequences (1992, 1995, 1998, 2003). In contrast, Hier (2003) argues that the emergence of the risk society creates favourable conditions for generating moral panics. In fact, given that risk-based problems are future-oriented and connected to a non-specific damage, they offer individuals opportunities to reduce potential harms by adopting "precautionary" strategies against the threat (Hier, 2015). These considerations trigger a reflection on the "social construction process of risks" (Douglas & Wildavsky, 1982). In fact, given the "hybridity" of the concept that classifies risks as "nature/culture constructs" (Zinn, 2007), if risks are classified as "objective" (as identified by "scientific measures"), but also as perceived (as socially and culturally conceived by people), the (political) representation of them by the media seems to contribute towards blurring the boundaries between these two categories. This can also produce consequences in terms of reaction to the risks (Garland, 2003). Similarly to what emerged in the

moral panic debate, these reflections recall the problems related to the "real entity" and the "hysterical and over-exaggerated" reaction to a "mediated and constructed" threat to the moral order. Moreover, the insistence on both the "negative nature", in terms of something that is "unpredictable", "uncertain" and "inescapable" (Beck, 1995) and "opportunities" (in particular in economic terms) deriving from risk-management (Bernstein, 1996; Garland, 2003), seems to somehow contain the echoes of Rohloff et al.'s (2013) distinction between "bad" and "good" moral panics.

It is worth reconsidering the public perception of climate change in terms of different "scares" generated by both the direct experience of the problem and the representation of the problem by the media. The analysis of different public perceptions of climate change as "exaggerated" or as an "imminent threat" should also take into consideration the multiplicity of versions proposed and framed by the media. As Critcher (2003) highlights, moral panics cannot be generated without the media. This indicates that media representation and social/personal experience of real events might be equally important in generating "turbulence" among the public (Akerlof et al., 2013). Accordingly, Goode and Ben-Yehuda (2009) refer to global warming as a new form of "amoral panic" (Waiton, 2008) that represents a "reasonable concern to a very real and present danger". Criticising Ungar's distinction between moral panic and risk panic, Rohloff (2011a: p. 10) highlights that "risk can be moralized and [...] moral panics themselves involve risk discourses". This also means that moral panics can be conceptualised as forms of discourse that reinforce (exaggerating the reactions to) the risk consciousness and are an integral part of moral regulation in time of crises (of which they are simultaneously causes and consequences) (Critcher, 2008).

Controversial results emerged from both the theoretical discussion and the empirical application of the moral panic framework to the climate change phenomenon. To date, a limited number of works have studied climate change as a threat to societal values and interests, such as Rohloff (2011a, 2013b) and Brisman and South (2015). From these works different and sometimes contradictory results emerge: while Rohloff (2011a, 2013b) and Cohen (2011b) identified climate sceptics/deniers as folk devils (together with other economic and political actors), for Brisman and South (2015) mainstream climate scientists are depicted as "folk devils" by sceptics/deniers.

Rohloff (2011a, 2011b, 2013a, 2013b) and Rohloff and Wright (2010) suggest that moral panic should be revised in relation to climate change not only in terms of "proportionality", but also as a "moralising discourse", by taking into account the dialectic between "bad and good" moral panics. Her application of these concepts to the analysis of documentaries (Rohloff, 2011a, 2013b) and other media (Rohloff, 2011a) devoted to promoting environmentalist lifestyles, shows that climate change campaigns might be used as "good moral panics" (Rohloff, 2013b, p. 409) that might be translated into "long-term civilising trends" (Rohloff, 2013a). This position is consistent with those studies that found that films can serve as mediator for public understandings of science (Frank, 2003; Kirby, 2003a, 2003b, 2003c, 2011). At the same time, findings from the field of environmental psychology reveal that increasing levels of awareness does not necessarily translate into long-term behaviour change (Nolan, 2010). Moreover, the dramatization of a scientific truth might be instrumentally used by climate change sceptics to discredit climate science as "exaggerated and alarmist" by undermining public trust in scientists (Von Burg, 2012). Finally, as Rohloff argues, the climate change debate also

generates "bad moral panics" and processes related to the notions of "good" and "bad" behaviours that are also translated into "good" and "bad" people (Rohloff, 2013b)¹⁶. In contrast to Rohloff, for Brisman and South (2015) the moral panic theory operates "in reverse" with respect to climate change. This means that, considering the five components of moral panics identified by Goode & Ben-Yehuda (2009), the resonance of contrarian voices in the climate change debate produces opposite effects in terms of disproportionality of reaction; concern or fear of the threat and actors responsible; hostility to the objects of the panic; widespread agreement or consensus that the threat is real; and volatility of fear or a "coming-and-going" concern. The authors identify a de-escalation rather than escalation (in terms of reinforcement of measures against the "problem"). They identify the forces behind this denigration of climate scientists in the interests of free-market capitalism and neoliberalism (Brisman, 2012). However, when Brisman (2013) analyses children's stories on climate change and environmental harm, beside suggesting that children's story should be careful in not "individualising" the climate change problem and, thus implicitly defending the claimed limited capacity of governments to intervene (which in turn perpetuates the neoliberal market system of production), he seems to adopt a perspective similar to that adopted by Rohloff in analysing Al Gore's documentary. In fact, both authors refer to potential behavioural changes deriving from media's narratives. In both cases, the media (documentaries or children's books) play an important role in activating "good moral panics" that promote processes of civilisation. Moreover, when Brisman (2012, 2013) and colleagues (Brisman & South, 2015; Dunlap & McCright, 2010, 2011) argue in several works that the climate change contrarianism depends on powerful corporate and political interests, they support the hypothesis that moral panics are tools to reaffirm the powerful structure in time of crisis. The media play a primary role in institutionalising these contrarian voices (and interests) by e.g. giving them equal time to that given to "climate change realists", and promoting confusion and instilling doubts among the public. Finally, the emergence of a dialectic between "good" and "bad" moral panics in the context of climate change supports the hypothesis of a polarisation between contrasting forces, which in the case of newspapers' reporting might be identified in the tensions between contrarian and advocate narratives.

2. Media and political economy of climate change

Given the complexity of climate change, which has become one of the "most politicised scientific issue" to date (Boykoff & Yulsman, 2013), it is useful to consider the political economy approach when investigating the construction of news reports on climate change. Moreover, considering the "moral panic potential" of climate change, there is still a need to explore the role of the media in serving the economic interests of political elites (Cricher, 2011). This is particularly valid in the context of climate change in which a multiplicity of actors and stakes are at play.

According to liberal approaches, the free market facilitates the representation of a multiplicity of voices by the media that become a "public arena" for discussion, since they only depend upon readers'

¹⁶ She refers to the example of those activists who prioritise animal/environment rights over the people's ones.

judgement which allows them to continue operating within a competitive marketplace and be independent from external influences (Curran, 2009). This happens thanks to the mechanisms of competition between groups and interests that the free-market activates, being independent from the state, political parties and external pressures (Curran et al., 1977). Furthermore, the radical revisionism of traditional liberal approaches focuses not only on the role of the media as "neutral" gate-keeper between the government and the public, but it simultaneously takes into account a multidirectional communication between individuals, groups and power structures (Curran, 1991). Weaknesses of both approaches (liberal and radical democratic) have been identified in scarcely reflecting on how power is exercised through capitalist structures (e.g. through alliances and structured organisations), and therefore how the media can "invigorate the structures of liberal democracy" (Curran, 1991).

On the other side of the spectrum, similarly to some approaches to moral panics, Marxist approaches interpret capitalist society as a form of class domination of which the media are an integral part reflecting (intentionally or unintentionally) the values and interests of specific powerful classes through capital accumulation. The public is seen as the target of these influences and is not always provided with the appropriate critical instruments and filters to oppose the dominant frameworks (Curran et al., 1977). In this sense, the mass society theory has focused on the mass-élite dichotomy by emphasising the contribution of the media to "social homogenization" (Bennett, 1982), and defending a "collectivist-statist" model of media management which might enhance pluralistic media output through state control (Curran, 1991).

However, both approaches showed limits in terms of guaranteeing expected pluralism: the free-market due to the concentration of ownership in few hands, and the collectivist one not immune from state censorship (see e.g. the Soviet Union case). From this, new approaches that result from a combination of both perspectives have been proposed by scholars (see e.g. Curran, 1991). Even though it is not the aim of this work to unearth the polarisation between liberal pluralism and Marxism (and their further evolution), it is important to highlight that this basic dichotomy between liberal-pluralist and Marxist/collectivist approaches is the basis for contrasting results in terms of theoretical constructs and empirical investigation of the media and "the political economy", "professional ideologies and work practices", and their "interaction with the socio-political environment" (see Curran et al., 1982 for a review). These contrasting forces, in terms of interplay between political and economic pressures and the media contribution towards "constructing" the meaning of "social facts", have also been the focus of several studies on mass media climate change communication.

Tanner and Allouche (2011) identify two main approaches to the political economy of climate change: one focuses on an international perspective raising reflections on global environmental justice and gaps between industrialised and developing/poor countries; and a second focuses on the role of global corporate lobbies in influencing the management of climate change-related issues. The latter macro-area also includes the influence that these corporate actors, together with media ownership, can exercise on media reporting. This is directly connected to the shift identified by

Curran (1977, 2002) from state to market controlled mass communication¹⁷. Following this approach, the media ownership, and their dependence on external financial support (through e.g. advertisements, see also Levy and Nielsen, 2010), due to economic pressures and lack of resources (Boykoff & Yulsman, 2013), is likely to produce "editorial interferences" and lack of critical reporting, especially in the case of climate change (Anderson, 2009). In the British context, this aspect has been recognised to be rooted in the nineteenth century with the repeal of both the advertisement duty (1853) and stamp duty (1855). This in turn enhanced a "commercialization" of the press, a progressive decline of radical press, and the concentration of ownership amongst few actors (Curran, 2002; Eldridge et al., 1997)¹⁸. At the same time, as highlighted by Murdock and Golding (1973), the media are part of a wider economic situation, and interrelated with other media and industrial interests. The media are also immersed in specific political systems, which in turn influence the media model. This also means that media conglomerates have both political and economic interests that are strongly interconnected. This becomes particularly relevant when considering for example that 60% of national newspaper circulation in the UK is controlled by two companies (Rupert Murdoch's News Corp UK and Lord Rothermere's Daily Mail Group). The percentage increases to 71% including the Trinity Mirror (Media Reform Coalition, 2015). As highlighted by Street (2001), the shift from a "press baron" system towards a conglomerate model does not mean that the interconnections between politics and the media have vanished¹⁹. Instead, it might indicate that the direction of this relationship cannot be established *a priori*. Focusing on both media performance and media effects on the public, several studies have demonstrated that the media play a key role in constructing specific images of social reality, trying to orient both public opinion and policy-making (Boykoff & Boykoff, 2007; Davis, 2000; Manheim, 1994; Nelson, 1989)²⁰. On the other hand, following Bennett's "indexing hypothesis", a number of studies have shown that the media tend to mirror political élites' agreement or disagreement given their dependence upon government sources (Althaus et al., 1996; Bennett, 1990; Entman & Rojecki, 1993). In fact, exploring the media discourse on US foreign policies (Herring & Robinson, 2003; Zaller & Chiu, 1996) several studies found that the press coverage of conflicts (Entman & Page, 1994) and national security-related issues (Billeaudeau et al., 2003; Domke et al., 2006; Hallin et al., 1993) was driven by the "élite debate".

Finally, some approaches emphasise a "media autonomy" from any potential influence from both the state and corporate actors (see Dreier, 1982 for a review). Accordingly, Robinson (2001) suggests that the apparent conflict between the "CNN effect" (characterised by media sovereignty) and the "manufacturing consent" (characterised state/power sovereignty) models can be solved if they are

¹⁷ Curran and Seaton (2009; Curran, 2002) refer to a progressive shift from state to market control in the British context since the second half of the nineteenth century with the abolition of taxes on newspapers (the so called "taxes on knowledge").

¹⁸ The abolition of the taxes was followed by increasing publishing costs that could be only sustained by entrepreneurs with higher capital availability and multiple ownerships (Curran, 2002).

¹⁹ Street refers to the "Murdoch's case" as a strong evidence of the interplay between media, economic and political interests (see also Daddow, 2012 for the "Murdoch effect").

²⁰ For example, the media played a role in constructing a European identity (see e.g. Bruter, 2003, 2004; Statham, 2008; Statham & Koopmans, 2009), and especially in the UK a negative image of it (Anderson & Weymouth, 1999; Gavin, 2001, 2012).

interpreted as a continuum in which the media can play an influential role in orienting policy-making in some specific moments, especially in time of policy uncertainty. At the same time, this partially contrasts with Hallin (1986) and Bennett (1990), who claim that even when the media represent a variety of contrasting positions, this is merely a reflection of political elite conflicts. In this vein, distinguishing media systems in relation to the ownership, and interrelations between the media, politics and other interests, Hallin and Mancini (2004) present the British system as a combination of the Liberal ("commercialisation" of the media based on market mechanisms) and Democratic Corporatist Models (combination of commercial character, connections with political groups, and partial influence of the state) (see also Curran et al., 2009). The authors (2004, p. 208) highlight that, in contrast to any other liberal models, the British press is characterised by external pluralism, "where despite their commercial character and despite the importance of the fact-centered discourse [...], the press has always mirrored the divisions of party politics fairly closely". Moreover, they argue that partisan orientations can be found in news content (especially in tabloids) (see also Curtice, 1999). In the UK context, socio-economic factors seem to be intrinsic to the UK governance of climate change (Boykoff, 2008; Carvalho, 2005, 2007), especially in periods of economic and political transition. Carvalho's study (2005, 2007) of UK "quality press" between 1985 and 2001 shows that after 1988²¹, climate change became mainly a political issue. The political polarisation started to be reflected in newspapers' polarisation with *The Times* defending government interests, *The Guardian* criticising government proposals, and *The Independent* not assuming a clear-cut position about the issue. With the release of the IPCC report in 1990, the uncertainty related to climate change clearly became politicised in the UK press, with the conservative newspaper defending government action (while questioning the credibility of scientists), and *The Guardian* and *The Independent* adopting a cautious approach to climate science. Even after the publication of the second IPCC report in 1995, which clearly attributed an influence of human activities on climate change, the conservative newspaper increased the profile of sceptics by giving them space and questioning the anthropogenic causes of the phenomenon (while scarcely discussing the results reported in the IPCC report). *The Independent* reported contrasting positions in relation to the journalists who authored the articles. *The Guardian* reported a sense of urgency and social responsibility around climate change. Finally, throughout the 1990s another form of climate discourse emerged related to the "backstage of science" and the identification of interests behind specific political and scientific positions. Even in this case, the ideological orientation of the newspaper influenced the representation of claim-makers and their interests in defending specific instances (against or "pro"-climate change) (Carvalho, 2005, 2007; Carvalho & Burgess, 2005). Good (2008) situates Carvalho's analysis within the Herman and Chomsky's Propaganda Model (PM) (1988), due to the emergence of a tendency in media reporting to defend a "carbon-heavy status quo" (Moser, 2010), which aims to stall or prevent governmental action and thus safeguards particular economic, social, and political interests. Comparing the Propaganda Model and the Moral Panic theory, and combining them in the interpretation of climate change, it is possible to identify some similarities. Even though they differ in terms of aims (the

²¹ Margaret Thatcher promoted free-market capitalism, nuclear culture and neoliberal initiatives.

moral panic focusing on a comprehensive model of representation/reaction to a moral threat; the PM on the behaviour of the media), it is still possible to find some overlap. In the moral panic framework, the role of the media (though controversial and debated among social scientists) is considered fundamental. Those approaches that explore the role of the media in reproducing the interests of powerful groups (see e.g. Hall et al., 1978), have some similarity to the thesis of the PM that the media serve the interests of corporate and state élites. The PM highlights the importance of the ownership filter, which results from market forces or state power. In a similar way, the analysis of the mechanisms behind moral panics' rise points to the need to consider media ownership (and its interaction with external forces) in exploring the media contribution to moral panics (Cricher, 2003). This interpretation might also be applied to the advertising filter proposed by the PM, which claimed that there is evidence of undue influence in terms of orienting the political content of the media. The search for connections between newspaper companies and external corporations reveals that, amongst the others, the Daily Mail General Trust (DMGT) has connections with RMS (Catastrophe Risk Modelling Company)²² and Euromoney Institutional Investor (International business-information group)²³, which have stakes in the energy/environmental sector. In the case of News Corp, Rupert Murdoch owns part of Genie Energy, involved in oil exploration in Syria (Craig, 2013). Looking at the advertising activity of newspapers, *The Telegraph* is directly connected to the organisation of tailored sponsorship events for a number of different car manufacturing industries (The Telegraph, 2018), and together with the *Trinity Mirror* it was involved in a 10-month content partnership with Smart Energy GB (Trinity Mirror, 2017). Moreover, newspapers are connected to car advertisements (see also The Guardian Labs, 2018). In 2017, Stop Funding Hate (2017) volunteers tracked the most prolific advertisers on the *Mail*, *Sun* and *Express* finding a variety of connections with car and transport industry (such as e.g. airline and cruise companies), and between the *Mail* and the *Express* and energy providers. Even though these connections are not evidence of interference with editorial lines, in some cases it has been claimed an influence on journalists. Anderson (2009) highlights that even though cases of "censorship" or "auto-censorship" can be identified in media reporting, especially when highly dependent on advertising sources, some journalists such as George Monbiot in the UK, have critically contested climate change scepticism. In contrast, Edwards and Cromwell (2006) argue that even when newspapers emphasise the reality of climate change by reporting on "terrifying" consequences or contesting some specific corporations, they simultaneously promote environmental disruption through their advertisements. In fact, as the authors show, *The Guardian* often reflects on species loss and natural devastation, but simultaneously advertises Lexus cars, Toyota, Audi, BMW, American Airlines etc. Hence, this *modus operandi* suggests contradictions and corporate interests in perpetuating "environmental-damaging" practices, despite a claimed concern for the environment. Moreover, the authors denounce

²² RMS "produces risk models, software applications and analytical data services used by the global risk and insurance industry to quantify and manage catastrophic risk" (DMGT, 2018), "from earthquakes, hurricanes, and floods, to terrorism and infectious disease" (RMS, 2018).

²³ It also organises global industry events such as the "Coaltrans Conferences" aimed at offering networking opportunities for the international coal industry, and the "Mining Indaba", annual professional conference connected to the development of mining in Africa.

a tendency of the newspaper to silence the "corporate obstructionism on climate change". Researching the reasons of this silence, Edwards and Cromwell (2006, p. 165) report a conversation with Paul Brown (environmental correspondent of *The Guardian*) who stated: "I have to protect myself [...]. Would you prefer that we got fired and replaced by someone less inclined to attack big business". This statement implies that journalists might be forced to adopt a "low level" criticism to preserve a source of income for the newspaper. If this represents a case of "self-censorship" by journalists who limit the intensity and scope of their criticism to avoid potential dangerous consequences for their careers, in a more explicit attempt to "contain" climate change concerns, Gelbspan (2005) recounted the case of a television editor who was threatened with a withdrawal of oil and automotive advertising after establishing connections between an extreme weather event and climate change.

Moreover, in both cases (Moral Panic and PM) the media are described as relying on external sources to inform their content. As highlighted by the Global Critical Media Literacy Project (GCMLP, 2016), many of the voices hosted by corporate media are funded by think tanks connected to big oil companies. This process is also explored by those moral panic approaches that sustain that the media have the power to legitimise specific claim-makers. The "flak filter" included in the PM refers to the reaction to the media communication as a means to discipline the media (Mullen, 2010b), which in the moral panic framework might be found in the "counter-reaction" of the folk devils (Hier, 2002a; Thornton, 1994).

Finally, the "anti-communism filter", then converged in the "dominant ideology" (Pedro, 2011), refers to the "anti-factor" element (identification of a specific "enemy"). This aspect might find a strong connection with the "hostility element" enhanced by moral panics especially against specific folk devils. As in the case of moral panics, the PM is more efficient in the presence of "elite consensus" (Mullen, 2010a), which promotes a specific "version of the story". Applying this interpretation to the media communication of climate change, the controversial and contrasting positions that populate the debate apparently undermine this assumption. However, some scholars highlight that there can be space for debate if the voices included represent the elite positions (Bennett, 1990). One interpretation of such a "schizophrenic" image resulting from different narratives might be read as a "strategy" or as "flak filter" to support the status quo (meaning "no action"). The rise of a number of organisations (see the controversy between sceptics and advocates described in the first chapter), which label themselves as "counter-movement to mainstream science" might be interpreted as an attempt to activate "flak mechanisms"²⁴. This is also confirmed by the literature which highlights the role played by fossil-fuel interests (intertwined with political lobbies) in questioning scientific understanding and consensus in order to maintain a "carbon-heavy status quo" (McCright & Dunlap, 2001, 2003; Moser, 2010). As better clarified in chapter three, the political and economic stakes are often cited as part of the narratives of climate change, they are also

²⁴ The Anti-Global Warming Petition ("Oregon petition") might be considered as an example of flak filter: it was claimed that more than 30000 scientists signed a petition against man-made global warming (Lavik, 2016). However, this initiative was linked to the ExxonMobil (McKnight, 2010; Monbiot, 2006).

related to the ownership and political orientation of the media, and the "anti-factor" emerges as dominant though controversial.

Finally, the interplay between political, economic and media interests can be explored looking at the frames that the media adopt in their narratives. In fact, as detailed in the next section, framing elements are considered crucial to both the construction of specific versions of a "story" and to the promotion of moral panics.

3. Framing the climate

Since the 1990s, concerted research efforts have focused on the analysis of the influence of the news media and journalistic reporting on framing climate change (Bell, 1994; Bord et al., 1998; Boykoff, 2014; Krosnick et al., 2000; Trumbo, 1996; Ungar, 1992; Weingart et al., 2000; Wilkins, 1993). Some of them have also shown a significant role of media reporting in shaping individuals' perception of climate change (Carvalho, 2010). Mass media are often identified as responsible for mediating processes between science, policy, and the public, by presenting causes and consequences of climate change, thus shaping public opinion and influencing climate governance (Boykoff, 2009; Rick et al., 2011). This means that climate change can be framed in ways that emphasise, or by contrast diminish, those aspects that potentially trigger either "good" or "bad" moral panics.

Several studies empirically investigated the effects produced by a variety of media products such as movies, documentaries, web campaigns, talk shows on public understanding of climate change (Askanius & Uldam, 2011; Feldman, 2013; Greitemeyer, 2013; Jacobsen, 2011; Morrison & Hatfield-Dodds, 2011; Salvador & Norton, 2011; Uldam & Askanius, 2013; Von Burg, 2012). Despite the number of studies devoted to investigating the effects produced by the media on audiences, the relationships between mass communication and public comprehension of climate vulnerability is far from being adequately understood (Capstick et al., 2015).

A multiplicity of studies on media reporting on climate change identified several frame typologies used by the media to represent the issue. According to Entman (1993, p. 52), the process of framing refers to the selection of "some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described". Entman's emphasis on salience in defining frames, which make a piece of news memorable to audiences, recalls the interpretation of frames given by McCombs and Shaw (2004) as part of the "second-level agenda setting"²⁵. While McCombs and colleagues (McCombs, 1997; McCombs et al., 1997b; McCombs & Shaw, 1993) suggest a combination of agenda-setting, priming and framing in a unique theoretical paradigm, for Scheufele (2000) these three theoretical models are different in terms of both premises and assumptions. In particular, framing differs from both priming and agenda-setting, because it concerns the "interpretive schemas" (not only the salience given to the issue) that influence the

²⁵ Agenda setting is related to the salience of the issue, whilst framing is related to the salience of the issue's attributes (McCombs et al., 1997a).

interpretation of a phenomenon (see also Scheufele & Tewksbury, 2007). Therefore, while for McCombs (2005) frames are connected to the "attribute agenda-setting" effects, which "involve the transfer of salience", for Scheufele and Tewksbury (2007) framing effects are directly connected to the attention given to media messages rather than to a simple exposure to them.

According to the frame theory, framing refers to the ways in which power elites receive and frame information, which are in turn framed by the media following their rules (Nwabueze & Egbra, 2016; Scheufele, 1999). However, the framing process may result from a number of different factors, such as for example news value, journalistic norms, journalists' knowledge about the phenomenon, preferences, ideologies, degree of independence from external forces (editorial lines or external influences), timing and space (Lester, 2010). Gamson and Modigliani (1989) refer to interpretive packages that the media use to attribute meaning to an issue. These packages are characterised by specific structures that frame the reality in a way that makes events relevant. They simultaneously result from and produce impacts in relation to their "cultural resonance" (the appeal to cultural themes make them natural and familiar), "sponsor activities" (sponsors behind the promotion of certain actions/positions), and "media practices" (journalistic norms and practices). Among this variety of definitions, it appears that the frames play a primary role in shaping the problem, identifying its causes (and expressing related moral judgments), agents responsible, and potential remedies. They also try to suggest certain pathways of interpretation in relation to specific complex issues (Iyengar & Simon, 1993). However, the framing process can be analysed from a number of perspectives, not only in relation to the media that frame the issue according to their own norms (Hulme, 2009), but also in relation to the "originators of the story" (claim-makers) and their ways to understand and represent the "problem", and the audiences who "filter" and "select" stories in relation to their own frames (Lorenzoni & Hulme, 2009; Neuman et al., 1992; Scheufele, 1999). This is particularly important to take into consideration when adopting a moral panic perspective to explore how the media "filter" their news, "select" their sources and "code" their messages in ways that might promote certain interpretations of climate change characterised by specific folk devils.

Considering climate change as "continuing news", resulting from events occurring over a period of time, this definition implies that the evolution of the phenomenon is a step by step process, constructed upon both previous events and predictions about future developments (Tuchman, 1973). This might also assume that the media framing process results from a combination of journalists' interpretation of science (science frame), and their expectations in terms of influencing public understanding (audience frame) and policy reaction (policy-makers' frame). However, following Tuchman (1973), this also means that editors, journalists and reporters "interiorise" a routine in their work, which sometimes might lead to inaccurately interpret and predict the evolution of the phenomenon. Moreover, the ways in which newsmen frame their news depend upon a process of negotiation (that is an integral part of everyday work) between social norms, internal and external pressure, journalistic routine and personal values (Tuchman, 1978). On the one hand, journalists can unconsciously or consciously "construct" stories based on "interiorised" norms and rules that are consolidated into a routine; on the other hand, they need to continuously adjust their interpretation in particular in contexts characterised by high uncertainty, multidimensionality and multilevel

influences (from local to global). In turn, this might produce a multiplicity of versions of the "same story".

These considerations are especially valid when applied to climate change, which since its emergence has been framed in many different ways in relation to a multiplicity of variables. These range from representing the problem as a "development issue", an "economic issue", a "national and global security issue", to an "issue of morality and social justice" (Hulme, 2009). Shanahan (2007) refers to six frames targeted to specific audiences, which might engage specific segments of the public, but disengage some others. In a similar attempt to identify the variety of frames adopted by the media to define science-related issues, Nisbet (2009) identified eight additional frames²⁶. Moreover, several emerging frames have been identified in relation to media reporting of climate change such as "conflict frame" (Boykoff & Boykoff, 2004; Dirikx & Gelders, 2010b; Young & Dugas, 2012), "certainty/consensus frame" (Asplund et al., 2013; Dominguez et al., 2016; Haßler et al., 2014; Kaiser & Rhomberg, 2015; Lyytimäki, 2011; Metag, et al., 2015; Young & Dugas, 2012), "dramatization frames" (Pasquaré & Oppizzi, 2012), "blame/responsibility frame" (Dirikx & Gelders, 2010b; Lück et al., 2018), "action frame", "morality frame", "political frame", "business frame", "environment frame", "human interest/impact frame" (Dirikx & Gelders, 2010b), "economic consequences frame" (Dirikx & Gelders, 2010b), "health-risk frame", "information/awareness frame" (Nwabueze & Egbra, 2016), "adaptation frame", "mitigation frame", and "neutral frame" (Batta et al., 2013). In some cases, "adversarial framing" becomes the focus to study the ways in which some groups discredit their antagonists in the context of climate change, by emphasising that elite-driven groups may be more effective in relation to both the support they receive from powerful interests and the fact that they "resist" rather than "promote" changes (Knight & Greenberg, 2012)²⁷.

In line with this, among the variety of frames adopted by the media, two main contrasting tendencies can be found in representing climate change as either a "conflict" or a "reality". For some time, US news media have represented global warming as a conflict between opposite positions (Antilla, 2005). However, while Boykoff and Boykoff (2004) found that US newspapers reported disagreement around the causes of global warming between 1988 and 2002, analysing both the US and UK news coverage, Boykoff (2007) found a shift in US broadsheet papers reporting since 2005, towards scientific consensus on attributing human causes to climate change. By contrast, in the UK the journalistic balance norm was low throughout the entire period. These findings led him to conclude that the "balance norm" was no longer the dominant framing in both contexts. However,

²⁶ These frames were used and adapted in several studies related to climate change framing in different contexts, such as e.g. in New Zealand (Chetty et al., 2015), and in South America newspaper reporting (Pinto et al., 2017). They will be also adapted and included in the coding schedule adopted by this thesis (see chapter four).

²⁷ However, media representations can vary across countries and contexts in particular in relation to their political, social and cultural frameworks. E.g. in the US, Trumbo (1996) found that scientists tend to be associated with frames that refer to causes and definition of the problem, whereas politicians with judgment and remedy frames. In the same context, Antilla (2005) identified four recurrent frames ("valid science", "ambiguous cause or effects", "uncertain science," and "controversial science"), whereas Brossard et al. (2004) and McComas and Shanahan (1999) identified frames related to "new evidence or research", "scientific background", "consequences", "economics,", "domestic politics", "international relations", and "current weather".

the analysis proposed by Boykoff focused on broadsheet papers, thus excluding other high circulation newspapers (Painter & Gavin, 2015). This was also confirmed by a later study carried out on four UK tabloids (*the Sun, Mail, Express, and Mirror*) between 2000 and 2006 by Boykoff and Mansfield (2008). They found that tabloids did not follow the same evolution of broadsheet papers; instead, the journalistic norm of balance persisted throughout the period. Even though these studies adopt different methodologies, newspaper sources, and consider specific time-periods, they suggest that the UK and US news media coverage on climate change is controversial. For example, in the same period considered by Boykoff's study (2007), but using different sample years and including editorials and opinion pieces, Painter and Gavin (2015) found a major representation of sceptical voices in the English context. By contrast, comparing *The (London) Times* and *The New York Times* between 2000 and 2009, Nerlich et al. (2012) found that the UK, unlike the US, focused on finding solutions because climate change was generally recognised as a problem. In a similar way, Grundmann and Krishnamurthy (2010) found a prevalence of "action frames" in the UK context²⁸.

The number of studies devoted to studying the frames adopted by the media in reporting on climate change reflects the multiplicity of forms that media narratives can assume in relation to specific events, contexts, time, but also political orientation of the media. The media can frame climate change in certain ways, but also "re-frame" it in relation to the evolution of the context, thus attributing new meanings to it (Hope, 2009). As shown in the next chapter (section five), the fact that each frame selects certain aspects while neglecting others, and emphasises (or underestimates) certain impacts on societies, connects the framing process to the role played by the media in "constructing" moral panics. In fact, despite a number of different interpretations related to their position as primary or secondary (active or passive) definers, the media are generally recognised to be instrumental in creating moral panics. Moreover, considering the traditional conceptualisation of moral panics, the media code/frame (especially during the inventory phase) the messages in certain ways that might produce distortion, exaggeration, prediction and symbolisation (Cohen, 1972; Critcher, 2008). This seems to be particularly evident in the context of "news waves" during which the coverage becomes "disproportionate" in quantity but also in terms of amplification, develops a "life of its own", and is governed by the media instead of the events (Vasterman, 2005). This suggests that during these moments, the media tend to make the news rather than simply report them.

All the aspects considered in chapter two, regarding the evolution of the moral panic framework (especially the combination of Cohen's and Goode and Ben-Yehuda's approaches proposed by Critcher), in addition to the political-economy component of climate narratives, and the multiplicity of frames already identified in media reporting on climate change, will be considered in constructing the guidelines to answer the research questions of this thesis.

²⁸ Action frames were also found in Sweden, New Zealand and Australia: a shift from "whether" (the problem exists) to "how" (proposing solutions) to act was observed (Berglez et al., 2009; Howard-Williams, 2009).

Summary

Contrasting positions exist about the rise of moral panics in the risk society. For some authors, the uncertainty and anxiety typical of the "new risks" (such as e.g. climate change) create favourable conditions for the proliferation of moral panics. However, other scholars suggest that the complexity of causation, the invisibility and unpredictability of consequences, and the difficulty in the identification of victims and offenders suppress moral panics. Not only the theoretical discussion, but also the empirical application of the moral panic framework to the climate change phenomenon produced contradictory results, in particular in terms of identification of "victims", "offenders" and "persecutors". More specifically, the partisan nature that characterises climate change (and its communication by the media) makes it difficult to attribute specific roles to the actors involved. Some political economy approaches (such as the Propaganda Model) present similarities with Moral Panics, and help reflect on the contrasting forces that populate the media debate around climate change. However, the media seem to play themselves the role of claim-makers that empower (and in turn are empowered by) specific actors to become authoritative definers of the problem. Accordingly, the idea of a "circuit of communication" in which the media, other claim makers, and political elites are all responsible for generating moral panics seems to prevail. The fact that the media use frames that select certain aspects while neglecting others, and emphasise (or underestimate) certain impacts on societies, connects the framing process of climate change to the role played by the media in "constructing" moral panics (as primary or secondary definers) and their relationship with the "structures of power". Considering the traditional conceptualisation of moral panics, the media code/frame (especially during the inventory phase) the messages in certain ways that can produce distortion, exaggeration, prediction and symbolisation.

Chapter 3 Media Communication of Climate-Change: a literature review through the lens of Moral Panic

Key points

Chapter three focuses on the review of the literature on media communication of climate change between 2010 and 2016 by adopting a moral panic critical lens. After providing an overview about the main characteristics of the studies under consideration (section one) and the approach adopted for critically reviewing this literature (section two), it presents the main themes/characteristics that have points of contacts with moral panic studies. More specifically, these are represented by the "interlocutors/claim makers" characterising the media debate (section three); the main contents (section four and its related sub-sections); and media framing of climate change (section five). Finally, the possibility of applying the moral panic theoretical framework to approach media communication of climate change is explored.

1. Literature Review method

The introductory chapters focused on both the review of the main criticalities in studying climate change, and the connections between moral panics (and related political economy issues) and media reporting on climate change. Building on this, chapter three considers the specific literature on media communication of climate change in order to investigate whether it is possible to apply the moral panic framework to investigate climate change polarisation in media reporting.

This chapter draws upon a core set of 273 academic peer reviewed papers directly relevant to the communication of climate change by the media. A systematic literature search was conducted by combining relevant keywords pertaining to the theme such as "communication of climate change", "weather extreme" and "climate perception"²⁹. The analysis included academic articles published in English language between 2010 and 2016. The time period was defined in relation to two main factors: the more recent systematic literature review, which also included media communication of climate change, considered the period from 2000 to 2011 (Wibeck, 2014)³⁰; and data published by the Pew Research Center (Stokes et al., 2016), show that since 2010 the public perception about climate-related risks has increased in Europe (and slightly in the UK).

²⁹ Journal Search engines such as Directory of Open Access Journals - DOAJ (www.doaj.org), Elsevier – Science Direct (www.sciencedirect.com), Journ (www.jurn.org), Open Access Journals Search Engine - OAJSE (www.oajse.com), Google Scholar, Web of science Thomson Reuters (<http://thomsonreuters.com>) were used to search for academic articles. Moreover, academic articles published in high Impact Factor journals (as classified by The Scimago Journal & Country Rank, <http://www.scimagojr.com/journalrank.php?category=3315&openaccess=true>) were included.

³⁰ The literature review conducted by Wibeck (2014) excluded studies that did not focus on analysing public understanding of media messages of climate change. Ballantyne (2016) carried out a literature review on 299 scientific articles before 2014, but it focuses on how researchers adopt communication theories and models to analyse certain aspects of climate change communication. Finally, the literature review conducted by Nerlich et al. (2010) includes researches carried out until 2010.

The literature review on media communication of climate change adopts "a moral panic perspective", trying to understand what kind of "threats" and "actors" (and potential panics) have already been identified by previous studies in media reporting. The aim of this review of the specific literature is to identify the emergent frames regarding media reporting on climate change, which, in turn, contribute to the construction of the analytical scheme adopted in this thesis.

Papers were retained for inclusion if they directly pertained to media communication of climate change; and were academic articles/editorials (excluding review articles, books and PhD theses).

2. Main approaches in literature to the communication of climate change

Much of this literature (223 out of 273 papers) is concerned with both reporting and understanding the empirical results of media analysis in different contexts. They frequently refer to the globalised nature of media communication of climate change. Within this corpus, there is a particular emphasis on Europe (especially the UK) and the North America (in particular the US) and the behaviour of the national press (see also Schäfer & Schlichting, 2014). Indeed, 43 out of 113 studies focusing on Europe (37% of the sample), either have a specific focus on the UK or include this country in cross-national studies.

The relevant literature appears in both disciplinary and interdisciplinary journals³¹. Not surprisingly, the majority of articles are published in social sciences journals with particular focus on Media and Communication or Internet studies, and in some cases specialised in science and environmental communication³². What is interesting in this distribution of articles is that some journals specialised in Climate Science³³, Meteorology, Physics, Biology and Aquatic Science published articles specifically related to communication issues. They are 42 articles in total (that represent 15% percent of the sample), and this might be interpreted as a signal of a raising awareness among climate scientists about the importance of effectively communicating climate science findings.

Several macro-areas, themes and sub-themes can be identified regarding how the news media report on climate change (see Table 3). These elements help explore the questions raised in the introduction of this work related to "How" and "Why" moral panics originate, and "Who" the claim-makers are. In fact, they frequently refer to "How and How Often" climate change is reported (Lewis,

³¹ E.g. Human Ecology Review, American Review of Canadian Studies, Current Science, Environmental Communication, Futures, Global and Planetary Change, Institute of Development Studies Bulletin, Journal of Disaster Risk Studies, International Journal of Electronic Governance, Journal of Environmental Studies and Sciences, Journal of Sustainable Development, Mitigation and Adaptation Strategies for Global Change, PLoS ONE, Proceedings of the National Academy of Sciences, Science as Culture, Environmental Values.

³² Journal of Communication, Journal of Science Communication, Canadian Journal of Communication, Revista Latina de Comunicación Social, International Journal of Communication, First Monday, Triple C, MedieKultur, The Communication Review, Studies in Communication Sciences, Media and Communication, Environmental Communication.

³³ See e.g. Climatic Change, International Journal of Climatology, Nature Climate Change, Wiley Interdisciplinary Reviews: Climate Change, Meteorological Applications, Weather, Physics Today, BioScience, and Pan-American Journal of Aquatic Sciences and Fisheries

2009), but also "Who" speaks for (Boykoff, 2011) and about the climate. From these findings, an attempt will be made to deduce "Why" moral panics might be generated.

The analysis begins with the identification of interrelationships between specific actors (see also Table 3). The introduction of such categories of interlocutors in combination to the main themes emerging from the literature review will help identify those who might be generally recognised as "victims", "offenders" and "persecutors" in the context of a potential moral panic in relation to climate change.

The interlocutors involved in the discussion surrounding climate science appear to be i) the media and the general public; ii) the general public and climate science; iii) the media and climate science; iv) policy makers and scientists; v) policy-makers and the media; vi) NGOs/activists and the general public; vii) policy makers and the general public; viii) multi-stakeholder platforms (different actors participate in a dialogue to find solutions to common problems); ix) NGOs/activists and the media; x) NGOs/activists and climate science; xi) economic actors and multiple actors (the media, scientists, policy makers and the general public).

The main contents identified in the analysis of the literature fall into four categories that are strongly interconnected (see also Table 3): media polarisation between sceptics and advocates; between underestimation and fear of apocalyptic consequences of climate change; climate as a political and economic issue; and climate communication and public engagement. The emergence of these four themes is also helpful to connect the proposed analysis to some key aspects of moral panics. Indeed, as highlighted in chapter two, i) the polarisation between sceptics and advocates of climate change causes the emergence of two different groups of folk devils. This dichotomy is also reflected in ii) a polarisation between over-estimation and under-estimation of the problem. Moreover, the emergence of the connections between climate change and the political sphere also raises questions about iii) the relation between media reporting and the structures of power (Hall et al., 1978). A final theme relates to climate communication and public engagement. However, this last topic will be only transversally examined since the present work does not focus on public reaction.

Each macro-area also includes a set of sub-themes, which in turn might be inscribed in the moral panic framework.

The Media Polarisation between sceptics and advocates includes: Climate Change Communication (CCC), uncertainty and complexity of climate change causes and impacts.

The theme related to underestimation/overestimation of consequences of climate change includes: i) CCC and inaccuracy/exaggeration; ii) CCC and fear; iii) climate change as a "(a)moral risk".

The climate as a political and economic issue includes: i) political influences on CCC; ii) climate as an economic and techno issue; iii) CCC and "climate (in)justice".

With regard to the frames (see also Table 3), the literature identifies the emergent traits of climate narratives such as i) "visualisation" of climate messages (in particular in terms of iconography used, interactive maps, graphics and interactive virtual games); ii) language; iii) narrative construction; iv) use of specific voices; and v) use of (a)moral messages. The exploration of the frames adopted by the media will be useful to identify potential narratives that might be interpreted by scholars as

"disproportionate" in relation to climate change facts. Moreover, the adoption of certain frames selects and tends to emphasise specific aspects of an issue while de-selecting and de-emphasising others (Brisman, 2012).

Finally, the channels/media analysed can be classified as "old" (radio, television, movies/documentaries, and print media) and "new" media (see also Table 3). The latter specifically refers to social media (Twitter, Facebook and YouTube), Google Trends and Google News, Online Arenas (such as e.g. blogs), and ICTs in general. Since the difference between old and new media is not directly connected to the aims of this work, it has been acknowledged but not deeply explored in this context.

What follows below is an overview of the main aspects emerging from the specific literature on media communication of climate change. It should be noted that, in adopting a moral panic framework, it is not always easy to identify a clear boundary between the identified topics/categories. Indeed, they are strongly interconnected; for example, in the case of frames that tend to be integral part of the majority of studies presented here. Finally, the constitutive features of moral panics such as "concern", "hostility", "consensus", "disproportionality" and "volatility" (Goode & Ben-Yehuda, 2009), will be adopted to critically review the literature.

Table 3. Macro-areas, themes and sub-themes related to moral panics emerging from the literature review

Macro-area	Themes/voices/constitutive elements	Sub-themes
Interlocutors	Media, general public, scientists, policy makers, NGOs/activists, economic actors	
Contents	Media polarisation between sceptics and advocates	Climate Change Communication (CCC), uncertainty and complexity of climate change causes and impacts
	Between underestimation and fear of apocalyptic consequences of climate change	CCC and inaccuracy/exaggeration
		CCC and fear
		CC as a "(a)moral risk"
	Climate as a political and economic issue	Political influences on CCC
		Climate as an economic and techno issue
		CCC and "climate (in)justice"
	Climate communication and public engagement	
Frames	"Visualisation" of climate messages	"Symbolisation and symptomatic frames" (iconography and symbols of climate change)
	Language	"Dramatization frames" (use of exaggeration vs mockery);
		"Problem definition frame" (use of specific language, e.g. scientific or political)
Narrative construction	"Conflict frames" and "consensus", "balance" and "sceptical" frames (use of inaccuracies, confusion of source,	

Table 3. Macro-areas, themes and sub-themes related to moral panics emerging from the literature review

		omissions/additions, information not scientifically-based and distortion of scientific results)
	Use of specific voices	"Personalisation and claim-makers" frames
	Use of (a)moral messages	"Moral frames" (climate change as a risk caused by humans vs climate change is not a concern for human beings)
Channels	Old media	Radio, television, movies/documentaries, and print media
	New media	Social media, Google Trends and Google News, Online Arenas and ICTs in general

3. Interlocutors

The question of who speaks for the climate is central to the moral panic framework. To answer this question, the identification and classification of voices ("primary definers" for Hall et al., 1978) that get to speak about the climate in the media help us understand and explain the complex relationships (and frequently conflicts) between different kinds of actors who are legitimised to "represent" the climate instances. In fact, the literature shows a tendency of the media to adopt a conflictual framework that involves contrasting positions. This is also the reason why the label "interlocutors", rather than voices, seem to be more appropriate in this context. A number of actors are involved as either active agents or target of discussion in relation to climate change by both new and old media. The presence of a multiplicity of controversial voices creates a complex constellation of "stakeholders", thus making problematic the identification of primary definers (DiFrancesco & Young, 2011). However, the new media tend to be characterised by a peer to peer communication in which several actors belonging to different levels are directly involved (e.g. media, citizens, policy-makers, scientists, NGOs and business groups), whereas the old media, given their mono-directional style of communication (media towards audience), tend to select specific speakers or represent discourses on climate change between different "selected" actors. Beyond the communication from the media to the general public, the main interlocutors involved in the climate change debate are represented by climate scientists and general public (in this case the literature mainly focuses on the analysis of scientific communication and public perception of this)³⁴, the media and scientists (focus on how the media interpret and frame scientific knowledge, and to a lesser extent how scientists evaluate media reporting, see e.g. Farnsworth & Lichter, 2012)³⁵, the media and economic actors

³⁴ See Akerlof et al., 2012; Anderegg & Goldsmith, 2014; Asplund, 2016; Cody et al., 2015; Corner & Groves, 2014; Hart & Feldman, 2016b; Hidalgo et al., 2014; Höppner, 2010; Kreslake et al., 2016; Lineman et al., 2015; Pearce et al., 2014; Retchless, 2014; Rhomberg, 2010; Somerville & Hassol, 2011; Speck, 2010; van der Linden et al., 2015; Ward, 2010; Wibeck, 2014.

³⁵ See Akerlof et al., 2012; Arcila-Calderón et al., 2015; Blanco Castilla et al., 2013; Boykoff, 2013; Corner & Groves, 2014; Feldman, 2013; Freeman & Geraghty, 2016; Hellebrandt & Hellebrandt, 2010; Ivanova et al., 2013; Malhotra, 2015; Rahmstorf, 2012; Rhomberg, 2010; Rick et al., 2011; Schäfer, 2016; Schäfer et al., 2016; Tosse, 2013; Vestergård, 2011; Ward, 2010; Wibeck, 2014.

(how the media can be influenced by business groups) (Murphy, 2015), NGOs/activists and scientists (how non-governmental organisations promote communication campaign based on scientific findings) (Holliman, 2011; Manzo, 2010a), NGOs/activists and the media (how NGOs and activists are represented by the media discourse on climate change and how they use the media)³⁶, NGOs-activists and the public (characteristics and effects of their communication, in particular on-line)³⁷, policy makers and the general public (criticisms and modalities through which this dialogue happens)³⁸, policy makers and scientists (how they interact in order to put into practice scientific outcomes)³⁹, policy-makers and the media (kinds of interaction and representation of climate politics-related issues by the media)⁴⁰. Moreover, sometimes business groups are also analysed in relation to their interaction with the media, policy-makers, scientists and the public (Schäfer, 2016).

In order to shed light on the complex relationships between climate change interlocutors and media reporting, the next section analyses the content of the media communication also in relation to its claim-makers.

4. Content of Media Communication

4.1. Media Polarisation between sceptics and advocates

One of the main recurrent themes in the scientific debate around media communication (especially news media) of climate change is the analysis of the conflict ("conflict frame") between "sceptics" and "advocates" of climate change, especially in both the USA and the UK (McKnight, 2010; Painter & Ashe, 2012; Painter & Gavin, 2015). It appears that mainstream media tend to give a "disproportionate" space to those scientists and stories that are sceptical about both the causation and consequences of climate change even though, as highlighted in chapter one, they represent the minority (Akerlof et al., 2012; Boykoff, 2013; Freudenburg & Muselli, 2010; Rahmstorf, 2012; Tosse, 2013). This is operationalised by representing sceptics as authoritative actors in the case of specific events (such as "climategate"⁴¹ or errors in IPCC reports⁴², see Anderegg & Goldsmith, 2014; Painter & Ashe, 2012; Somerville & Hassol, 2011; Ward, 2010), as a counter-movement to

³⁶ See Arcila-Calderón et al., 2015; Gavin, 2010; Hestres, 2013; Holliman, 2011; Roosvall & Tegelberg, 2015; Segerberg & Bennett, 2011; Uldam, 2013.

³⁷ See Holliman, 2011; Jun, 2011; Kunelius & Eide, 2012; Manzo, 2010b; Schäfer, 2016; Segerberg & Bennett, 2011; Uldam, 2013.

³⁸ See Cooper, 2011; Feldman, 2013; Retchless, 2014; Speck, 2010.

³⁹ See Corner & Groves, 2014; DeWeber & Wagner, 2015; Feldman, 2013; Malhotra, 2015; Retchless, 2014; Rhomberg, 2010; Schäfer, 2016; Somerville & Hassol, 2011.

⁴⁰ See Arcila-Calderón et al., 2015; Feldman, 2013; Freeman & Geraghty, 2016; Gunster, 2011; Hellebrandt & Hellebrandt, 2010; Jaspal et al., 2016; Keskitalo, Westerhoff, & Juhola, 2012; Malhotra, 2015; Rhomberg, 2010; Rick et al., 2011; Speck, 2010.

⁴¹ The term Climategate refers to the hacking of emails exchanged between researchers of the University of East Anglia (Climatic Research Unit) before the Copenhagen Summit on climate change in 2009. These emails were used by sceptics as a proof of data manipulation by climate scientists (see also chapter six). Analysing newspapers' reporting on the climategate scandal, Bowe et al. (2014) found no significant differences between the US and Britain, however, the adoption of a "Scientific Dishonesty" frame was the second more frequent frame.

⁴² The IPCC Fourth Assessment Report estimates that the Himalayan glaciers are expected to disappear in 2035 (instead of 2350) (Brisman, 2012).

mainstream science (Jaspal et al., 2016), or as "victims" and "marginalised" (such as e.g. in the case of "greenhouse sceptics" in Australia, see Jaspal et al., 2016). The causes of this "disproportionality" are also attributed to a lack of dialogue between both scientists and the media (Aram, 2012; Boykoff & Yulsman, 2013; Farnsworth & Lichter, 2012; Russill, 2009), and scientists and policy-makers (Boykoff, 2013; Vestergård, 2011). Moreover, additional elements, such as the lack of climate science literacy among journalists (Kakonge, 2013; Tosse, 2013), tight deadlines (Boykoff, 2013), need for dramatization in media narratives, political orientation of the media (Gkiouzevas & Botetzagias, 2015; Painter & Ashe, 2012), but also inaccuracy (Akerlof et al., 2012; Boykoff, 2013; Shaw, 2013; Vestergård, 2011), exaggerations (Lopera & Moreno, 2014; Manzo, 2010b; Vestergård, 2011), confusion of sources, omissions/additions, and distortion of scientific results (Höppner, 2010) are often present in media reporting (and especially in newspapers).

While the representation of sceptical voices is a "central" topic, and despite some controversial results reported in the literature about the over, balanced or limited presence of contrarian positions, it is possible to trace a general evolution of the phenomenon (Fahy, 2017). In fact, even in those countries historically characterised by the higher visibility of sceptical voices (such as the USA), the tendency to marginalise those who question the reality of climate change is generally recognised (Grundmann & Scott, 2014; Jang & Hart, 2015). Several studies highlighted an evolution in the climate debate in which climate change has been generally recognised as a real "threat", moving towards scientific consensus on the attribution of human causes to climate change (Boykoff, 2007; Gibson et al., 2015). However, this does not mean that the dichotomy between "sceptics" and "advocates" is bridged; instead, it seems to evolve into new forms. As further explored in the next section, the tendency to treat climate change as a political and economic issue contributes towards shifting the focus of sceptical positions from the causes towards the impacts and consequent actions needed.

The European media tend to report consensus on climate change (i.e., that climate change is occurring), with exception of the UK which is more like the US in that it is characterised by contradictory media reports concerning the existence of anthropogenic climate change. In 1988, the UK press represented climate change as a "multi-faceted collective threat" characterised by two competing "culprits": the humans as "experimenter" (and the Earth as "victim"); and the "non-human" events and processes - such as solar sun spots and volcanic activity - which induce natural variations in climate. However, the volatility and mutability of the media representation of climate change as a multi-faceted threat produced uncertain scenarios about causes and effects (and about what actions should be taken) (Nerlich & Jaspal, 2014). These findings are in line with Carvalho's (2005, 2007) study of UK "quality press" between 1985 and 2001, which shows how until 1988 newspapers reported a generalised consensus around climate change, by recognising scientists as authoritative reliable sources of information. After 1988, the partisan nature of the debate emerged, with *The Times* defending Government interests, *The Guardian* contrasting government proposals, and *The Independent* impartial.

Moreover, in the UK, scepticism emerges especially in relation to specific events (such as e.g. the "climategate" scandal) (Grundmann & Scott, 2014), but it is also a peculiarity of right-leaning

newspapers. In this context, a specific kind of scepticism prevails, represented by the "impact sceptics" who recognise the anthropogenic causation of climate change, but claim that impacts may be positive, far in the future or unknown (thus questioning the need for policies or interventions) (Painter & Ashe, 2012; Painter & Gavin, 2015). J. Matthews (2015) found that in UK elite newspapers (2000-2010) the voices that speak for the climate result from a combination of processes of politicisation and journalistic logics. In general, climate change is presented as a process which has tangible effects and potential future risks/threats. The outcomes of political, industry and scientific elite communicative efforts have produced coverage focused on climate science (characterised by generalised consensus), international more than domestic political discussion, and business and civil society commentary on the outcomes from climate change. In the UK, sceptical positions were also found to be present on TV channels (BBC and ITN), as well as on the web through both explicit (by directly reporting the positions), and implicit forms (by framing news/information in a way that casts doubts) (Gavin & Marshall, 2011).

It appears that the media, in the name of a "balanced reporting", create disproportionality by giving a space to contrarian voices greater than that they actually have in the debate around climate change (Antilla, 2005; Boykoff & Boykoff, 2004; Moser & Dilling, 2004; Tosse, 2013). From the review of the literature, a complex picture emerges in which the primary definers of climate change (claim-makers) might be identified in climate scientists, whereas sceptics represent the counter-claimers. However, given the "non-proportional" representation of these two contrasting voices (pro and sceptics), sometimes they seem to have equal weight in the debate even though sceptical positions do not receive such a consideration within the scientific community (see chapter one). This complexity makes it difficult to identify specific "folk devils". In fact, assuming that climate scientists represent the claim-makers (Cohen, 2011b), and in so doing, anthropogenic activities are recognised to be responsible for climate change, the resulting folk devils should be represented by those who act against the environment (such as e.g. climate change sceptics). Instead, what emerges is a powerful counter-movement represented by sceptics who totally or partially deny, firstly the causes, and then the consequences of climate change. In this evolution, the media increase the credibility and institutionalise these contrarian voices contributing towards reversing the roles. Thus, the counter-claimers, who were supposed to play the "folk-devil" role, become claim-makers (Boykoff, 2013; Carvalho, 2007), whereas the mainstream scientists turn out to fall into the category of "folk devils" who try to "terrorise" the public by imposing unnecessary changes in people lifestyle and society. This is consistent with Brisman and South's (2015) arguments that interpret climate scientists as "folk devils", and Brisman's (2012, 2013) study which interprets the media as "accomplices" in accommodating not only climate change scepticism, but also individual and collective inaction. Accordingly, sceptics emerge as authoritative claim-makers who denounce a "conspiracy" orchestrated by climate change scientists firstly in relation to the causes, then to the consequences of climate change. On the one hand, this interpretation of the phenomenon is partially in contrast to Cohen's (2011b) interpretation of the "sceptics" as folk devils, because climate science refers to them as "crazy persons" and does not admit any denial. On the other hand, even though mainstream scientists pretend to play the role of "primary definers and claim-makers" by trying to

govern and control the spread of information on climate science (Tosse, 2013), the media offer multiple patterns of interpretation by giving voice to opposite positions creating a "nebulous aura" around climate science.

4.2. Between underestimation and fear of apocalyptic consequences of climate change

The conflictual frame not only encompasses the polarisation between sceptics and advocates, but also the dichotomy between under and over estimation of the problem. Indeed, contrasting ways of reporting climate change emerge, divided between "underestimation of the problem" and use of "apocalyptic tones" adopted to describe the consequences of climate change. This is interpreted by the literature as further contributing towards creating an image of a "schizophrenic" climate science among the public. On the one hand, the literature recognises that climate-related issues are difficult to communicate to both the public and policy-makers. However, anthropogenic causes are almost universally recognised (only a small group of scientists is still sceptical). On the other hand, the misleading representation reported by the media of a polarisation (not so marked in reality) between two conflictual parts (global warming advocates and sceptics) increases confusion (Boykoff, 2013; Speck, 2010), feelings of uncertainty (Rhomberg, 2010; Ward, 2010) and fear among the public (Manzo, 2010a, 2010b). The fear increases when climate change is depicted as a natural phenomenon that causes catastrophic consequences, but unpredictable and almost unmanageable because of its natural evolution. The perception of uncertainty among the general public is also connected to the limited capacity of the media to effectively communicate the "invisible" causes, and the abstract nature of climate change (Markowitz & Shariff, 2012). At the same time, the uncertainty is also considered a useful means for engaging people in an active discourse around the phenomenon (Holling, 2001; Pearce et al., 2015). However, the communication of uncertainty from the science to policy-makers, to the media and the general public, is a double-edged sword. On the one side, it might be an opportunity to increase confidence in science by adopting transparency as guiding principle, and by orienting policy-making to a variety of solutions (Patt & Weber, 2014) in terms of mitigation (to prevent potential negative consequences by reducing/stabilising the current rate of greenhouse gas emissions) or adaptation (to changes that have occurred since the start of the industrial revolution, e.g. temperature increase). On the other side, it might cause an underestimation of risk (due to the impossibility of predicting climate impacts on specific contexts) or a justification for delaying action (Retchless, 2014). Uncertainty effects should be also interpreted in relation to the type of audience (policy-makers, specific stakeholders, or the general public) and individuals' differences (such as cultural factors, political orientation and expertise) (Feldman et al., 2014; Retchless, 2014).

These considerations lead to a reflection on the interconnections between uncertainty and perception of risk (Retchless, 2014; Rhomberg, 2010)⁴³. It seems that both uncertainty and

⁴³ See also previous studies conducted by Weingart et al. (2000); Lorenzoni et al. (2005); Lorenzoni & Pidgeon (2006); and Smith (2005).

exaggeration (in terms of reporting catastrophic consequences), as well as images of extreme weather events (Nerlich & Jaspal, 2014)⁴⁴, increase the perception of, and concern/fear about climate change (and its related risks) (Otieno et al., 2013; Sakellari, 2014), as a temporally and spatially distant phenomenon (Manzo, 2010a). Thus, uncertainty and exaggeration become obstacles to public engagement (Nerlich & Jaspal, 2014) and produce "apathy" in the public (Greitemeyer, 2013; Wibeck, 2014). Both the use of "exaggerated and sensational effects" and the adoption of a "flood myth" narrative structure (such as e.g. in the case of the movie "The Day After Tomorrow") tend to reduce the credibility of the science among the public (Von Burg, 2012) because the causes of the disaster are represented as a vindication of nature, which limits human possibilities to intervene (O'Neill & Nicholson-Cole, 2009; Salvador & Norton, 2011). Some studies also highlight that spectacular-oriented documentaries/movies mainly reinforce existing environmental behaviour (Howell, 2011, 2014; Morrison & Hatfield-Dodds, 2011; Sakellari, 2014) or are interpreted in relation to existing preconceptions. In some cases, the media communication of fear is seen as a useful tool if combined with other emotions which objectify and anchor climate change in order to make the phenomenon more comprehensible and recognisable (Höijer, 2010). It is also claimed that the adoption of fearful frameworks might raise awareness, but they generate changes in behaviour that are only short term (Howell, 2011; Jacobsen, 2011; Nolan, 2010; Sakellari, 2014).

The dramatization of the scientific truth is also subject to instrumentalisation by sceptics, who refer to the "exaggerated effects" as evidence of inaccuracies in climate science (Von Burg, 2012). In contrast, it is suggested that information about policy choices should be communicated as simply as possible in order to involve the majority of people in the public debate (Morrison & Hatfield-Dodds, 2011). These findings are consistent with Ungar's (1995, 2001) arguments that criticise the application of the moral panic theory to climate change-related issues due to the incalculability and invisibility of this "new risk" (Beck, 1995), and the "a-morality" (Goode & Ben-Yehuda, 2009) of the problem (as described by the media, in particular if it is not attributed to human activities). The "a-morality" of climate change is also considered by Markowitz & Shariff (2012). Following their analysis, climate change should be interpreted as a "moral issue" to be tackled as a "moral imperative", but it is frequently represented by its communicators as an issue that does not need to be "righted". Thus, the "a-morality" of climate change is connected to the "uncertainty", which is in turn instrumentally used for justifying inaction on climate change. In fact, even though science has made progress in both measuring and predicting the consequences of climate change (as testified by the progression of the IPCC reports); these "certainties" tend to be overshadowed. Therefore, in this case it seems to be more appropriate to refer to "a-moral uncertainties" (Moser, 2010). From this, even those (both public and institutions) who are convinced that climate change is dangerous, tend to delay any kind of intervention. Moreover, the "abstractness" (Kleinschmit & Sjöstedt, 2014), the "complexity", the "blamelessness of unintentional action", the "guilty bias", the "uncertainty", the "moral tribalism" (politicisation of climate change), and "long time horizons and faraway places" are

⁴⁴ In a time-series analysis between 2002 and 2010 Brulle et al. (2012) found that extreme weather events (as well as the number of science articles) do not significantly increase public concern regarding climate change.

all recognised to be serious obstacles for activating "moral alarmism" (Markowitz & Shariff, 2012). The conclusion proposed by some scholars is that climate change needs new "moral institutions" (moral entrepreneurs) which mediate between "decision-makers" and the public (Corner & Groves, 2014; Corner et al., 2014; Markowitz & Shariff, 2012) and can make the connection between science and practice stronger. The morality of climate change is also connected to the "moral role" that scientists recognisably play in communicating their scientific findings to the general public (Roeser, 2012; Tosse, 2013).

The difficulty of identifying either specific folk devils, or, by contrast, a plurality of them, contributes towards creating some similarities between the moral panic and the risk society given the "invisibility" and "incalculability" of climate change (Ungar, 1992, 1995, 2014). At the same time, there is a trend in the literature that attributes to climate sceptics the role of "offenders", and to mainstream scientists that of "victims". From this, the mainstream scientists tend to be represented by the media as in a constant defensive position, struggling to question sceptics' position by emphasising and exaggerating their findings to convince a "sceptical and apathetic" public. Even the provocative use of the term "global warming fundamentalists" by Boykoff (2013) for distinguishing mainstream scientists from their counterparts suggests a tendency to attribute to the former a negative and radical connotation. These considerations seem to support the idea that if folk devils exist, they are those scientists who try to "scare" the public by exaggerating and distorting the reality of facts.

4.3. Climate as a political and economic issue

Climate and politics appear to be intertwined in relation to at least four levels: (1) the international political environment, (2) political orientation of the media, (3) the perception of the problem by the public in relation to their political preferences⁴⁵, and (4) the influence exercised (explicitly or implicitly) by governments (and economic actors) on the media. The conflictual frame surrounding climate change does not only relate to the divergence between scientists, national policy-makers and the media, but it also refers to a power play between nation-states (Kunelius & Eide, 2012; Malhotra, 2015). The main division appears to be that between developed and developing countries (Gunster, 2011) producing a kind of "blame game" (Engesser & Brüggemann, 2015). Developed countries blame the developing ones for not understanding the importance of reducing emissions (see also Lück et al., 2018). The dominant "western construction" of the problem often represents developing countries as the most vulnerable (Harvey et al., 2012; Manzo, 2010b; Padgham et al., 2013; Schmidt et al., 2013). On the other hand, developing countries blame the developed ones for being responsible for their vulnerability (Billett, 2010; Shrestha et al., 2014), thus claiming compensations (Rhaman, 2016) or perceiving themselves as entitled to produce emissions (Billett, 2010). Even though the

⁴⁵ Moreover, the partisan nature of climate change was found to generate both Hostile Media Perception (HMP) and public opinion polarisation (Hart et al. 2015). Kim (2011) showed that perceptual differences in story bias are triggered by partisanship, and this produces consequences in terms of a lack of trust in science news and selective exposure. This suggests that HMP tends to reinforce people tendency to select news stories that confirm their opinion, and this in turn reinforces their polarisation (Feldman et al., 2014).

theme is marginally considered by the examined literature, it clearly emerges a division between developed and developing countries in terms of representation of the issue by the media, but also in terms of "environmental and social (in)justice". However, in both developed and developing countries, climate change often tends to be represented by the media as a political issue (and often connected to the economic one) (Batta et al., 2013; Kirilenko & Stepchenkova, 2012; Stoddart et al., 2015). It can be characterised by "national domestication" (Arcila-Calderón et al., 2015; Blanco Castilla et al., 2013; Kunelius & Eide, 2012)⁴⁶, which in some cases reflects governments' way to act (Boussalis, Coan, & Poberezhskaya, 2016; Poberezhskaya, 2015; Speck, 2010). However, it can also be represented as an "international problem" that should be solved through international agreements (Batta et al., 2013; Evans, 2016; Gordon et al., 2010; Mercado, 2012; Nwabueze & Egbra, 2016).

Moreover, mixed political and economic interests are implicitly defended by the media (Murphy, 2015). In some cases, when governments appropriately consider climate-related issues, the media tend to represent them as a real problem to be tackled. In contrast, when the problem is underestimated the uncertainty becomes a dominant topic (Lockwood, 2009). Climate change policies (Gkiouzepas & Botetzagias, 2015) and policy failures in reducing emissions are also a frequent target of the media (Blanco Castilla et al., 2013; Feldman, 2013; Gunster, 2011).

The representation of political figures/voices (and sometimes their related "contested framework") seem to prevail over the scientific sources all over the world⁴⁷, thus supporting the notion that climate change is more often interpreted as a political rather than a scientific issue (McKnight, 2010). Moreover, global political events are found to attract news media attention (DiFrancesco & Young, 2011; Liang et al., 2014) more than the publication of scientific literature (Rick et al., 2011; Schafer et al., 2013).

Climate change is described as a politicised issue (Antilla, 2005; Aykut et al., 2012; Boykoff & Boykoff, 2004; Carvalho, 2007; Dirikx & Gelders, 2010a; Schmidt & Schäfer, 2015). The media tends to give more attention to the political valence and interpretation of the phenomenon, rather than to the scientific explanation (Jaspal et al., 2016; Rick et al., 2011). This means that climate science might be interpreted and metabolised through the political lenses that dominate the discourses surrounding climate change. In fact, several studies show that the political polarisation of the media also tends to produce political polarisation in the public (see e.g. Feldman et al., 2012; Feldman et al., 2014; Hart & Nisbet, 2012; Jamieson & Hardy, 2014; Hmielowski et al., 2013; McCright, 2011; Zhao et al., 2016).

The "politicisation" and consequent "polarisation" around climate change recall several criticalities of the moral panic debate regarding the role of the media as primary or secondary definers

⁴⁶ In analysing Sweden, Indian and US newspapers, Olausson (2014) found that three main discursive modes of domestication (adaptation of news to "nation-state identity") can be identified: introverted domestication (disconnection of local phenomena from their global connections); extroverted domestication (interconnections between the local phenomena and their global relation); counter-domestication (de-territorialised mode of reporting without any domestic anchoring, see also Horta, Carvalho, & Schmidt, 2017).

⁴⁷ See Boussalis et al., 2016; DiFrancesco & Young, 2011; Dotson et al., 2012; Grundmann & Scott, 2014; O'Neill, 2013; Rebich-Hespanha et al., 2015; Takahashi et al., 2017; Takahashi & Meisner, 2013; Takahashi, 2011; Young & Dugas, 2012; Yun et al., 2012.

of social problems (Hall et al., 1978), and the identification of "victims" and "folk devils". The existence of two "contrasting communities" that use multiple media formats and channels (Cooper, 2011), make it difficult to clearly identify those who can be labelled as folk devils and their antagonists who counteract (McRobbie & Thornton, 1995; Thornton, 1994), as well as the identification of the primary definers of the problem. At the same time, this polarisation in climate change echoes the political economy debate (see chapter two) supporting the idea that the media polarisation reflects political elite conflicts (Bennett, 1990; Hallin, 1986).

Media coverage was found to be a function of economic (Zamith et al., 2012) and elite statements (Shehata & Hopmann, 2012), thus reinforcing the partisan and economic character of the climate change issue. The "politicisation" of climate change is also reflected in the reporting of specialised scientific online news services, such as e.g. *Nature News*, which, despite a predominant "scientific frame", tends to critically cover political, economic, and social dimensions of climate change (Nielsen & Kjærgaard, 2011). A study of UK newspapers' coverage of the issue of new nuclear power stations in the period between the launch of the UK government's first Energy Review in January 2006 and the publication of the government's final White Paper on Nuclear Power in January 2008, shows how Government and Industry voices prevailed by insisting on the need for energy supply/security, while marginalising environmental-related issues (and indirectly underestimating the impacts on the environment/climate) (Doyle, 2011). The techno-faith showed in this case, might also be interpreted as an attempt to relegate the climate change problem to a technical issue (Chatterton et al., 2012, cited by Uldam, 2013). Far from being politically resolved, climate change seems to be presented as a "secondary" technical problem that can be managed through the introduction of new technologies and market developments⁴⁸. In the UK context, when climate change-related solutions are considered by newspapers (Cherry et al., 2013; Nerlich et al., 2012), the focus is mainly on technical and economic aspects of the issue, while marginalising the potential cultural and social effects of a broader "sustainable living" (Cherry et al., 2013). The adoption of green energy is debated in both online (Jaspal et al., 2014) and offline arenas (Jaspal & Nerlich, 2014a) in relation to sources of energy such as e.g. fracking practices. In the UK the controversy connected to pro and anti-fracking positions arises from different representation of the issue by certain newspapers (with *The Times* and *The Daily Telegraph* most likely to adopt pro-fracking arguments, whereas *The Guardian* and *The Independent* anti-fracking arguments) (Jaspal & Nerlich, 2014a). This tends to shift the focus (and its related conflictual framework) from a "scientific-based discussion" towards a "political" debate in which different interests (pro-environment and pro-economy growth) are debated, however implicitly adopting a "business angle" (DiFrancesco & Young, 2011)⁴⁹.

⁴⁸ Schäfer et al. (2015) also found that energy is the most discussed issue in climate change-related security contexts in Western countries such as Australia, Canada, New Zealand, the UK and the USA (but also in Singapore); whereas India, South Africa and, to a lesser extent Thailand, focus on food security and water scarcity.

⁴⁹ This is also supported by studies conducted in other contexts (see Bourk et al., 2015; Chetty et al., 2015; Chubb & Nash, 2012; Davidsen & Graham, 2014; Lee et al., 2013; Stoddart et al., 2015; Young & Dugas, 2012; Yun et al., 2012).

The fact that the media tend to support or oppose government actions and corporate interests, in relation to their political and economic orientation, by sometimes explicitly insisting on or implicitly defending the "status quo" (meaning "no action") (DiFrancesco & Young, 2011; Moser, 2010; Takahashi, 2011), is consistent with an elite-engineered model (Goode & Ben-Yehuda, 2009), and Hall et al. (1978) interpretation of moral panic as a means to reaffirm the dominant power. At the same time, it is not clear if the media can be considered as either primary or secondary definers, or by contrast, following Critcher (2003, 2008), equally responsible for creating "circuits of communication" aimed at defending certain economic and political interests (which reflect their own interests). In fact, as highlighted by the literature, the political polarisation of climate change is indicative of a disagreement about climate change deriving from values more than scientific evidence (even though the science is used for supporting these "values-based disputes") (Corner et al., 2014; Hulme, 2009).

On the one hand, a piece of research in the US (see e.g. Akerlof et al., 2012; McKnight, 2010; Schmid-Petri et al., 2015) shows that there is no relevant difference in the representation of sceptical voices between conservative and liberal media; on the other, both the US and the UK newspapers were found to give more space to sceptical voices in comparison to other countries, with marked differences between left-leaning and right-leaning newspapers (right-leaning newspapers were more likely to include uncontested sceptical voices) (Painter & Ashe, 2012).

5. Framing Climate Change

As highlighted in the second chapter of this work, frames provide a perspective for interpreting problems by focalising on some aspects while ignoring others (Cohen, 2011b). At the same time, the frames are not only produced by the media (which provide certain interpretive lenses), but they are in turn interpreted by the public in relation to a number of individual variables (Nisbet, 2009). Following Brüggemann (2014), journalistic frames can be defined as "patterns of interpretation of individual journalists", whilst news frames as "patterns of meaning articulated in news content". Therefore, climate-related news frames might be interpreted as resulting from multiple journalistic, public, scientific and political contexts. Scholars have classified frames in a variety of ways by using existing categories or developing new ones, and this makes it difficult to classify frame schemes in a systemic way (Corbett, 2015). Some of them emerged from the analysis of the media content such as "conflict" (Caillaud et al., 2011; Olausson, 2010), "political/economic" (Boussalis et al., 2016; Caillaud et al., 2011; Kumpu, 2013; Poberezhskaya, 2015), "human, morality and responsibility" frames (Asplund et al., 2013; Dirikx & Gelders, 2010b; Grundmann & Krishnamurthy, 2010; Semetko & Valkenburg, 2000). Another common frame is the representation of the problem as a "global" issue (Rebich-Hespanha et al., 2015; Takahashi, 2011; Takahashi & Meisner, 2013; Young & Dugas, 2012), or as a "national problem" rather than a local one (Ahchong & Dodds, 2012; Bosch, 2012; Mercado, 2012; Stoddart & Tindall, 2015; Stoddart et al., 2015). Media play a key role in introducing the issue on the political agenda: e.g. in the UK, adaptation is a need that emerges from the local level and opens "policy windows" at all scales (Keskitalo et al., 2012). However, the general

preference for "global discourses" also points to the prevalence of mitigation discourses (Ahchong & Dodds, 2012; Batta et al., 2013; Ford & King, 2015; Moser, 2014; Takahashi & Meisner, 2013), but in terms of international achievements. This might mean that delegating the problem to an international arena might further contribute towards the creation of an abstract and "far-away" problem.

Media also adopt "personalisation" frames by choosing specific voices or images that both speak for and represent the climate (Boykoff, 2013; DiFrancesco & Young, 2011; O'Neill, 2013; Rebich-Hespanha et al., 2015) and in so doing they tend to legitimise those who should be considered as "experts" and "moral entrepreneurs". Thus, the choice of specific subjects/voices (while excluding others) is recognised to promote particular ways of conceptualising climate change (and related powerful interests) (O'Neill & Smith, 2014; Rebich-Hespanha et al., 2015)⁵⁰. Scientists appear to be highly trusted messengers, but governments are perceived as primarily responsible for action (even though politicians are scarcely trusted) (Corner et al., 2015)⁵¹. Opinion polls and the public are often used by the media as "rhetorical devices" for promoting or opposing political choices (Carvalho, 2010; Höppner, 2010; Young, 2013). However, there is a tendency to marginalise the role of citizens in the climate change discourse, sometimes presenting them as "concerned" or "victims" (DiFrancesco & Young, 2011; O'Neill, 2013; Rebich-Hespanha et al., 2015), and some others as "apathetic and hypocritical" (Höppner, 2010). This interpretation of the public also responds to some criticisms made of the moral panic framework, which assumes that public opinion exactly reflects media representation of it (Hunt, 1997; Miller & Kitinger, 1998). In this sense, following Critcher (2008), the role of the public can be interpreted as a useful support for the media to empower themselves in the interaction with the claims makers.

The frames adopted by the media are characterised by specific rules and ways of coding messages aimed at creating the image of risks of climate change (Retchless, 2014). Narratives and languages adopted by the media (and in turn reproduced by news consumers in different contexts, such as e.g. social media platform) are frequently cited as effective components of climate communication frames. Creative compounds are shared on online platforms showing the existence of a "common climate language" (Koteyko, 2010; Koteyko et al., 2010). This also means that, for example, in the case of conflict frame, messages tend to reproduce the same "fragmented" narratives of climate change (without contextualising the information, see Boykoff, 2013; DiFrancesco & Young, 2011), inaccuracies, confusion of source, omissions/additions (Jennings & Hulme, 2010), exaggerations, misleading paraphrases, information not scientifically-based (Ahchong & Dodds, 2012) or distortion of scientific results (Tosse, 2013; Vestergård, 2011). The manipulation of language might also become a tool for implicitly defending specific economic interests in communicating climate change-related causes and risks (Murphy, 2015). Sometimes the use of specific words or metaphors might

⁵⁰ The adoption of "testimonials" is often used to increase attention around climate change (Dahlstrom, 2014; Manzo, 2010a; Murphy, 2015). Famous personalities are invested by both the media and the public of a credibility sometimes higher than that given to scientists (Leas et al., 2016).

⁵¹ Some studies show that supportive messages based on consensus not only increase trust in scientists and beliefs in climate change, but also support for climate change mitigation policies (Feldman et al., 2012; Feldman et al., 2014; Hmielowski et al., 2013; Hmielowski & Nisbet, 2016; Nisbet et al., 2014, 2015).

produce effects on public reaction such as in the case of "global warming" (that appears to negatively influence human feelings) instead of "climate change" (Lineman et al., 2015; Manzo, 2012), or the use of "war metaphors" instead of "game metaphors" (Asplund, 2011)⁵². In other cases, the same words can assume totally different meanings if used by "convinced" or "unconvinced" speakers (Holmberg & Hellsten, 2011). The morality frames, for example, are often associated with the use of "religious metaphors" and human aspects of climate change (Grundmann & Krishnamurthy, 2010)⁵³. However, religious metaphors in the British conservative newspapers are often used to denigrate the scientific status of climate change (by presenting it as an irrational faith-based religion and its proponents as religious fanatics intolerant of criticism); and to mock climate change using metaphors of sin, sacrifice, and self-punishment (Woods et al., 2012).

In addition to the language used, the iconography of climate change creates recognisable symbols of climate change (Braasch, 2013; Cottle, 2009; O'Neill & Hulme, 2009; O'Neill et al., 2013), not only related to human aspects (Manzo, 2010b) or the whole planet (O'Neill & Smith, 2014), but also to ecological icons. This iconography activates a process of symbolisation (Cohen, 2011a) that makes immediate connections (also in emotional terms) to climate change (such as e.g. in the case of polar bears that immediately recall the effects of the phenomenon) (Ballantyne et al., 2016; León & Erviti, 2015; Manzo, 2010a). However, effect frames combined with fear-laden language/images might produce negative impacts on public perception (Greitemeyer, 2013; Morrison & Hatfield-Dodds, 2011; Sakellari, 2014; Whitmarsh, 2011). As noted in discussing dramatization, this characteristic of media communication seems to fulfil the category of "exaggeration" and "distortion" of the facts as described by moral panic researchers⁵⁴.

6. Traces of Moral Panic in Climate Change Media Communication

Some traces of moral panics might be identified in the anthropogenic climate change discourse, but also contradictory aspects that question the applicability of this conceptual framework to the analysis of the phenomenon. Following Moser (2016), the communication of climate change landscape is shaped by a multiplicity of elements such as the climate itself (e.g. climatic extremes), scientific advances, climate policies and action, incisive communication moments (e.g. Pope Francis' encyclical on the Human-Earth relationship), multidisciplinary of climate science, and contextual factors (political cultural and political related events). These factors, when combined, serve to shape the climate change discourse in a number of different ways, giving distinct pictures also in relation

⁵² Moreover, the dominant "western connotation" of climate change also involves issues related to the translation of the "conventional scientific concepts" in local languages in non-western countries (Harvey, 2011; Hulme, 2017; Marin & Berkes, 2013).

⁵³ The literature highlights that both ideology and religiosity might influence science beliefs (Zia & Todd, 2010) through value-based judgments (Zhao et al., 2011).

⁵⁴ Constructive and solution-oriented messages (positive framing) (Hart & Feldman, 2016a), and sometimes the combination of satiric and serious frames (Bore & Reid, 2014), which suggest positive emotions and potential solutions rather than anxiety, produce positive outcomes in terms of motivating people to act (Cody et al., 2015; Kreslake et al., 2016; Manzo, 2010a; Markowitz & Shariff, 2012; Morton et al., 2011; Wibeck, 2014) and attitudes towards climate change mitigation (Spence & Pidgeon, 2010).

to the evolution of the phenomenon over time (in scientific, but also in political and economic terms), and in relation to its spatial dimension (global/national/local). For example, the fact that climate change is also described in terms of climate (in)justice recalls ethical issues at the international level indicating that there are different folk devils also in relation to the geographical perspective adopted.

Considering the main ingredients of the moral panic framework, as firstly defined by Cohen (1972), and further developed by Goode and Ben-Yehuda (2009), and other scholars (e.g. Critcher, 2003), the first problematic definition is related to the issue of concern. From the analysis of the literature produced on the media communication of climate change, some important questions arise about the "object of concern". In fact, from the literature review a "schizophrenic" image of climate change emerges as resulting from its media representation. During its "emergence phase" the climate change discourse is polarised between "denials" and "supporters" of the fact that climate change is real and caused by human activities. Then, this polarisation shifts towards a polarisation between sceptical and acceptor positions around the effects of climate change and (in)action needed. From this, it seems difficult to establish whether climate change is universally perceived as a concern by both the public and the media. However, a division emerges between two "communities" (sceptics and advocates), as also testified by opinion polls and a piece of literature on public perception of the phenomenon in particular in the UK (see e.g. BBC, 2010; Capstick & Pidgeon, 2014; DECC, 2013; Reser et al., 2012; Spence et al., 2010; Stokes et al., 2016; Taylor et al., 2014; van der Linden, 2015; YouGov, 2012). Polls are frequently used by the media and political discourse as "rhetorical devices" for "directing attention to an issue or position, legitimating a given policy or promoting opposition toward a political choice" (Carvalho, 2010). This seems to support Critcher's (2003) arguments about the marginal role played by the public in defining the level of concern. Thus, the media tend to use the "public" mainly to support their own perspective and "construct" an image of a public opinion that does not necessarily correspond to the real one. This means that the public may be instrumentally used by the media to support (or weaken) sceptics and advocates' crusades by reinforcing the dichotomy between these two "factions".

These considerations are directly connected to the second "attribution" identified by Goode and Ben-Yehuda (2009) regarding the "hostility" against specific "folk devils". In the case of sceptics, the so called folk devils might be identified in mainstream scientists, activists and NGOs that are responsible for the "societal crisis"; whereas in the case of advocates a multiplicity of "offenders" exist, such as, recalling Rohloff (2013b), climate/sceptics/deniers, governments, corporations whose consumption of resources is considered excessive while producing a large carbon foot print.

Moreover, given that "the consensus need not to be universal or even national, it might be limited to some groups or some regions. But a substantial segment of the public must see threat in that condition for the concern to qualify as a moral panic" (Goode & Ben-Yehuda, 2009, p.35), different "versions of the story" are provided by each group. On the one hand, the media report a generalised consensus around the anthropogenic causes; on the other, they serve the contrarian voices either by giving them "disproportionate" space (in particular in the US) or by adopting sensational effects and dramatization as tools for "exaggerating" the problem and implicitly promoting under-estimation of it (thus reinforcing sceptical positions). This is also connected to another controversial aspect of the

moral panic framework related to the "disproportionality of what?". In the climate change case, it is not possible to identify an "over-exaggerated" reaction of both the public and the measures adopted by governments for tackling the problem. At the same time, the over-reaction of the public is not considered by some approaches (such as that proposed by Critcher, 2003) as essential to generating moral panics. In contrast, the disproportionality seems to relate to both the "over-exaggeration" of the problem by the media (or "under-estimation" by sceptics) and the "over-representation" (or under-representation) of specific voices. Climate change sceptics interpret media reporting (and mainstream climate science) as "too apocalyptic". On the opposite, those who are concerned about climate change accuse the media of representing contrarian voices "disproportionally" (even though they represent the minority). However, the "exaggeration" promoted by the media in terms of using "apocalyptic" tones is recognised by both parts. While in the sceptics' case, it is used as a testimony of the "irrationality" underlying both the proposed scientific theories and the "irrational" policies to contain a "non-existent" problem; in the advocates' case, it is seen itself as a means for promoting underestimation.

Finally, in the case of volatility, reporting on climate change is triggered by a multiplicity of events (e.g. economic, political, or celebrity events). However, these facts are more or less related to the core phenomenon, and only in the case of meteorological events they can be considered as "deliberately" attributed by the media to climate change. However, in correspondence to some events specific voices prevail, such as in the case of climate-related scandals that support the affirmation of sceptical positions, which in turn undermine science credibility (Leiserowitz et al., 2012; Ward, 2010)⁵⁵.

To provide a preliminary answer to the overall question guiding this thesis, the lack of a "unique and universal" narrative of climate change suggests the existence of two different moral panics related to two strong groups. In fact, the evolution of climate narratives has also involved different kinds of voices who speak for the climate in the media debate, ranging from scientists (since 1980) and environmental pressure groups, towards the involvement of politicians, industries, and celebrities as legitimised claim-makers (Anderson, 2011). This evolution also indicates a progressive shift of the problem from science towards a politicised issue characterised by specific economic interests (Moser, 2010). From this, it is difficult to identify those who can be labelled as primary definers, because both groups have consolidated their authority in the media debate over time. However, it can be argued that at the beginning of the narrative process, there was a tendency to treat climate change as a scientific issue (during the inventory phase to use Cohen's approach), whilst from 1990 onward a politicisation of the issue has progressively prevailed ("opinion and attitude phase"), especially in the UK and the USA (Boykoff & Boykoff, 2004; Carvalho, 2007). This shift from considering scientists as primary definers towards politicised and political figures as dominant claim-makers caused a polarisation around climate change and the emergence of a clear cut between two

⁵⁵ In some cases, mass media marginalisation of specific voices is highlighted, e.g. activists during UN meetings (Roosvall & Tegelberg, 2015; Uldam, 2013). However, Lück, Wozniak, and Wessler (2015) found that during UN conferences journalists and NGOs' representatives build networks aimed at exchanging insights and co-producing knowledge for different audiences.

factions. Each group tells different stories, promotes opposite "panics", and identifies different folk devils.

Given this complex picture, in the case of sceptics, the moral panic traits identified by Cohen (1972) in "increasing the size, the seriousness, the negative consequences of a phenomenon, reporting 'false' stories, focusing media attention on a specific phenomenon", seem to "work in reverse" as also suggested by Brisman (2012). In fact, sceptics tend to highlight a lack of scientific consensus around climate change (firstly in terms of causes, then in terms of consequences) (Moser, 2010). However, within this group generalised consensus exists about the fact that some scientists threaten the current social order by attributing to human behaviours both the causes of climate change and responsibility to amend it. The concern does not produce over-reaction in the public. Instead, the disproportionality should be considered in relation to an underestimation of the problem (and over-estimation of consequences attributed to the counterparts). In this case, the panic may result from top-down imposition of restrictions (e.g. in limiting greenhouse gases emissions that provide the society with high levels of well-being) that are not needed, given the inability of scientists to determine the real impacts of climate change. In this sense, climate change seems to be an "a-moral" issue (Goode & Ben-Yehuda, 2009) given the incalculability and invisibility (Ungar, 1995, 2001) of this "new risk" (Beck, 1995), which is treated either as a "vindication" of nature that cannot be tackled by humans, or as an "uncertain" risk that might also produce positive impacts. From this, a necessity to reaffirm the "status quo" emerges by identifying and contrasting the real "threat" (hostility against mainstream scientists, but also activists and NGOs and politicians who are responsible for the "societal crisis").

The other side of the story is provided by the advocates. Within this group, a generalised consensus and concern does exist about the fact that climate change threatens the "planet" (and humans) if current lifestyle and practices (individual and collective) do not change and appropriate "controlling" measures are not adopted. In this case, the disproportionality is related to an over-estimated authority given by the media to sceptics, who represent the minority within the scientific community (and the frequent use of "panic frames"). Here, hostility is against a multiplicity of "offenders", identified not only in climate/sceptics/deniers, but in all those powerful actors who excess in consuming resources (Rohloff, 2013b). The "climate crisis" seems to be a symptom of a wider "moral crisis" in which individuals and societies are called upon to remedy the "wrong" values and behaviours that contribute towards causing this situation. The resulting panic is directly connected to the phenomenon per se and its potential "devastating consequences" for the society. In this case, some attempts to activate "processes of civilisation" (Rohloff, 2012) can be identified (such as, e.g., in the case of Al Gore's documentary), through "warning messages": given the "catastrophic" consequences of climate change, people should be concerned and increase their hostility against the "common threat" by reacting and acting to limit the risks. At the same time, the dramatization of these warning messages may also represent an opportunity for denials to discredit science given the "drama" associated with these narratives.

Summary

During its emergence phase, climate change reports in the media are largely polarised between those stories of "denial" and "acceptance" of the existence of climate change and its anthropogenic causes. Over time, this polarisation has shifted towards the effects of climate change and the (in)action needed. Given the lack of a "unique and universal" narrative, the hypothesis of the existence of two different moral panics emerges related to two strong groups. In the case of sceptics, the literature supports the idea of a moral panic working "in reverse". Sceptics highlight a lack of scientific consensus around climate change. In contrast, there is a generalised consensus about the fact that a part of scientists threatens the current social order by attributing to humans both the causes of climate change and responsibility to amend it. The concern does not produce over-reaction in the public, but it is related to the fear of restrictive controlling measures. The disproportionality relates to an underestimation of the problem (and over-estimation of consequences attributed to the counterparts). Climate change appears to be an "a-moral" issue that cannot be tackled by humans, and the "uncertainty" around it might produce positive impacts. From this, a necessity to reaffirm the "status quo" emerges by identifying and contrasting the "threat" (hostility against the "environmentalism" responsible for the "societal crisis").

In the case of advocates, a generalised consensus and concern relates to the fact that climate change threatens the "planet" (and humans) if current practices (individual and collective) are not controlled by specific measures. The disproportionality relates to an over-estimated authority given by the media to sceptics, who represent the minority within the scientific community (and the use of "apocalyptic" metaphors connected to consequences). Here, the hostility is against a multiplicity of "offenders", identified not only in climate/sceptics/deniers, but also in all those powerful actors who harm the environment. The "climate crisis" reflects a wider "moral crisis" in which individuals and societies are called to self-reflect on those "wrong" values and behaviours that contribute towards causing this situation. The resulting panic is connected to the phenomenon per se and its potential devastating consequences for the society.

Chapter 4 Research Frame, Questions and Case Study selection

Key points

Chapter four introduces the research framework designed to answer the research questions of this thesis (section one). It describes the methods adopted for analysing both British newspapers (sections 2-2.2) and think tanks' press releases between 1988 and 2016 (section three). The moral panic framework is utilised in two ways: to investigate the process of construction of the news through specific frames and the evolution of reporting over time; and to investigate the applicability/relevance of the theoretical model to the phenomenon.

1. Introduction

The research combines both quantitative and qualitative methods of analysis, in order to understand how climate change-related issues are "mediated" and transmitted to the public by British newspapers. As shown in chapter two, a limited theoretical discussion on the application of the moral panic theory to climate change was conducted and it produced contradictory results, mainly in relation to the types of media considered and specific moments in which climate-related discourses are analysed. The originality of this research relies on empirically exploring the possibility of applying the moral panic model on newspaper reporting on climate change by referring to a specific case study represented by British newspapers. In fact, as noted in the first three chapters of this work, the media landscape is characterised by a political polarisation around climate change. Chapter three revealed that moral panics provide a tool for interpreting climate change newspapers' narratives. Moreover, in parallel and in continuity with previous research, which analysed British newspapers, this study refers to an extended period from 1988 to 2016 to compare its results with previous findings and provide a potential evolutionary perspective.

More specifically, the research investigates the contribution of newspaper reporting to the social construction of the meaning of climate change. The adoption of the moral panic framework has two purposes: to investigate the process of construction of the news through specific frames (also exploring the reasons behind specific narratives) and the evolution of reporting over time; and to investigate the applicability/relevance of the theoretical model to the phenomenon.

To undertake this investigation, this thesis examines the application of the moral panic framework from a media perspective to answer the following research questions:

Research question 1. Are climate change articles (958 articles) between the years of 1988 and 2016 from 8 newspapers (grouped per political orientation) consistent with a moral panic framework (see chapter five)?

Research question 2. Does the moral panic framework help explain the characteristics of rival climate change narratives in British newspapers (i.e., those who see the harm in anthropogenic climate change versus those who deny climate change) (see chapters five and six)?

Research question 3. How do contextual factors (specifically political orientation of newspapers and think tanks' narratives) influence the construction of different realities assembled into these polarised and rival narratives (see chapter seven)?

These questions are explored through framing analysis (chapter five) and Corpus Assisted Discourse Analysis of British newspapers (chapter six), and qualitative analysis of conservative think tanks' documents (chapter seven) to investigate the potential influence of newspapers' political partisanship. In fact, previous studies (Boykoff & Mansfield, 2008; Carvalho, 2005, 2007; Painter & Gavin, 2015) suggest differences in media reporting on climate change between left-leaning and right-leaning newspapers particularly in terms of how they represent climate change scepticism. This suggests that different answers might be found to the proposed questions in relation to the political orientation of newspapers.

Specifically, the first research question, related to the existence of empirical evidence of political differences between sceptics and advocates (and related moral panic traits) is investigated through regression analysis and the analysis of the association between the different frames adopted by the news articles and political orientation of newspapers (chapter five).

Moreover, the second question is investigated through a categorical principal component analysis (CATPCA) of the identified variables (see section 2.1 of this chapter related to framework analysis), which synthesises the main dimensions emerging from the data to explore the characteristics of these contrasting positions. Furthermore, the qualitative analysis provides additional insights on some specific traits that emerged from the quantitative analysis contributing towards responding to this question (see chapter six).

Finally, the third question related to the potential influence of external factors on climate narratives is partially investigated by exploring the relation between political affiliation of newspapers and their framing tendencies, and the relation between "volatility" of reporting and contextual events (international meetings/agreements, weather extremes, and scientific publications). However, this is further investigated through the analysis of think tanks' documents (see section three) by identifying potential similarities with newspapers' narratives (chapter seven).

In the following sections, the methods adopted for analysing newspaper reporting and for carrying out think tanks' documents analysis will be clarified further.

2. Newspapers' analysis method

The aim of the newspapers' analysis is twofold: investigating the evolution of news narratives on climate change over time (in relation to the political orientation of newspapers) and identifying if and what elements of the moral panic framework are applicable to the study of the phenomenon. The choice of the British context and the medium (newspapers) is related to the fact that, as highlighted by Painter and Gavin (2015), Britain plays a primary role in the international politics of climate change, and its news articles are reproduced by English-speaking print media around the world. Moreover, in 2011 newspapers were the second source of information for science, after television

(respectively 33% and 54% of British people regularly use these sources of information) (BBC, 2011 as cited by Painter & Gavin, 2015). In 2018, 40% of the UK population still read a print newspaper (Ofcom, 2018) and, in contrast to television, newspapers' coverage of climate change-related issues is higher and offers greater space to address the topic.

Given that the moral panic concept is multifaceted and previous studies mainly adopted inductive approaches for analysing media reporting on specific phenomena, the present study operationalises the moral panic concept by adopting both content/frame analysis and corpus assisted discourse analysis (CADA) to explore the process of construction of the social reality in the context of climate change and related emerging media discourses.

The study mainly draws on both Cohen's and Goode and Ben-Yehuda models for analysing newspaper reporting by operationalising the components of their approach. However, as explained in detail below, it takes into account the evolution of some aspects of the moral panic framework as proposed by other scholars. The majority of the constitutive elements of their framework (such as "consensus", "hostility", and "disproportionality") can also be explored by analysing specific frames. In order to achieve higher reliability, following Gamson and Modigliani (1989), the frames (or "packages") are not considered as single holistic variables, instead they are broken down into sub-categories in order to identify specific patterns of content variables. Moreover, as suggested by Matthes and Kohring (2008), since frames can be interpreted as "clusters of frame elements", the following approach is adopted: i) definition of the "frame concept" and identification of frame elements (internal variables); ii) investigation of the relation between frame elements and political orientation of the newspapers through analysis of their association and regression analysis; iii) identification of dimensions that can explain the variance of the sample through categorical principal component analysis (CATPCA) of the identified variables characterised by "high differences between the clusters and low differences within a cluster" (Matthes & Kohring, 2008). As highlighted by these authors, even though this method does not completely solve the issue of reliability because this shifts the problem to the content analysis of the elements, this allows increasing the reliability in relation to the analysis of smaller units. CATPCA is a Nonlinear Component Analysis appropriate for data reduction from high-dimensional data sets (Scholkopf et al., 1998) when variables are categorical (nominal and ordinal) (Linting et al., 2007)⁵⁶.

The moral panic applicability is explored in relation to the frames adopted by newspapers over an extended period (1988-2016). The choice of the starting date relates to the emergence of the climate change issue in the public debate⁵⁷ as triggered by several events such as extreme weather events (hottest summer in the North America ever recorded)⁵⁸ and the creation of the IPCC as

⁵⁶ CATPCA aims to "reduce the dimensionality of a set of variables while accounting for as much of the variation as possible [...]. The solution of a categorical principal components analysis maximizes the correlations of the object scores with each of the quantified variables for the number of components (dimensions) specified" (Meulman & Heiser, 2004).

⁵⁷ NASA scientist James Hansen calls for action on anthropogenic global warming and Margaret Thatcher gives a speech about the urgency on acting on climate change (Boykoff & Boykoff, 2004). Some traces of reporting can also be identified before the 1988 (Carvalho, 2007).

⁵⁸ It was the fifth hottest summer of the 1980s, anticipated by hot waves in 1980, 1981, 1982, and 1987 (Ungar, 1992).

internationally accepted scientific authority that provides recommendations based on scientific evidence. Moreover, as shown by Carvalho (2007) in her research on newspaper reporting on climate change by the three main British "quality" newspapers between 1985 and 2001, the year 1988 represents a first peak. Moreover, Carvalho (2008) suggests that public discourses should be studied over extended periods to capture the "historical evolution" of concepts. This is the reason why, this thesis investigates an extended period from 1988 to 2016.

While the volume of coverage considers the entire period (from 1988 to 2016)⁵⁹, both the CATPCA and the corpus assisted discourse analysis focus on a sample of articles retrieved from 8 newspapers (including their Sunday and online versions) using the Lexis/Nexis database (Table 4)⁶⁰.

Moreover, both news and editorials are considered in order to gain a comprehensive perspective about the representation of the phenomenon and the extent to which the articles reflect editorial lines. Although the attribution of a political orientation to newspapers might be open to debate, in this case, a classification emerged from a survey carried out by YouGov in 2017 about people's perception of newspapers' orientation in the UK was used as reference⁶¹.

The following keywords are used to retrieve the news: "climate change", "global warming", "greenhouse effect" (Carvalho, 2007).

The adoption of a moral panic conceptual framework for classifying and interpreting data gives the opportunity to simultaneously identify the main components of the process of news construction and exploring what elements of the framework are applicable to the study of the phenomenon.

Finally, some elements emerging from the quantitative analysis of the frames are further investigated through content analysis and corpus assisted discourse analysis (CADA) to qualitatively explore the process of constructing media discourses around climate change (see section 2.2). CADA allows the simultaneous analysis of both text and context, plus their qualitative and quantitative aspects. This facilitates the identification of the cultural values and power relations reflected in the construction of social reality. Following Doyle (2007), the structure of the text (headlines and paragraphs), the selection of social actors (object and subject of the narratives), the linguistic choices (vocabulary); and discursive strategies (types of discourses adopted to represent reality) are considered. Moreover, contextual elements such as political orientation of the newspapers, political events at a national level and international levels related to climate change, and potential influence deriving from think tanks' construction of climate change meaning help illuminate the "socio-cultural" and "institutional" context in which discourses are (re)produced (Fairclough, 1995).

⁵⁹ This will also contribute towards investigating the "volatility" of the phenomenon, but also its reappearance over time (Young, 2009).

⁶⁰ The choice of including tabloids relates to both their circulation and previous scientific findings. In fact, as previously showed by Boykoff and Mansfield (2008), the study of UK tabloids (the Sun, Mail, Express, and Mirror) between 2000 and 2006 revealed a tendency to report sceptical positions. The newspapers were selected in relation to their presence (and circulation) on the market throughout the period (<https://www.statista.com/statistics/529060/uk-newspaper-market-by-circulation/>).

⁶¹ It should be acknowledged that some scholars argue that even the most progressive newspapers are not free from advertising and corporations' influences (upon which they depend for financial support), which might influence their content. This means that sometimes it might be difficult to attribute a specific political orientation to newspapers (Edwards & Cromwell, 2006).

Table 4. Newspapers included in the study

Newspaper	Format	Political alignment	Circulation December 2016 ⁶²	Owner(s)
Daily Mail	Daily tabloid	Right wing	1,491,264	Daily Mail and General Trust
The Mail on Sunday	Weekly tabloid	Right wing	1,284,121	Daily Mail and General Trust
Mail online	Online	Right wing		Daily Mail and General Trust
Daily Mirror	Daily tabloid	Centre-left	716,923	Trinity Mirror
Sunday Mirror	Weekly tabloid	Centre-left	620,861	Trinity Mirror
Mirror.co.uk	Mirror online	Centre-left		Trinity Mirror
The Daily Express	Daily tabloid	Right-wing	391,626	Richard Desmond
The Sunday Express	Weekly tabloid	Right-wing	335,271	Richard Desmond
Express Online	Online	Right-wing		Richard Desmond
The Sun	Daily tabloid	Right-wing	1,611,464	News UK
The Sun on Sunday	Weekly tabloid	Right-wing	1,383,048	News UK
The Times	Compact daily newspaper	Centre right	446,164	News UK
The Sunday Times	Broadsheet	Centre right	792,210	News UK
Thetimes.co.uk	Online	Centre right		News UK
The Daily Telegraph	Broadsheet	Centre right	460,054	Telegraph Media Group
The Sunday Telegraph	Broadsheet	Centre right	359,287	Telegraph Media Group
Telegraph.co.uk	Online	Centre right		Telegraph Media Group
The Guardian	Berliner	Centre-left	161,091	Guardian Media Group
The Guardian online	Online	Centre-left		Guardian Media Group
The Observer	Sunday version of The Guardian	Centre-left	182,140	Guardian Media Group
The Independent	Broadsheet until March 2016	Liberal	57,930	Alexander and Evgeny Lebedev
The Independent on Sunday	Broadsheet until March 2017	Liberal	97,218	Alexander and Evgeny Lebedev
Independent.co.uk	Online	Liberal		Alexander and Evgeny Lebedev

2.1. Framework Analysis

In the following, the schema and coding schedule for exploring the moral panic application (mainly based on Cohen's and Goode and Ben-Yehuda's models) to British newspaper reporting (research question one) is outlined. The identification of the main frames will help identify tensions between

⁶² <http://www.pressgazette.co.uk/print-abcs-seven-uk-national-newspapers-losing-print-sales-at-more-than-10-per-cent-year-on-year/>

forces (such as sceptics and advocates) (research question two), how they evolved over time and the mechanisms adopted by newspapers for constructing the news (see Appendix 1 for coding examples). This schema resulted from the combination of existing frames (adapted to the needs of this study) identified by other scholars in newspaper reporting on climate change (see chapters two and three), and additional frames created ad hoc to investigate the presence of those elements that emerged in the context of Cohen and Goode and Ben-Yehuda's moral panics' studies (see chapter two). It mainly draws on the three phases identified by Cohen (Inventory Phase, Opinion and Attitude Themes Phase, and Rescue and Remedy Phase) combined with the attributions identified by Goode and Ben-Yehuda (concern, hostility, consensus, disproportionality, and volatility) (see Box 1). In fact, the characteristics identified by Goode and Ben-Yehuda correspond to the specific phases identified by Cohen (see Box 1). Accordingly, the attributions of "consensus", "concern" and "disproportionality" characterise the Media Inventory Phase in which the media exaggerate and distort the problem ("disproportionality" trait), "construct" expert consensus around the "severity" of the phenomenon, predict future related events and identify specific symbols to generate "concern" around a "common threat". The "hostility" is especially inflamed in the Opinion and Attitude Themes Phase in which specific opinions/attitudes are encouraged (and amplified by the media) around the causes and the nature of the problem, and specific folk devils are identified. Finally, both "concern" and "volatility" combine in the Rescue and Remedy Phase in which "coming-and-going" "symptoms" and events are used to justify the implementation of specific control measures/action/solutions (see Box 1). The main difference that distinguishes the two approaches relies on the interpretation of the media either as "initiators" of the process (Cohen's processual model) or "amplifiers" of other views (Goode and Ben-Yehuda's attributional model) (see also Critcher, 2003). However, both approaches recognise a role (primary or secondary) played by the media in activating moral panics.

Box 1. Similarities and differences between attributional and processual models

Attributional model	Processual model
Similarities	
<p>Concern ←————→</p> <p>Consensus ←————→</p> <p>Hostility ←————→</p> <p>Disproportionality ←————→</p> <p>Volatility ←————→</p>	<p>Media Inventory Phase (identification of threat, legitimation of authoritative voices, and consensus among experts → exaggeration, distortion, and prediction)</p> <p>Opinion and Attitude Themes (images/folk devils, specific narratives of causes and nature of the problem)</p> <p>Rescue and Remedy Phase (sensitisation process, solutions/actions proposed, debated, refuted, social control culture)</p>
Differences	
<p>Passive role of the Media in transmitting views of others;</p> <p>Focus on claim makers' strategies to influence the public</p>	<p>The Media are essential "initiators" of the process;</p> <p>The agents (e.g. state agencies, politicians etc.) contribute towards constructing the issue;</p> <p>Emphasis is on the "ideological discourse" behind moral panic (such as e.g. law and order)</p>

Cohen refers to phases in a "processual" perspective, which includes the emergence of the problem, the "construction" of opinion and attitude against the threat, and the development of countermeasures. In this thesis (see Box 2), these elements are defined as components because they are analysed both synchronically and diachronically.

Finally, following Goode and Ben-Yehuda's attributional model (2009), the majority of the ingredients of their framework will emerge from the analysis of specific frames such as in the case of hostility, in relation to the construction of the threat and specific folk devils ("folk devil frame"), consensus, in relation to the degree of shared agreement around both causes and consequences of the phenomenon ("general consensus frame", "balance frame" and "causation frame"), and disproportionality, in relation to the tendency of the newspapers to dramatize and (un)balance the reporting giving more space to minor voices ("claim-makers frame", "dramatization frame", and "balance frame") (see Box 2).

Following, the definition of the public as suggested by Critcher (2003), and further supported by Maneri (2013), as "constructed" by the media, rather than "activated", the "concern" component is explored in relation to its representation through claim-makers' voices and tones used to describe the threat.

Following, Critcher (2003) and Rohloff (2012), who suggest a more "fluid" application of the moral panic framework in relation to the specific phenomenon under investigation, the criterion of disproportionality is explored in relation to the space given to sceptical and advocacy positions ("balance frame"), and the use of sensational effects and catastrophic tones in reporting climate change consequences ("dramatization frame"). This, in relation to the evidence embodied in the existing literature, which highlights how the media communication of climate-related issues tends to give a disproportionate space to sceptical voices compared to their real weight in the scientific debate (marginal in comparison to mainstream scientists) (Boykoff & Boykoff, 2004; Carvalho, 2007). Moreover, the literature highlights that newspapers tend to use catastrophic tones in describing potential consequences of the phenomenon that are not actually found in climate science (Ereaut & Segnit, 2006). Accordingly, Maneri (2013) advocates measuring disproportionality in terms of the language used for creating exceptionality.

Finally, volatility is interpreted in relation to the appearance and disappearance of the phenomenon over time in correspondence to "collateral events", such as political and weather-related events, and the publication of scientific findings. In fact, the literature shows that specific events attract media attention (Anderegg & Goldsmith, 2014; Arcila-Calderón et al., 2015; Cody et al., 2015; Elsasser & Dunlap, 2012; Holliman, 2011; Kunelius & Eide, 2012; Lörcher & Neverla, 2015; Porten-Cheé & Eilders, 2015; Stoddart & Tindall, 2015).

Box 2. Guidelines for exploring the process of construction of news and the applicability of the moral panic framework

DESCRIPTIVE VARIABLES

Date, newspaper, author, word count, news title, political orientation of the journal

MEDIA INVENTORY COMPONENT: CONCERN, CONSENSUS, AND DISPROPORTIONALITY

1) SOURCES OF INFORMATION, GENERAL PREVAILING FRAMEWORK

1) Sources of information ("Claim-makers frame")

Who are the main social actors used by journalists as claim-makers in their climate narratives?

CLAIM-MAKERS FRAME (1 present - 0 no present):

1. Government/Politicians
2. Businesses
3. Other Media
4. Public/Civil Society
5. NGOs/Activists/Associations
6. Scientists
7. Celebrities
8. Justice/Law Enforcement
9. Religious Officers

2) Overall presentation of the problem ("General Frame" and "Problem Definition Frame")

GENERAL FRAME (see also Boykoff, 2007)⁶³:

What is the degree of overall consensus around climate change?

1. **Consensus frame:** General recognition of scientific consensus around causes, entity, consequences and need for intervention
2. **Partial consensus:** General recognition of scientific consensus about causes and its existence, uncertainty about some other aspects (severity of consequences or types of actions to be taken)
3. **Neutral frame:** No specific position expressed
4. **Partial scepticism:** Partial recognition of scientific consensus around causes or existence of the problem, but negation of consequences, no intervention is needed
5. **Sceptical frame:** Presentation of the problem as controversial and uncertain in all regards, a conflict between different parties

PROBLEM DEFINITION FRAME (see also Matthes & Kohring, 2008) (1 present - 0 no present):

What is the perspective adopted to represent climate change?

1. **Topic: Scientific:** the problem is presented as a scientific issue; reference to scientists; reference to scientific findings
2. **Topic: Political:** the problem is presented as a political issue; reference to political figures; government way of tackling the problem; reference to policies
3. **Topic: Economic and Energy:** the problem is presented as an economic issue; reference to specific economic factors and energy-related issues
4. **Topic: Technological:** climate change is presented as a problem to be tackled through technological tools
5. **Topic: Ecological/Environmental/meteorological:** climate change is presented as an issue concerning the natural world and its damage (focus on plants, animals, biodiversity, habitat, and/or weather events such as heat waves, droughts, floods, and weather trends) (Yun et al., 2012)
6. **Topic: Civil Society:** climate change is presented as a societal problem; reference to civil society, NGOs, people engagement/affection, people habits, footprint and life style

⁶³ Boykoff specifically refers to consensus around the anthropogenic causes of climate change. In this case, the consensus is relative to several aspects of climate change (causes, consequences and action).

2. EXAGGERATION AND DISTORTION; SYMBOLISATION

1) Exaggeration and Distortion ("Dramatization Frame" and "Balance Frame"):

DRAMATIZATION FRAME (see also Dirikx & Gelders, 2010b):

What is the degree of dramatization used by climate narratives?

1. **Mockery:** the risks of climate change are "mocked"/dismissed or presented as opportunities
2. **Slightly dramatic:** the consequences of climate change might cause negative consequences, but not exactly measurable or specified.
3. **Neutral:** consequences are evaluated neither positive nor negative
4. **Dramatic:** the consequences of climate change are represented as negative, but not as beyond humans' control
5. **Extremely dramatic/alarmist:** the consequences of global warming are presented as catastrophic, irreversible and beyond humans' control

BALANCE FRAME in relation to consequences (see also Boykoff & Boykoff, 2004):

How balanced is reporting on climate change consequences?

1. **Certainty:** The article only presents arguments that consequences of climate change exist and they will affect the "status quo"
2. **Mostly certain:** The article presents uncertainty around the severity of consequences, but emphasises that consequences of climate change exist
3. **Balanced:** The article presents a balanced account of debates surrounding the existence/severity of the consequences of climate change
4. **Mostly uncertain:** The article presents uncertainty around the severity of consequences, but emphasises the dubious nature of the claim that consequences of climate change will be negative
5. **Uncertainty:** The article only presents arguments that consequences of climate change are not predictable or not exist

2) Symbolisation (Symbolisation Frame):

What are the symbols associated to CC?

SYMBOLISATION FRAME (1 present - 0 no present):

1. Nature
2. Humans
3. Religious symbols

THE OPINION AND ATTITUDE THEMES COMPONENT: HOSTILITY

3. ORIENTATION; IMAGES; CAUSATION

1) Orientation ("Moral/Ethical Frame") (see Matthes & Kohring, 2008):

What moral evaluation does prevail?

MORAL/ETHICAL FRAME (1 present - 0 no present):

1. CC as a **benefit** (e.g. for health/nature/economy/society)
2. CC as a **risk** (e.g. for health/nature/economy/society)

2) Images ("Folk Devils Frame"):

Who are those classified as deviants?

FOLK DEVIL FRAME (1 present - 0 no present):

1. **Scientists** (discredited, criticised, mocked, identified as responsible for undermining the current "status quo")
2. **Contrarians/sceptics** (discredited, criticised, mocked, identified as responsible for undermining scientific certainty)
3. **Politicians/Policy-makers** (discredited, criticised, mocked, identified as responsible for "societal crisis")
4. **NGOs/Activists/Environmentalists** (discredited, criticised, mocked, identified for undermining the current "status quo")
5. **Businesses** (discredited, criticised, mocked, identified as responsible for climate change)

6. **Industrialised countries** (discredited, criticised, mocked, identified as responsible for climate change)
7. **Poor/Developing Countries** (discredited, criticised, mocked, identified as responsible for climate change)
8. **Civil Society** (discredited, criticised, mocked, identified as responsible for climate change)
9. **Climate change** (the phenomenon per se and its causes are represented as a threat)
10. **Other media/Journalists** (media reporting and journalists' conduct are described as manipulator of reality)
11. **Law Enforcement** (unjustified abuse of power usually against CC activists)

3) Causes ("Causation Frame"):

What is the degree of human influence on climate change?

CAUSATION FRAME (see also Boykoff, 2007)⁶⁴:

1. **Anthropogenic**: The article only presents arguments that anthropogenic global warming exists, clearly distinct from natural variations
2. **Mostly anthropogenic**: The article presents both sides, but emphasises that anthropogenic global warming exists, distinct from natural fluctuations
3. **Balanced**: The article presents a balanced account of both anthropogenic and natural global warming
4. **Mostly natural**: The article presents both sides, but emphasises natural fluctuations as cause of global warming
5. **Natural**: The article emphasises natural fluctuations as cause of global warming and the dubious nature of the claim that anthropogenic global warming exists

THE RESCUE AND REMEDY COMPONENT⁶⁵: CONCERN

4) SENSITISATION, PREDICTION/ACTION

1) Sensitisation ("Symptomatic Frame") (see also Yun et al., 2012):

What are the symptoms of climate change?

SYMPTOMATIC FRAME (1 present - 0 no present):

1. **Ecological symptoms** (e.g. weather extreme events) are related to climate change
2. **Health symptoms** (e.g. diseases) are related to climate change
3. **Social changes** (e.g. migration phenomena, war) are related to climate change

2) Societal Control Culture ("Solution/Action Frame") (see Yun et al., 2012)⁶⁶:

What are the countermeasures discussed?

SOLUTION/ACTION FRAME (1 present - 0 no present):

1. **Financial/Economic solutions** proposed, implemented, rejected or debated
2. **Technological solutions** proposed, implemented, rejected or debated
3. **Policy-making solutions** proposed, implemented, rejected or debated (see also Trumbo, 1996).
4. **Scientific solutions/research** proposed, implemented, rejected or debated
1. **Societal action** proposed, implemented, rejected or debated
2. **Natural predictions/evolution**: natural processes will solve the problem /no need for action

958 news articles were coded to explore the applicability of the schema, and around 10% of the entire sample (92 newspaper articles) was coded by a second researcher to test the inter-coding reliability. Each author independently undertook content coding. Using Krippendorff alpha, an inter-

⁶⁴ The frame is retrieved and adapted from Boykoff and Boykoff's (2004) study that uses this frame to evaluate the "balance" in reporting the causes of climate change. They specifically call it "balance frame".

⁶⁵ The two elements of "novelty" and "exploitation" identified by Cohen are explored in relation to the emergence of specific positions of newspapers and contextual factors such as their political/economic orientation, and the emergence of new elements emerging over time (changes in narratives over time).

⁶⁶ Yun et al. (2012) define this frame as "prognostic frame".

coder reliability of 0.8 on average was achieved meeting accepted criteria for inter-coder reliability (Hayes & Krippendorff, 2007)⁶⁷. The differences between the two coding analyses were discussed by both researchers and an agreement was achieved⁶⁸.

The application of the proposed schema derives from the literature review, which highlights a division between two main groups represented by sceptics and advocates (see chapter three). The identification of the elements included within the frames, and their relation with the newspapers' political orientation (through analysis of the associations and regression analysis) will help answer the first two research questions related to the existence of moral panics and the characteristics of rival climate change narratives. The best scenario resulting from the CATPCA is a clear division between two main dimensions related to sceptical and consensual positions. Building on this, Table 5 shows the hypothesised outcomes of the analysis⁶⁹. Accordingly, two main components are expected, one identifying climate change scepticism/denial (mostly associated with uncertainty around causes, consequences and action, and identification of folk devils in scientists, environmentalists and developing countries), and the other identifying scientific consensus (mostly associated with scientific consensus around causes, consequences and intervention, and identification of folk devils in climate change, contrarians, businesses, developed countries and those actors who contribute to pollution).

Table 5. Best scenario hypothesised resulting from the analysis of newspapers

Moral Panic Component	Frame	Variables	Sceptics'	Advocates'
			dimension (CR)*	dimension (CL)*
Inventory	Claim-makers	Government/politicians**	X	X
		Businesses	X	
		Scientists/NGOs/activists/associations		X
		Public/civil society	X	X
		Other media	X	X
		Others (celebrities/justice/law enforcement/religious officers)	X	X

⁶⁷ The inter-coding reliability indicates results from the average of alpha values obtained by comparing the two coding analyses' results per each single variable.

⁶⁸ In the first version of the coding book, among the claim-makers, politicians and governments represented two different variables. The two coders agreed to create a unique variable Government/Politicians. In the case of the "Balance Frame", the definition of "slightly balanced", as "The article presents both sides, but emphasises that negative consequences of global warming exist", was changed in: "Mostly certain: The article presents uncertainty around the entity of consequences, but emphasises that consequences of global warming exist". This in order to avoid confusion with the definition of Balance (see Box 2). The alpha relative to "general frame", "dramatization frame", "balance frame" and "causation frame", which could be most likely open to interpretation, were respectively 0.87, 0.82, 0.85 and 0.71. In the case of the causation frame, the lower value depends on the fact that often articles do not refer to causation explicitly, but mention either "man-made climate change" or human activities (e.g. industrial production) implicitly implying the anthropogenic nature of the phenomenon. This point was discussed and clarified by the two coders.

⁶⁹ In the case of multiple dimensions characterising newspapers' debate on climate change, the CATPCA makes it possible to identify potential new dimensions explaining newspapers' reporting and related constitutive components.

Table 5. Best scenario hypothesised resulting from the analysis of newspapers

Opinion and Attitude	General frame	Consensus/partial consensus/neutral		X	
		Scepticism/partial scepticism	X		
	Problem Definition	Scientific			X
		Political**	X		X
		Economic and energy	X		
		Technological	X		
		Ecological***	X		X
		Civil Society			X
	Drama	Mockery	X		
		Slightly dramatic/neutral			X
		Dramatic/extremely dramatic	X		X
	Balance	Certainty/mostly certain			X
		Balanced/mostly uncertain/uncertainty	X		
	Symbols	Nature			X
		Humans			X
Religious symbols		X			
Morality	CC as a benefit	X			
	CC as a risk			X	
Folk Devils	Scientists/NGOs/activists/ environmentalists/developing countries/uncertainty	X			
	Politicians/policy-makers**/ other media and journalists	X		X	
	Climate change/ businesses/sceptics/ industrialised countries/civil society/law enforcement			X	
	Anthropogenic/mostly anthropogenic			X	
	Balanced/mostly natural/natural	X			
Rescue and Remedy	Symptoms	Ecological/health/social		X	
	Action/ Prediction	Financial and economic action/natural evolution	X		
		Policy-making/scientific/societal actions			X
		Technological solutions	X		X

*Centre Right/Centre Left

** Depending on their orientation.

*** For advocates CC is interpreted as a "threat" for both nature and civil society; for sceptics, the adoption of an ecological frame might be related to the representation of climate change as natural phenomenon.

2.1.1. Sample criteria

The following keywords were used to retrieve the news articles from the Nexis/Lexis database: "climate change", "global warming", "greenhouse effect" (Carvalho, 2007). A first search on the Lexis/Nexis database revealed that searching everywhere in the text the single keywords was ineffective to identify the articles that directly refer to climate change. Moreover, the word count on the database refers to all words present in the file (including additional information connected to the newspaper such as name, date of publication etc.). Therefore, the criteria adopted for selecting the articles on the database were set on "articles that mention the keyword at least three times in the text" and "articles that contain at least 500 words". After removing duplicates and those articles that mention climate change but were not directly related to the problem, 20284 articles resulted from the search.

In order to select the sample to be coded through the means of the pre-established framework, the following criterion was adopted: inclusion of newspapers' articles containing the keywords "climate/climatic", "warm/warming" and "greenhouse/greenhouse effect" in the headline.

This criterion identified those articles that exclusively focus on climate-related issues and contain the most in-depth information and analytical features to be classified.

After filtering the articles per keywords contained in the headline 14009 articles were retained from the 20284 (see Table 6).

Table 6. Number of articles per keywords

Keyword	N articles
Climate	7686
Climatic	24
Warm	3100
Warming	2807
Greenhouse	392

Once the letters were removed, plus the duplicates resulting from the simultaneous presence of different keywords in the same title, 9789 items were considered.

The articles were grouped in 3 blocs of years (1988-1997; 1998-2007; 2008-2016) (see Table 7). The choice of ten-year blocs (with the last bloc consisting of 9 years) gives the possibility of coding and analysing a reasonable number of articles that could be representative of the entire bloc-population. At the same time, it also provides information on how newspaper reporting might have changed over time (also considering that each bloc is characterised by both peaks and troughs in the number of articles)⁷⁰.

Following Boykoff and Boykoff (2004, 2005) the sample was generated as NItems/NSample and selecting articles as they appeared chronologically. Therefore, every 2nd item of the 1988-1997 group was included for analysis, every 5th of the 1998-2007 group, and every 20th of the 2008-2016 group. This also reflects the fluctuation of the number of articles over the entire period (the sample was larger in years where news coverage of the phenomenon was greater). Since the sample retrieved

⁷⁰ Moreover, as Chapter five (Figure 20) shows, each bloc is equally characterised by the occurrence of three types of events that are related to politics, science and weather extremes.

from NItems/NSample slightly exceed the number of the estimated sample the final sample size resulted in 958 articles (Table 7).

Table 7. Sample of articles per bloc of years

Years	N of articles	Sample (size needed to reach the 95% of confidence level)*	Final sample size used
1988-1997	396	196	197
1998-2007	1933	321	389
2008-2016	7460	366	372
N	9789	883	958

*the confidence levels are calculated according to the normal distribution.

The adoption of this criterion also made it possible to include papers representative of each of the owner group considered (see Table 8).

Table 8. Sample of articles per ownership

Row Labels	Count of Items
Daily Mail and General Trust	81
Trinity Mirror	15
Richard Desmond	18
News UK	79
Telegraph Media Group	76
Guardian Media Group	456
Alexander and Evgeny Lebedev	233
N	958

Finally, considering the political orientation of the newspapers (Table 9), following the classification emerged from a recent survey carried out by YouGov in 2017 about people's perception of newspapers' orientation in the UK⁷¹, the sample reflects the real disproportion between the number of articles published by left-leaning and right-leaning newspapers⁷².

Table 9. Sample of articles per political orientation

Political Orientation	Items
Centre-Right	236
Centre-Left	722
N	958

2.2. Corpus Assisted Discourse Analysis

In the second stage of the research, the adoption of a Corpus Assisted Discourse Analysis (Partington et al., 2004) contributed towards answering the second question related to the characteristics of the tensions (and their evolution) emerging in the UK newspapers' debate around

⁷¹ Two newspapers included in the initial design, which are the Sunday People and the Daily Star, were excluded from the final sample due the casual extraction. Since they belong respectively to the Trinity Mirror (perceived as oriented to the centre-left) and Richard Desmond (perceived as oriented to the centre-right) groups, they contributed to the centre/left-leaning (Sunday People) and centre/right-leaning (Daily Star) groups.

⁷² The original distribution of the entire population (9789) was represented by 3138 articles published by centre/right-leaning newspapers and 6651 articles appeared in centre/left-leaning newspapers.

climate change⁷³. CADA adopts corpus linguistic techniques to discursively analyse texts by combining qualitative and quantitative approaches (Haider, 2017)⁷⁴. The analysis was carried out on the sample retrieved for the framework analysis. Newspapers were analysed in three separate time-periods to explore potential differences across the blocs. The corpus assisted analysis helped identify some patterns for in-depth qualitative and critical analysis of the discursive strategies around specific elements that partially emerged from the frame analysis. Specifically, these elements are represented by differences between newspapers in using scientists as claim-makers and scientific frames (see sections 2.1 and 2.2, chapter five), "dramatization" of consequences (see section 3.2, chapter five), use of religious symbols (see section 3.3, chapter five), and representation of natural symbols and related symptoms (sections 3.3 and 5.1, chapter five).

The analysis focused on the following textual and contextual elements:

- Textual elements:
 1. Themes (emerging broader and sub-themes)
 2. Actors (with "framing power", both subject or object of the discourse);
 3. Language and rhetoric (key concepts and their relationship with the wider frame);
 4. Discursive strategies (analysis of media representation of social actors' discourse strategies resulting from the combination of the previous elements such as themes, actors and language);
- Contextual elements:
 1. Comparative-synchronic analysis (different interpretation of the phenomenon given by the two groups of newspapers in relation to the context in which they operate);
 2. Historical-diachronic analysis (evolution of a given social issue as represented by the media) (Carvalho, 2008).

The analysis was facilitated through AntConc software, which allows both qualitative and quantitative analysis of keywords, collocates, and concordance line analysis⁷⁵. In the case of scientists (as voices reported by the articles) and the use of dramatic frames, the in-depth exploration of the most frequent words was considered more appropriate than only focusing on those texts, identified by the frame analysis, which use both frames (scientific and dramatic/extremely dramatic). In fact, in some cases, scientific voices can be used even though they are not the main claim-makers reported in the articles, and extremely dramatic tones can relate to specific aspects even though the overall degree of dramatization of the articles does not reflect it (e.g. using extremely dramatic headlines, but suggesting the possibility of "acting" to control the consequences in the corpus). The three blocs of years were explored independently and involved comparing the two corpora (centre-left and centre-right news). The most frequent words emerging in the two corpora (divided per the three blocs of years) were identified. The concordance plot provided by the software was used to

⁷³ The second research question is the following: "Does the moral panic framework help explain the characteristics of rival climate change narratives in British newspapers (i.e., those who see the harm in anthropogenic climate change versus those who deny climate change)?"

⁷⁴ McEnery (2006, 2009) showed how the application of corpus linguistic techniques helps understand the discursive construction of moral panics.

⁷⁵ Collocation analysis focuses on identifying occurrences of specific words in the corpus (White, 2017). Concordance analysis collocates these words in the context used (surrounding text) (Laurance, 2014; Wynne, 2008).

evaluate the dispersion of the words and therefore their relevance⁷⁶. This enabled the identification of the most frequent words that characterise both corpora and qualitatively explore the context in which these words are used (see Appendix 2).

In the case of symbols/symptoms, the analysis focused on those articles identified by the schema. In fact, the "keywords" that might be mentioned in the texts are not always sufficiently emphasised as symbols of climate change.

3. Analysis of documents produced by sceptical think tanks

The third step of the research process aimed to find similarities between newspapers' reporting on climate change and communication strategies adopted by sceptical think tanks to disseminate their perspectives on climate change, which in turn might be influenced by corporations given their direct connections with them. This contributes towards answering the third research question related to potential external influences on climate narratives. Given that a substantial literature focusing on the communication strategies of sceptical think tanks already exists (see chapter two, section 2), and in order to select the documents produced by conservative think tanks to be included in this research, the focus is on those actors mostly mentioned in the sample (per bloc of years), to see if and how their communication strategies are reflected in newspapers' reporting. As Table 10 shows, some institutions and personnel connected to denial activities of climate change emerge in the corpora under consideration. The think tanks identified through direct mention or mention of their members by the newspapers are represented by the Global Warming Policy Foundation (directly mentioned and through its representatives such as Nigel Lawson, Philip Stott, Matthew Ridley, Henrik Svensmark, Richard Lindzen), the Global Climate Coalition in the first bloc (through its representative Richard Lindzen) and the CATO institute (through Christy John).

In all three cases, the qualitative investigation focused on the analysis of the press releases in order to compare the content of these public documents and that included in the newspapers. The analysis followed a similar schema used for analysing the news articles content by focusing on the use of scientists as claim makers, dramatization and ecological/religious symbols and symptoms. Specifically, the analysis included (see Table 11):

i) Press releases issued by the Global Warming Policy Forum (22 documents between 2014-2016), and by the Global Warming Policy Foundation (GWPP) (78 documents between 2009-2016) (<https://www.thegwpp.com>)⁷⁷.

ii) Blog news (410 documents between 1998-2016) issued by the CATO institute and retrieved from the institute's website (<https://www.cato.org>). Blog articles included in the section "Energy and Environment" were retained only if directly connected to climate change. All contents included in this section were examined one by one to identify those related to climate change.

⁷⁶ As suggested by White (2017), the AntConc's concordance plot tool gives an indication of how the words are dispersed in the corpus allowing to exclude those words that might appear at a high frequency, but only in one text in the corpus.

⁷⁷ 18 duplicates were eliminated.

iii) Press releases issued by the Global Warming Coalition (GCC) during the first period (55 documents between 1988-2007). Since the GCC was disbanded in 2001 and the website is no longer active, the documents were retrieved combining the archives of both Greenpeace (<https://research.greenpeaceusa.org/index.php?a=view&d=4212>), and Web-archive (https://web.archive.org/web/*/global%20climate%20coalition)⁷⁸.

Table 10. Keywords used to select documents produced by sceptical think tanks to be included in the analysis

Year-bloc	Frequency	Keyword
1988-1997	15	BP (British Petroleum)
	11	Lindzen (Richard)
	8	Exxon
1998-2007	48	BP (British Petroleum)
	30	Exxon
	13	ExxonMobil
	8	Svensmark (Henrik)
2008-2016	46	Foundation ⁷⁹
	31	Lawson (Nigel)
	17	Exxon
	12	ExxonMobil
	24	Stott (Philip)
	19	Ridley (Matthew)
	10	Christy (John)
10	Chevron	

Table 11. Distribution of documents released by the think tanks per bloc of years

	1988-1997	1998-2007	2008-2016	Total
GCC	18	37	-	55
CATO	-	37	373	410
GWPF	-	-	100	100

⁷⁸ Web-archive provides links to the original website pages. However, since not all resources were accessible (link expired), the search was combined with the Greenpeace archive, which provides scans of some documents from the GCC press releases.

⁷⁹ In 16 cases, the keyword foundation refers to the Global Warming Policy Foundation.

Chapter 5 Characteristics of Moral Panics into Media Reporting

Key points

Chapter five reports the results emerging from the quantitative analysis of the data by operationalising the moral panic framework. It explores the "media inventory component" (split into two sections) through investigating the sources of information, general prevailing framework, and general consensus (section two); and through exaggeration, distortion and symbolisation (section three); the "opinion and attitude themes component", through orientation, images, and causation (section four); and the "rescue and remedy component", through sensitisation, prediction and action (section five). Section six presents the results of a categorical principal component analysis (CATPCA) that captures the main components of the newspaper reporting over the entire period. Finally, some considerations are drawn on the possibility of applying the moral panic framework to British newspapers' reporting on climate change.

1. Overview

The sample included in the analysis consists of 958 articles split into three blocs of years (see Figure 1). The first bloc (1988-1997) represents the 21% of the sample (197 articles: 161 belonging to centre/left-leaning newspapers, and 36 to centre/right-leaning newspapers), the second one (1998-2007) the 40% (389 articles: 301 belonging to centre/left-leaning newspapers, and 88 to centre/right-leaning newspapers), and the third bloc (2008-2016) the 39% (372 articles: 260 belonging to centre/left-leaning newspapers, and 112 to centre/right-leaning newspapers)⁸⁰. The number of words per article is in average slightly higher for the centre/left-leaning newspapers (927) compared to the centre/right-leaning newspapers (876)⁸¹. The following sections in this chapter follow the same schema that was developed to investigate the newspapers' frames (see Box 2, chapter four). The analysis contributes towards answering the two research questions related to the applicability of moral panics to media communication of climate change, and to the existence of two politically polarised moral panics in British newspaper reporting⁸².

⁸⁰ The number of news articles included in last bloc is smaller compared to the second bloc, because it consists of 9 years.

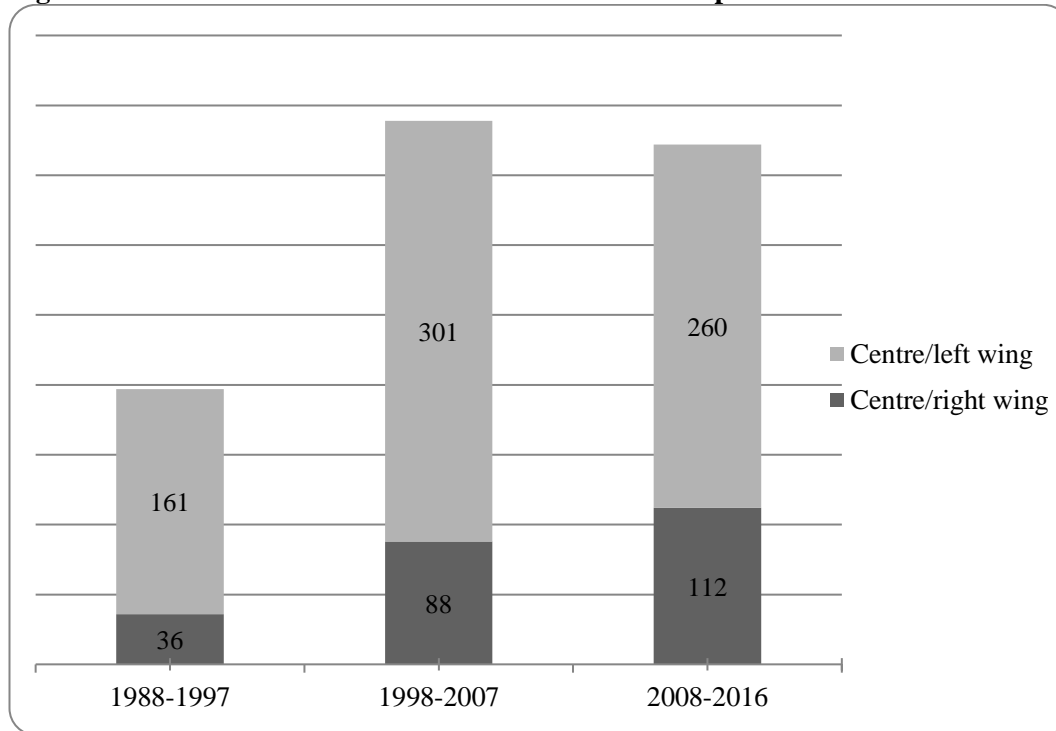
⁸¹ This number is slightly higher than the real one, because the Lexis/Nexis database includes in the count all the words present in the file (including additional information such as authors' names, headlines, date of publication etc.).

⁸² Specifically, the research questions are the following:

Research question 1. Are climate change articles (958 articles) between the years of 1988 and 2016 from 8 newspapers (grouped per political orientation) consistent with a moral panic framework?

Research question 2. Does the moral panic framework help explain the characteristics of rival climate change narratives in British newspapers (i.e., those who see the harm in anthropogenic climate change versus those who deny climate change)?

Figure 1. Distribution of articles over time in relation to political orientation of newspapers



2. The Media Inventory Component. Sources of information, general prevailing framework, and general consensus

The first section of the questionnaire investigates the claim-makers used by the newspapers as authoritative voices who speak for the climate, the general frame adopted in terms of consensus, and the definition frame. These elements are part of the media inventory component⁸³ in which the threat is identified, specific authoritative voices are legitimised to talk about the problem, and consensus among experts is highlighted.

2.1. Claim-makers frame

Table 12 shows the summary of the associations (obtained through contingency tables) between adoption of claim-makers (different from the journalist who authored the article) and political orientation. The analysis reveals a statistically significant association between political orientation of newspapers and selecting scientists (weak positive association with centre/right-leaning newspapers, $\phi=.075$), environmentalists/NGOs/activists (negative association with centre/right-leaning newspapers, $\phi=-.103$), and celebrities (negligible positive association with centre/right-leaning newspapers, $\phi=.093$) as claim-makers. The odds of centre/right-leaning news articles to adopt scientists and celebrities as claim-makers are respectively 1.43 and 12.43 times higher than the odds of centre-left news articles (see Table 12). By contrast, activists are around 4 times more likely to be used as claim-makers by the centre-left news articles compared to their counterparts (0.24 odds

⁸³ Cohen refers to an Inventory phase, which is directly connected to the emergence of the problem. In this context, this element is defined as Inventory component because it is analysed over the three blocs.

ratio for the centre-right group compared to centre-left)⁸⁴. There is not a statistically significant association between the use of politicians/Government representatives as claim-makers and political orientation. This is also the case regarding the use of public/civil society, other media and other claim-makers (such as justice and law enforcement). However, politicians as claim-makers are 1.12 times more likely to be present in centre-right leaning news articles, whereas the public civil society is around 3 times more likely to be adopted by centre-left news articles (odds ratio of 0.31 for centre-right leaning newspapers compared to centre-left, see Table 12). Observing the distribution over time of the three claim-makers' categories resulting in statistically significant association with political orientation (Figure 2) it is possible to see how, especially in relation to scientists, the centre/left is characterised by a higher increase between the first and second blocs of years, and then a slighter increase between the second and the third. In contrast, the centre/right-leaning news articles are characterised by a steady increase in adopting scientists as claim-makers over the entire period. This tendency of the centre/right might be explained in relation to the employment of "unqualified scientists" by more conservative media to support fossil-fuel interests as highlighted by Moser (2010) in the USA context, and to a lesser extent in some British newspapers (McKnight, 2010). This aspect will be further explored through CAD analysis.

Table 12. Summary of contingency tables between political orientation and claim-makers⁸⁵

Claim-makers	Odds Ratio	Phi value
	Centre-right vs Centre-Left	Centre-right vs Centre-Left
Environmentalists (present vs not present) p=.001	0.24	-.103
Scientists (present vs not present) p=.021	1.43	.075
Celebrities (present vs not present) FET=.015*	12.43	.093
Politicians/Government (present vs not present) p=.621	1.12	.14
Businesses (present vs not present) p=.417	1.39	.026
Public/Civil Society (present vs not present) p=.104	0.31	-.053

⁸⁴ Odds Ratio was calculated as follows: Odds[Centre-Left]/Odds[Centre- Right].

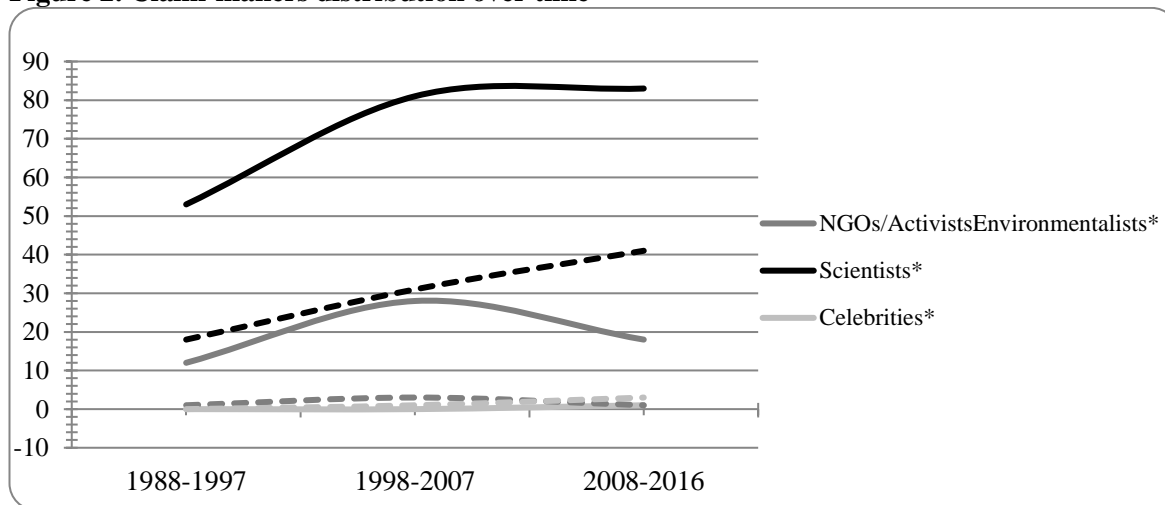
⁸⁵ Claim-makers (1=present, 0=not present) and political orientations (1=centre-left, 0=centre-right) were coded as dummy variables.

Table 12. Summary of contingency tables between political orientation and claim-makers⁸⁵

Other media (present vs not present)*	1.01	.001
FET=1		
Justice/Law enforcement (present vs not present)	3.09	.054
p=.108		
Religious officers (present vs not present)*	0.99	-.032
FET=1		

*Where cells have expected count less than 5 the Fisher Exact Test is more appropriate for small sample sizes (Agresti, 1992).

Figure 2. Claim-makers distribution over time



*The continuous line refers to centre/left-leaning newspapers; the dashed line to centre/right-leaning newspapers

2.2. Problem definition frame

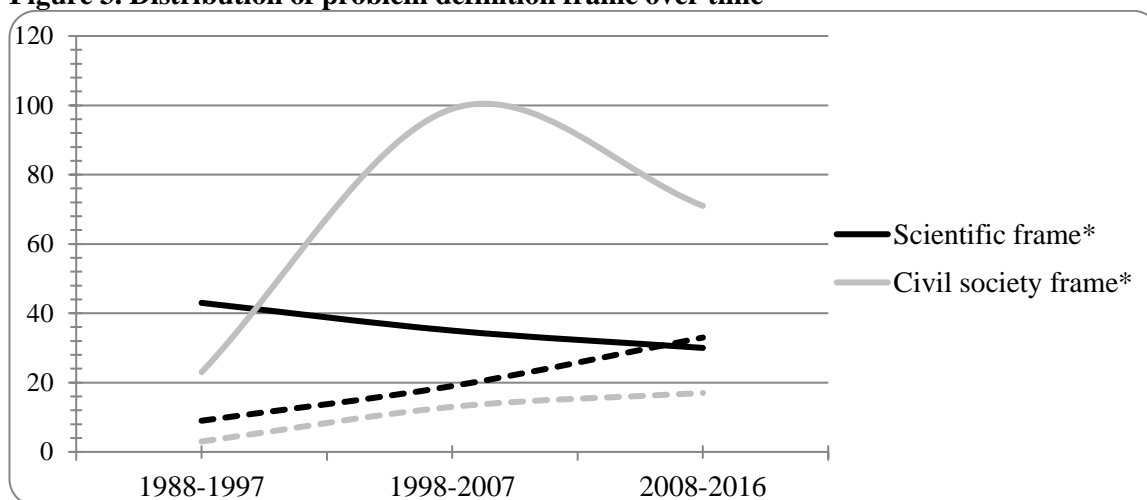
Table 13 shows the summary of the associations (obtained through contingency tables) between political orientation and adoption of problem definition frames. It shows a statistically significant relation between political orientation and adoption of both scientific frame and civil society frame. Unexpectedly (see Table 5, chapter four), there is a negative association (despite negligible, $\phi = -.123$) in the case the scientific frames and centre/left-leaning newspapers. Accordingly, those articles characterised by a scientific frame are 1.98 times more likely to belong to centre-right newspapers (see Table 13). Exploring the distribution of these two frames over time (Figure 3), the civil society frame is more frequently adopted by the centre/left news articles, with a dramatic drop in the third bloc. There is also a slight steady increase in the case of centre/right-leaning newspapers. It is also observed a decrease in adopting scientific frames for the centre/left-leaning newspapers; whereas an increase for the centre/right. In the third bloc, the number of scientific frames adopted by the centre/right news articles is higher than that related to their "counterparts". This aspect reinforces the hypothesis that the centre/right-leaning newspapers tend to adopt a scientific frame and employ scientists as claim-makers, to scientifically justify the "negation/partial negation" of climate change.

These two aspects will be further investigated through CAD analysis in order to identify potential differences between the two political orientations.

Table 13. Summary of contingency tables between political orientation and problem definition frame⁸⁶

Problem Definition Frame	Odds Ratio	Phi value
	Centre-right vs Centre-Left	Centre-right vs Centre-Left
Scientific (present vs not present) p=0.000	1.98	.123
Political (present vs not present) p=.126	0.79	-.049
Economic and Energy (present vs not present) p=.150	0.78	-0.47
Technological (present vs not present)p=0.96	0.48	-0.05
Ecological/Meteorological (present vs not present) p=.778	1.04	.009
Civil Society (present vs not present) p=.000	0.44	-.129

Figure 3. Distribution of problem definition frame over time



*The continuous line refers to centre/left-leaning newspapers; the dashed line to centre/right-leaning newspapers

2.3. General consensus frame

In order to understand what type of general frame (ordinal dependent variable) news articles tend to adopt in relation to their political orientation, and their placement in a specific bloc of years, an ordinal regression was performed. The choice of an ordinal regression was considered appropriate

⁸⁶ Definition frames (1=present, 0=not present) and political orientations (1=centre-left, 0=centre-right) were coded as dummy variables.

due to the ordinal nature of the dependent variable (five ordered categories: consensus, partial consensus, neutral, partial scepticism and scepticism)⁸⁷ (DeCarlo, 2003; Winship & Mare, 1984). The location-scale model was adopted after testing that the variability of the terms in the scale model significantly contributed towards explaining the variability of the dependent variable⁸⁸. The Pearson and Deviance goodness-of-fit measures show observed not-significance levels, hence the model based on Negative Log-log link function⁸⁹ appears to fit the data (Winship & Mare, 1984). Finally, the chi square of the model has an observed significance level of 0.000, which enables the rejection of the null hypothesis that the model without predictors is as good as the model with predictors.

Table 14 shows that the three blocs of years do not have a statistically significant effect on the different degrees of consensus. In contrast, the proportional odds model shows the positive effect for predictor political orientation centre/right ($\beta = .979$, $p < .001$). This means that, given that bloc of years is held constant in the model, the odds of an article to express sceptical positions (vs consensus-oriented views) are around 2.7 times higher if the article also expresses a centre/right view compared to a centre/left view (see Table 14). However, overall when the problem is framed with sceptical attributes, the odds are almost 100 times higher for partial scepticism rather than a "total scepticism" indicating a higher tendency to recognise the problem and its causes, while negating its consequences and the need for intervention⁹⁰.

Table 14. Political Orientation and bloc of years effects on consensus (N article =958)

Dependent Variables	B	Std. Error	Odds Ratio
Consensus	.611*	.095	1.84
Partial consensus	2.557*	.195	12.90
Neutral	3.622*	.295	37.41
Partial scepticism	4.605*	.409	99.98
Scepticism	Ref.		
Independent Variables	B	Std. Error	Odds Ratio
1988-1997	-.489	.264	0.61
1998-2007	-.006	.144	0.99
2008-2016	Ref.		
Centre/right	.979*	.234	2.66
Centre/left	Ref.		
Model Fit: chi-square=117.181 (p=0.000); Goodness of Fit: Person chi-square=22.205 (p=.074); Deviance chi-square=21.649 (p=.086); Nagelkerke= .184			

*p<0.001

⁸⁷ Consensus (score 1), partial consensus (score 2), neutral (score 3), partial scepticism (score 4) and scepticism (score 5).

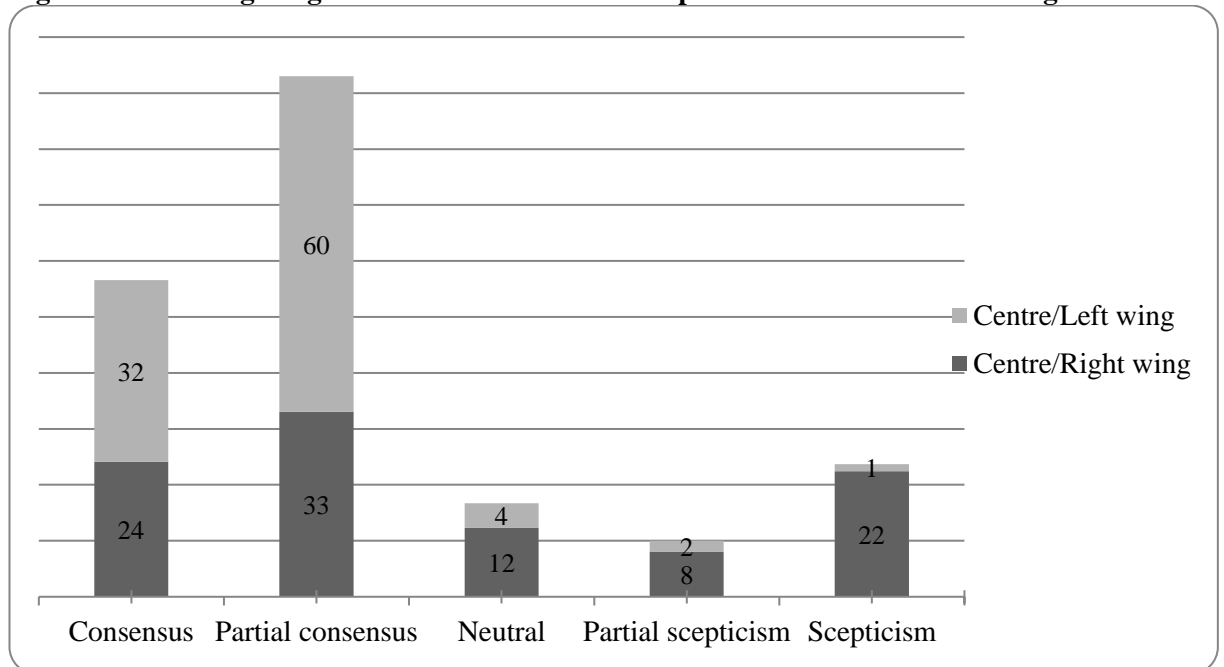
⁸⁸ The scale component accounts for differences in variability across different groups (DeCarlo, 2003) enabling the elimination of the biased parameter estimates (McCormick & Salcedo, 2017; Williams, 2009).

⁸⁹ The original model adopted the complementary log-log function. However, given the significance of both Pearson and Deviance goodness-of-fit measures, the negative log-log link function was considered more appropriate because the data are not normally distributed (positive skewness= 2.17), and the lower values (in this case consensus) were more probable.

⁹⁰ The definition of partial scepticism is: "recognition around causes or existence of the problem, but negation of consequences, no intervention is needed" (see chapter four).

The distribution of the different degrees of consensus adopted by the newspapers in relation to their political orientation (Figure 4) shows that in both cases the consensus/partial consensus prevails (with a dramatic gap between the two groups), but the scepticism/partial scepticism is a peculiarity of the centre/right-leaning newspapers. This suggests that both groups tend to give more space to "consensus positions". However, in the case of the centre/right almost the half of the articles either adopt a sceptical/partial sceptical or neutral frame to approach the problem.

Figure 4. Percentage of general consensus frames adopted to describe climate change



3. The Media Inventory Component. Exaggeration, Distortion and Symbolisation

The second section of the questionnaire investigates the tones used by the newspapers to describe the consequences of climate change, and the degree of consensus about their severity. The inventory component, as described by Cohen, also relates to exaggeration, distortion, and prediction. The exaggeration component has been partially examined in the previous section in relation to the space given to sceptical positions in defining the problem in general terms. In the following section, this aspect is further investigated in relation to the tendency of the newspapers to (un)balance the reporting of consequences, potentially "over-representing" minor voices ("balance frame"). Moreover, the distortion and prediction components are analysed in relation to the type of dramatization used to describe the consequences (see chapter four for a definition of dramatization). This in order to understand both the degree of certainty and the type of dramatization used to describe the severity of climate change consequences. In fact, the literature review showed that the media serve the contrarian voices either by giving them "disproportionate" space or by adopting sensational effects as tools for "exaggerating" the problem and implicitly promoting under-estimation of it (thus reinforcing sceptical positions). Previous studies observed an evolution of scepticism over time shifting the focus from questioning the consensus around the causes (mostly recognised as

anthropogenic) towards the consequences (uncertain and invisible). This is also connected to another controversial aspect of the moral panic framework related to "disproportionality". The disproportionality seems to relate to both the "over-exaggeration" of the problem by the media (or "under-estimation" by sceptics) and the "over-representation" (or under-representation) of specific voices. Climate change sceptics tend to counterattack advocates' positions by emphasising their "over-exaggeration" and "apocalyptic" tones in describing climate change. In contrast, advocates' positions highlight that the media tend to "disproportionally" represent contrarian voices (even though they represent the minority).

Finally, the last section analyses a crucial element for moral panics' activation, which is the use of recognisable symbols.

3.1. Balance frame

Figure 5 shows the distribution of the balance frames around consequences over time in relation to political orientation⁹¹. In the case of the centre/right-leaning newspapers, an increasing adoption of all the categories included in this frame is observed over time. However, certainty (certain/mostly certain consequences) around consequences prevails over the entire period. On the other hand, the use of certainty is higher for the centre/left-leaning newspapers with a decrease in the third bloc, and a negligible increase in adopting uncertainty around consequences.

Going further, the analysis of the relationship between political orientation, bloc of years and balance frames in relation to consequences, shows statistically significant differences between the two groups. An ordinal regression was performed to investigate the relation between political orientation, time-period, and balance⁹². The location-scale model was adopted after testing that the variability of the terms in the scale model significantly contributed towards explaining the variability of the dependent variable. The Pearson and Deviance goodness-of-fit measures show values higher than 0.05, hence the model based on Negative Log-log-link function appears to fit the data⁹³ (the chi square of the model has an observed significance level of 0.000).

Table 15 shows that amongst the three blocs of years only the first bloc (1988-1997) has a significant effect on the balance frame. Holding political orientation constant, and given its estimate value ($\beta=1.63$), the odds for the first bloc being in a higher uncertainty category increase by around 5 times in comparison to the third bloc, indicating a higher probability of uncertainty in the first period compared to certainty. Moreover, the model shows a positive effect for predictor political orientation centre/right ($\beta= 1.61$; $p<.01$), indicating that holding the bloc of years variable constant, the odds of an article belonging to centre/right-leaning newspapers to tend to uncertainty rather than

⁹¹ The total number of frames is less than 958 because the "not present" category has not been included in this figure.

⁹² The ordinal regression was adopted due to the ordinal nature of the dependent variable, which includes the following five ordered categories: certain (score 1), mostly certain (score 2), balanced (score 3), mostly uncertain (score 4) and uncertain (score 5).

⁹³ The original model adopted the complementary log-log function. However, given the significance of both Pearson and Deviance goodness-of-fit measures and the positive skewness (2.22), the negative log-log-link function appeared to better fit the data.

certainty are 5 times higher the odds of an article with centre/left orientation. These results indicate that even though the certainty prevails across the three blocs (see Figure 5), there is a higher probability of representing uncertainty in the first period compared to the third one, and that the centre/right-leaning newspapers are more likely to represent uncertainty around consequences compared to their counterparts. Figure 6 shows the percentage values related to the adoption of different categories included in the balance frame by the two groups. It shows that 72% of articles belonging to centre/left-leaning newspapers refer to certain or mostly certain consequences; whereas in the case of centre/right-leaning newspapers half of the sample is split between uncertain/mostly uncertain consequences (24%), balanced reporting (11%), or it does not consider the consequences (16%). This result is in line with previous findings which highlighted that conservative newspapers tend to give more space to sceptical voices compared to their real weight in the scientific debate (marginal in comparison to mainstream scientists) (Boykoff & Boykoff, 2004; Carvalho, 2007).

Table 15. Political Orientation and bloc of years effects on balance frame (N articles =758)⁹⁴

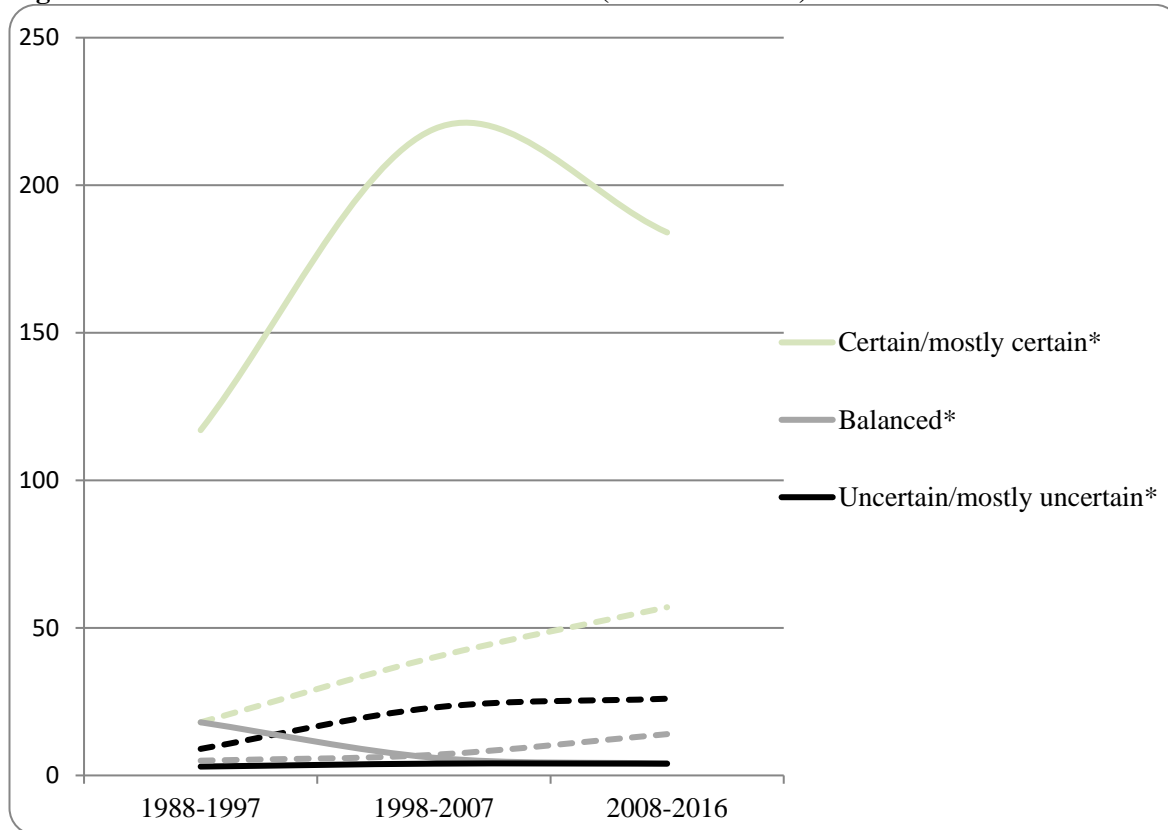
Dependent Variables	B	Std. Error	Odds Ratio
Certain	2.095*	.194	8.13
Mostly certain	3.332*	.289	27.99
Balanced	4.487*	.437	88.85
Mostly uncertain	5.589*	.611	267.47
Uncertain	Ref.		
Independent Variables	B	Std. Error	Odds Ratio
1988-1997	1.633*	.222	5.12
1998-2007	.255	.356	1.29
2008-2016	Ref.		
Centre/right	1.610*	.278	5
Centre/left	Ref.		

Model Fit: chi-square=232.308 (p=0.000); Goodness of Fit: Person chi-square=16.965 (p=.258); Deviance chi-square=16.461 (p=.286); Nagelkerke= .303

*p<0.001

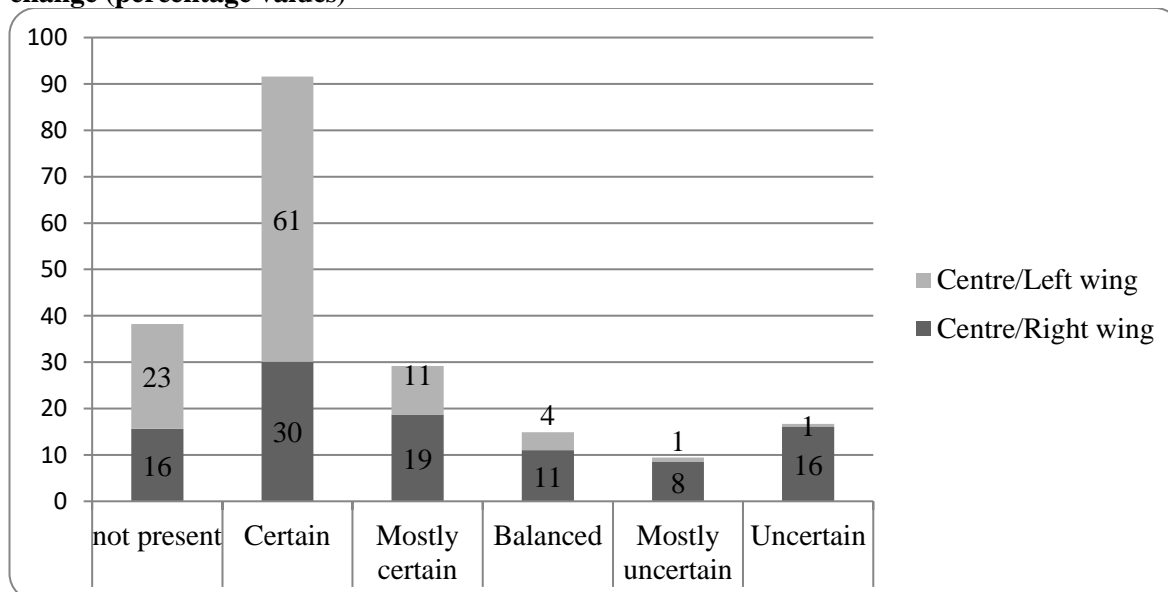
⁹⁴ Only those articles adopting a balance frame were included in the model.

Figure 5. Balance frame distribution over time (absolute values)



*The continuous line refers to centre/left-leaning newspapers; the dashed line to centre/right-leaning newspapers

Figure 6. Distribution of categories related to balance frame adopted to describe climate change (percentage values)



3.2. Dramatization frame

In order to analyse the relationship between political orientation, bloc of years and dramatization, a multinomial logistic regression was performed given the not ordered nature of the categories (Kwak & Clayton-Matthews, 2002) included in this frame. The category "dramatic" was adopted as reference since this is the most frequent one (43%). The category "not present" was considered as missing value since this does not affect the model, and it does not contribute towards understanding

the kind of dramatization style adopted by the news articles (El-Habil, 2012)⁹⁵. Both explicative variables were significant in the model ($p=.000$) (Table 16).

For mockery and neutral (relative to dramatic), the Wald test for predictor political orientation centre/right is respectively 75.05 and 8.55, with associated p -values $<.01$ (Table 16). It is possible to reject the null hypothesis and conclude that the difference between centre/right and centre/left-leaning newspapers is statistically significant for these two categories relative to "dramatic". Holding the variable bloc of years constant, if an article belongs to a centre/right-leaning newspaper, the multinomial log-odds of adopting both mockery and neutrality compared to a dramatic frame would be expected to increase by 3.7 and 0.6 units respectively (meaning around 41 times and 2 times chance to be included in the category compared to the dramatic frame). The odds for an article belonging to the centre/right-leaning newspapers and adopting mockery rather than: a) extremely dramatic frames, is 28.2 times the odds for centre/left-leaning newspapers; b) slightly dramatic frames, is 25.7 times the odds for centre/left-leaning newspapers; c) neutral frames, is 21 times⁹⁶.

Moreover, the odds for an article belonging to a centre/right-leaning newspaper that adopts a neutral frame rather than a slightly dramatic frame are 1.2 times the odds for an article belonging to the centre/left, and 1.34 times compared to an extremely dramatic frame. In all other cases, the political orientation does not affect the adoption of specific frames significantly. This indicates that comparing the two groups, the articles belonging to the centre/right-leaning newspapers are more likely to adopt a mockery frame than any other kind of dramatization. This group is also more likely to adopt neutrality rather than drama compared to their counterparts. In contrast, the centre/left-leaning newspapers are more likely to adopt higher degrees of dramatization.

Considering the influence of the blocs of years (reference category "third bloc from 2008-2016") on the adoption of dramatization frames (see Table 16), holding political orientation constant, this variable has a significant influence on adopting slightly dramatic frames ($p<.01$), neutral frames (relative to the first bloc of years, $p<.01$), as well as extremely dramatic frames ($p<.05$). This indicates that the odds of an article belonging to the first two blocs of years to adopt a slightly dramatic frame rather than a dramatic frame are respectively around 2.4 and 1.9 times the odds of an article belonging to the third bloc. In the case of neutral frame, the odds of an article belonging to the first bloc of years adopting a neutral frame rather than a dramatic frame is 1.9 times the odds of an article belonging to the third bloc. Finally, the odds of an article belonging to the first two blocs of years adopting an extremely dramatic frame rather than a dramatic frame are respectively around 3.1 and 2.2 times the odds of an article belonging to the third bloc. The drama seems to increase between the first and second bloc of years considering an increase of extremely dramatic frames by 1.2 times in the second bloc of years compared to slightly dramatic frames.

⁹⁵ The simple size criterion of a minimum of 10 cases for each explanatory variable, provided by Hosmer and Lemeshow (2000) is satisfied, given a ratio of 38 cases to 1 independent variable. The proportional by chance accuracy rate is equal to 28.59. Considering a benchmark of improvement of 25% (El-Habil, 2012), hence adopting a proportional by chance criterion of 36%, and comparing this value to the overall percentage computed by SPSS (equal to 45%), the criterion for classification accuracy is satisfied.

⁹⁶ The log-odds values are calculated by dividing the $\text{Exp}(B)$ values of the compared categories (e.g. $\text{Exp}(B)$ of mockery/ $\text{Exp}(B)$ of extremely dramatic).

Overall, for the centre/right-leaning news articles the mockery, dramatic, and neutral frames are the most used frames, representing the 28%, 27%, and 23% of the total number of dramatization frames used over the entire period. As shown in Figure 7 and Figure 8 relative to the distribution of the different categories included in the dramatization frame across the three blocs of years, for the centre/right news articles, mockery is the category with the highest growth rate (increase of 120% from the first to the third bloc, even though not statistically significant); whereas the extremely dramatic frame increases between the first and the third bloc (and decreases between the second and the third bloc), and the dramatic frame increases between the first and the third period.

In contrast, the centre/left-leaning news articles are characterised by a lower number of both "extreme" categories, the mockery frame is absent in the first bloc, and the extremely dramatic decreases over time. In this case, the dramatic frame prevails over the entire period representing 49% of the total number of frames adopted (with a growth rate of 41% between the first and the third bloc), followed by the neutral frame (23% of the total frames in the entire period) and the slightly dramatic (20%). Even though the dramatic frame prevails over the entire period (Figure 9), between the second and third bloc there is a decrease in using extremely dramatic, dramatic, but also slightly dramatic tones for centre/left-leaning articles, and an increase in neutral tones (Figure 8). In contrast, for the centre/right-leaning newspapers the mockery frame continues to grow, but the dramatic tones increase as well (Figure 7). These findings might support an evolution of scepticism over time, which shifts the focus from questioning the consensus around the causes towards the consequences (Maneri, 2013). This is also supported by the fact that in the last bloc, the centre/left-leaning newspapers adopt more neutral tones in describing the consequences of climate change, whereas the centre/right-leaning newspapers continue to "mock" the consequences, but also use more dramatic tones for creating exceptionality. However, the "extremely dramatic" tones do not increase significantly.

Table 16. Multinomial Logistic Regression Analysis predicting dramatization (N articles= 769)

Categories related to dramatization		B	Std. Error	Exp(B)
Mockery	Intercept	-3.752*	.429	
	1988-1997	-.279	.506	.757
	1998-2007	.280	.323	1.323
	2008-2016	Ref.		
	Centre/right	3.710*	.428	40.835
	Centre/left	Ref.		
Slightly dramatic	Intercept	-1.368*	.193	
	1988-1997	.861**	.277	2.365
	1998-2007	.644**	.234	1.905
	2008-2016	Ref.		
	Centre/right	.464	.248	1.590
	Centre/left	Ref.		
Neutral	Intercept	-.860*	.162	

Table 16. Multinomial Logistic Regression Analysis predicting dramatization (N articles= 769)

	1988-1997	.647**	.242	1.911
	1998-2007	-.206	.221	.813
	2008-2016	Ref.		
	Centre/right	.661**	.226	1.937
	Centre/left	Ref.		
<hr/>				
	Intercept	-2.630*	.332	
Extremely dramatic	1988-1997	1.140**	.435	3.128
	1998-2007	.813***	.388	2.255
	2008-2016	Ref.		
	Centre/right	.368	.389	1.444
	Centre/left	Ref.		

Model Fit: chi-square=110.418 (p=0.000); Goodness of Fit: Person chi-square=15.396 (p=.052);

Deviance chi-square=13.964 (p=.083); Nagelkerke= .207

The reference category is dramatic

*p<0.001 **p<.01 *** p<.05

Figure 7. Centre/right-leaning news articles' distribution of dramatization frame across the three blocs of years (percentage values refer to the frequency of a specific frame out of the total frequency of that specific category over time)

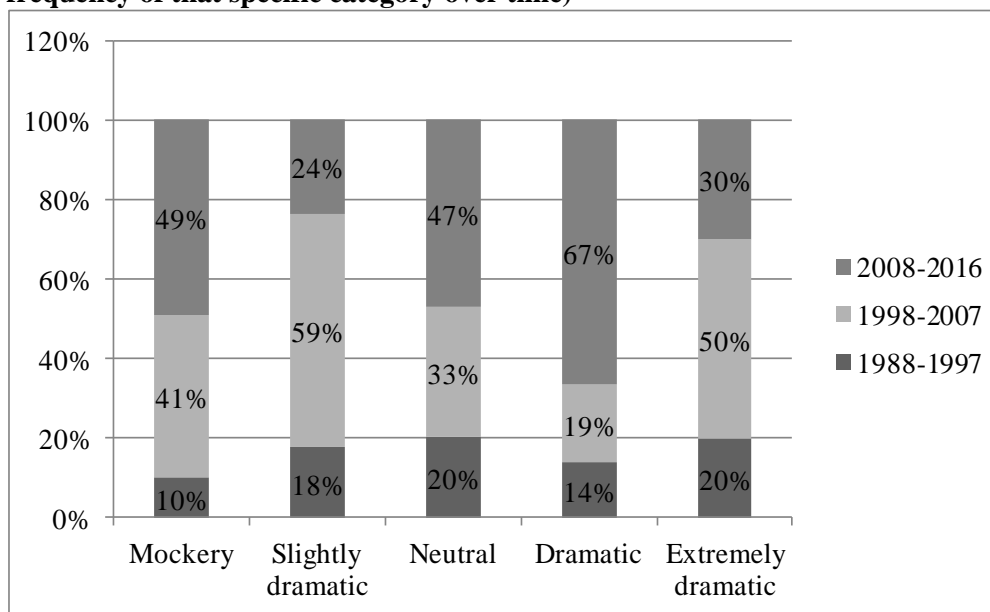


Figure 8. Centre/left-leaning news articles' distribution of dramatization frame across the three blocs of years (percentage values refer to the frequency of a specific frame out of the total frequency of that specific category over time)

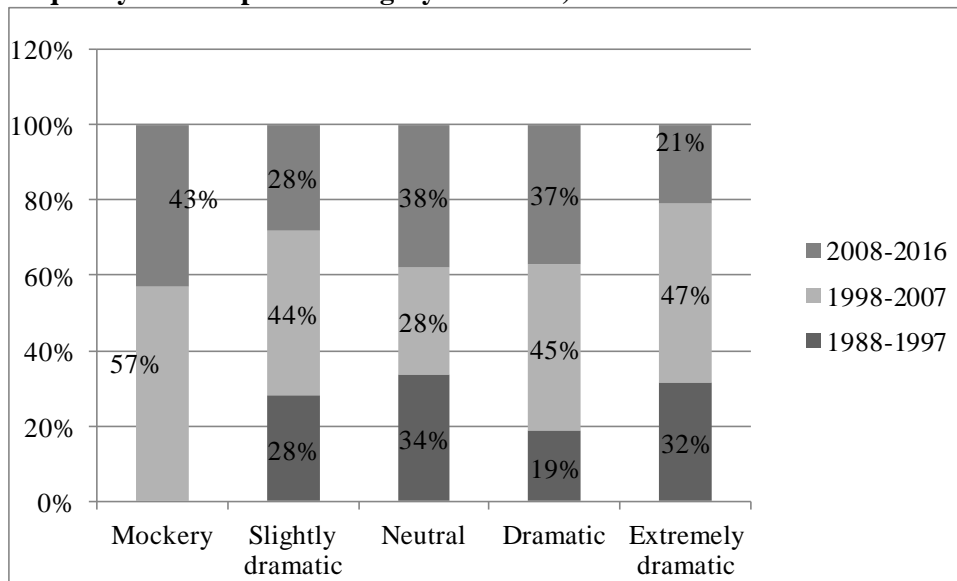
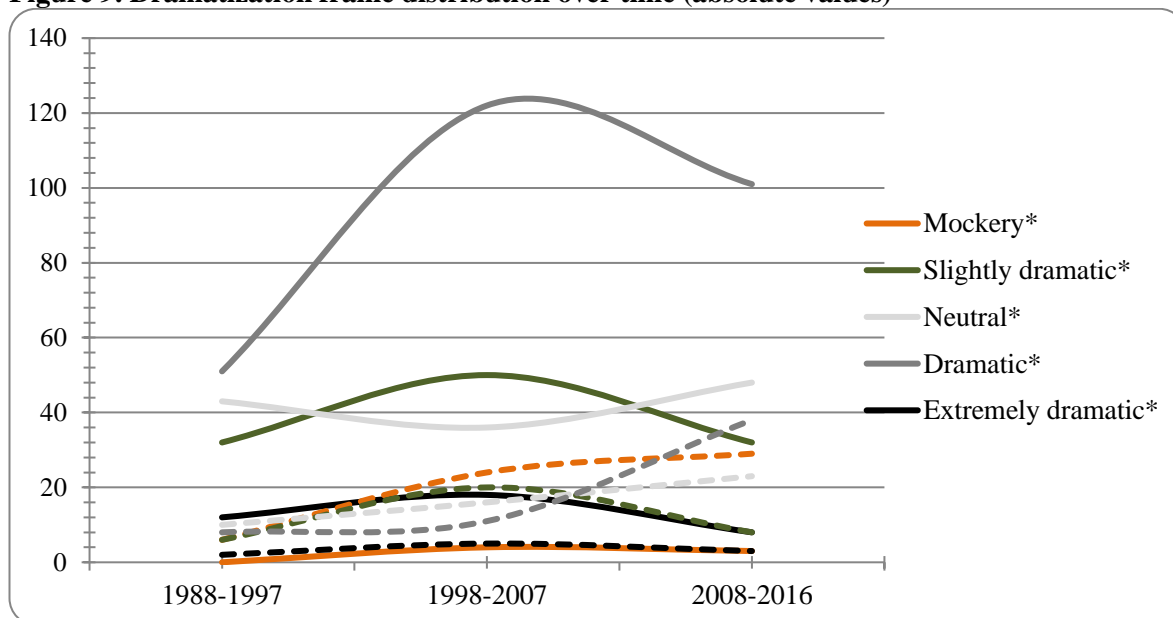


Figure 9. Dramatization frame distribution over time (absolute values)



*The continuous line refers to centre/left-leaning newspapers; the dashed line to centre/right-leaning newspapers

3.3. Symbolisation frame

In the case of symbolisation frame, there is no significant distinction between the two groups (Table 17). However, given that the odds ratio values show a greater tendency for the centre-right news articles to adopt symbols related to both nature and religion compared to the centre-left, and the literature highlights a role played by these symbols in defining climate narratives (see e.g. Braasch, 2013; Manzo, 2010b; O'Neill & Hulme, 2009; O'Neill & Smith, 2014; O'Neill et al., 2013), their adoption will be further explored in the qualitative analysis of the articles to see if differences exist between the two groups.

Table 17. Summary of contingency tables between political orientation and symbolisation⁹⁷

Symbols	Odds Ratio	Phi value
	Centre-right vs Centre-Left	Centre-right vs Centre-Left
Nature (present vs not present) p=.856	1.03	.006
Humans (present vs not present) p=.178	0.73	-.044
Religion (present vs not present) p=.86.	1.88	.056

3.4. The Media Inventory Component: some considerations

The analysis of the general frames used to "construct" climate-change narratives showed a significant relationship between three categories of claim-makers (scientists, NGOs/environmentalists, and celebrities) and political orientation. It also showed a statistically significant relationship between political orientation and use of both scientific and civil society frames. The most interesting aspect that emerges from this analysis is an increasing tendency of the centre/right-leaning news articles to adopt a scientific frame and employ scientists as claim-makers. This is in line with those studies that found a tendency of conservative media to use scientific evidence to support fossil-fuel interests (Moser, 2010) and negation of the problem (McKnight, 2010). Moreover, the centre/right news articles are more likely to adopt a sceptical frame rather than consensus compared to centre/left-leaning newspapers. The differences between the two political orientations reinforce the hypothesis of the existence of two prevailing narratives of climate change that support two different moral panics rooted in the political economy of the problem. However, observing the distribution of the consensus frame, a balance (rather than an over-representation of sceptical positions) seems to emerge amongst the centre/right-leaning news articles, considering that half of the sample uses consensus/partial consensus; and the second half varies from sceptical to neutral frames. The sceptical/partial sceptical frames alone represent more than 30% of the sample. This finding is in line with what suggested by the literature, which highlights the persistence of "false balance" in newspaper reporting of climate change (see e.g. Boykoff & Mansfield, 2008)⁹⁸. In this case, the space given to sceptical interpretations of the phenomenon might be read as an "over-representation" of sceptical voices, since they represent a minority in the scientific debate (Akerlof et al., 2012; Boykoff, 2013; Freudenburg & Muselli, 2010; Rahmstorf, 2012; Tosse, 2013), contributing towards creating "confusion" and "uncertainty". This is also supported by the differences between the two political orientations and the use of both balance and dramatization frames. In fact, the centre/left-leaning newspapers tend to assume certain or mostly certain consequences; whereas 50% of centre/right-leaning news articles are split between uncertain/mostly uncertain consequences, balanced reporting, or they do not consider the consequences, thus

⁹⁷ Symbols (1=present, 0=not present) and political orientations (1=centre-left, 0=centre-right) were coded as dummy variables.

⁹⁸ Their study focuses on reporting scientific consensus around the causes.

confirming that conservative newspapers tend to give more space to sceptical interpretations (Boykoff & Boykoff, 2004; Carvalho, 2007; Carvalho & Burgess, 2005). Moreover, in line with the literature (Carvalho, 2005, 2007; Ereaut & Segnit, 2006), the articles belonging to the centre/right-leaning newspapers are more likely to adopt mockery; whereas the centre/left-leaning newspapers are more likely to adopt dramatic tones. However, in the case of the centre/left-leaning newspapers, there is a decrease in the use of dramatic frames, and an increase of neutral frames between the second and the third bloc of years; whereas, in the case of the centre/right-leaning newspapers, both mocking and dramatic frames continue to grow. This might suggest an evolution of scepticism over time from questioning the consensus around the causes towards the consequences (Maneri, 2013). Finally, in the case of symbolisation frame there is not a significant distinction between the two groups. However, this aspect will be further investigated in the qualitative analysis.

4. The Opinion and Attitude Themes Component. Orientation, Images, and Causation

The third section of the framework investigates the opinion and attitude construction, which in Cohen's model represents the phase in which specific images/folk devils emerge, and the narratives try to orient the opinion towards specific directions in relation to the causes and the nature of the problem. This is investigated in relation to the orientation offered by newspapers to interpret the phenomenon in terms of benefit/risk ("moral/ethical frame"), the "construction" of a specific image of folk devils ("folk devil frame"), and the explanation of the causes at the base of the phenomenon ("causation frame"). This component is strongly related to "inflaming" hostility (Goode & Ben-Yehuda, 2009) in relation to the construction of a threat and specific groups responsible for it.

4.1. Moral/ethical frame

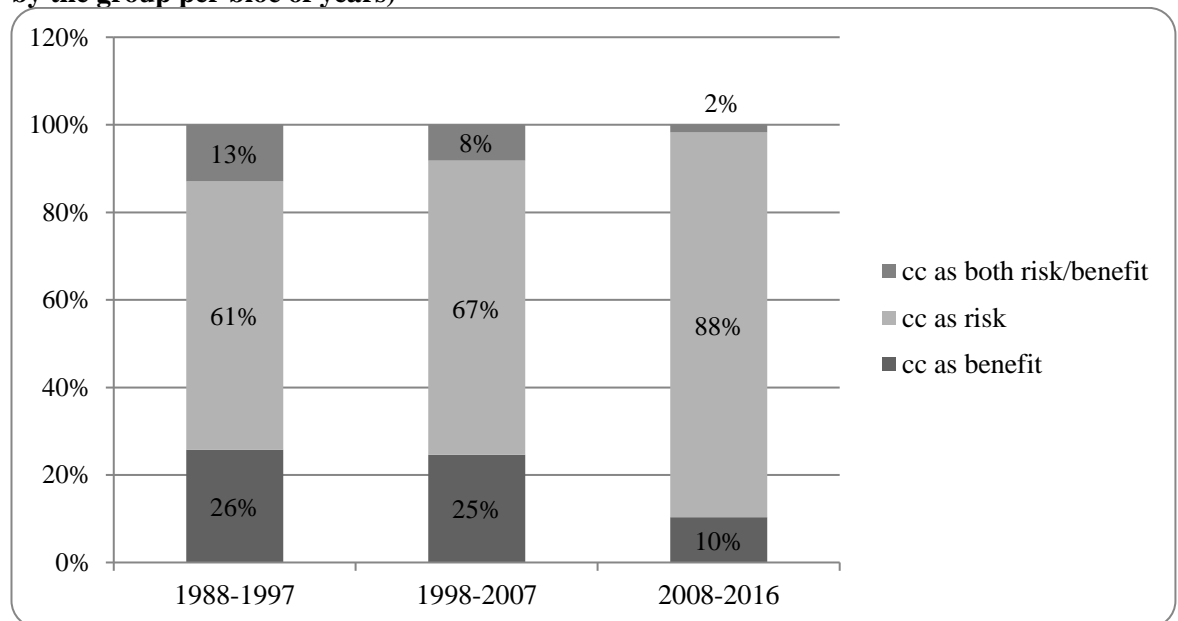
In the case of selecting a morality frame⁹⁹, a significant relationship was found between political orientation and the representation of climate change as either a risk or benefit: negative association between centre/right-leaning articles and representation of the phenomenon as a risk, and positive association between centre/right-leaning articles and representation of climate change as a benefit (odds around 3.5 times higher than centre-left, see Table 18). Figure 10 and Figure 11 show the distribution of the moral frames within each bloc of years per political orientation. In both cases, the representation of climate change as a risk prevails, even though in the case of the centre/right group the representation of climate change as a benefit is more frequent. However, it is interesting to highlight that when the centre/left-leaning newspapers describe climate change as a potential benefit, they also tend to simultaneously describe it as a risk. This suggests that they tend to simultaneously present both the advantages and disadvantages of the phenomenon.

⁹⁹ In some cases, climate change was represented as both a risk and a benefit in relation to specific characteristics of the phenomenon.

Table 18. Summary of contingency tables between political orientation and moral/ethical frame¹⁰⁰

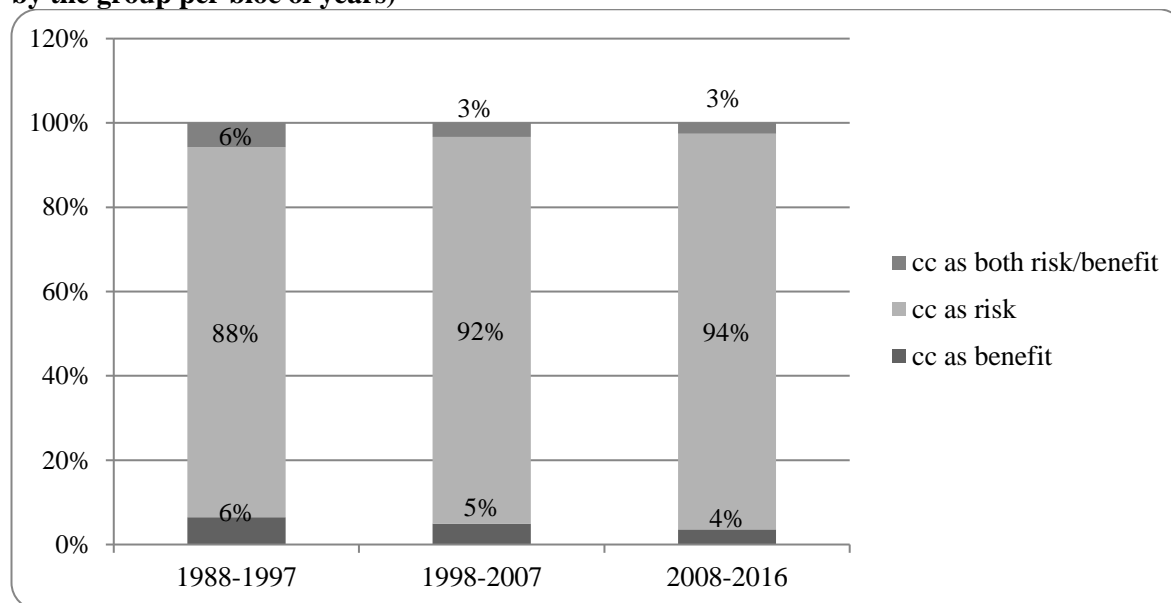
Climate change (CC) as a Risk/benefit	Odds Ratio Centre-right vs Centre-Left	Phi value Centre-right vs Centre-Left
CC as a risk vs no mention of CC as a risk	0.33	-.236
p=.000		
CC as a benefit vs no mention of CC as a benefit	3.47	.153
p=.000		

Figure 10. Centre/right-leaning news articles' distribution of moral/ethical frame across the three blocs of years (percentage values calculated on the total number of moral frames adopted by the group per bloc of years)



¹⁰⁰ Moral/ethical frames (1=present, 0=not present) and political orientations (1=centre-left, 0=centre-right) were coded as dummy variables.

Figure 11. Centre/left-leaning news articles' distribution of moral/ethical frame across the three blocs of years (percentage values calculated on the total number of moral frames adopted by the group per bloc of years)



4.2. Folk Devil frame

Since the main aims of this work are to identify the differences and potential communalities in terms of narratives of climate change between different parts (which are also characterised by political orientation), and the potential association of these narratives with moral panic frames, a tetrachoric correlation (Table 19)¹⁰¹ was performed (Lorenzo-Seva & Ferrando, 2012) to identify the relationship among folk devils, and between folk devils and political orientation¹⁰².

Table 19. Tetrachoric correlation matrix

	Scient	Scept	Env	Busin	Ind C	Dev C	CC	Unc
Scept	-.264							
Env	.804*	-.151						
Busin	-.403	.383*	-.296					
Ind C	-.492	-.619	-.643	.144*				
Dev C	-.368	-.490	.083*	-.325	.424*			
CC	-.842	-.221	-.796	-.616	-.535	-.554		
Unc	.001*	-.319	-.387	-.453	-.407	-.085	-.439	
C/L	-.665	.321*	-.613	.372*	.254*	-.107	.385*	-.245
C/R	.732*	-.365	.681*	-.419	-.287	.124*	-.402	.281*

* $p < 0.005$; scient= scientists; scept= sceptics; env= NGOs, activists, environmentalists; busin= businesses; ind C= industrialised countries; dev C= developing countries; CC= climate change; Unc= uncertainty

As shown in Table 19, the centre/left wing tends to be significantly associated with the representation of sceptics, businesses, industrialised countries and climate change as folk devils, whereas the centre/right wing is significantly associated with the representation of scientists,

¹⁰¹ "Tetrachoric correlation is based on the assumption that the response categories are proxies for unobserved, normally distributed variables" (Panter et al., 1997, p. 570-571).

¹⁰² For reasons of space, only the variables showing significance are reported.

environmentalists/NGOs, and uncertainty as folk devils. Table 19 also shows that there is a strong association between scientists and environmentalists, suggesting that these two categories are often identified as a whole by the centre-right group. In contrast, sceptics and businesses show association, and both are cited by the centre-left as folk devils.

Comparing these results with the expected outcomes reported in Table 5 (see chapter four and the transformed Table 26), climate change as a folk devil is mainly associated with the centre/left. As expected, the centre/left-leaning newspapers also tend to represent businesses, sceptics, and industrialised countries as folk devils, whereas the centre/right-leaning newspapers tend to label scientists, environmentalists, developing countries and uncertainty as folk devils. The politicians and other media/journalists do not present significant differences between the two parties. Unexpectedly (see Table 5, chapter four), the representation of the civil society as folk devil does not contribute to the differentiation between the groups significantly.

4.3. Causation frame

The relationship between political orientation, bloc of years and causation frame was investigated through an ordinal regression¹⁰³. The Pearson and Deviance goodness-of-fit measures show values higher than 0.05 (Table 20), hence the model based on Negative Log-log-link function appears to fit the data¹⁰⁴. The chi square of the model has an observed significance level of 0.000, which enables the rejection of the null hypothesis that the model without predictors is as good as the model with predictors.

Table 20 shows that amongst the three blocs of years only the first bloc (1988-1997) has a significant effect on the causation frame. Holding the political orientation constant, and given its estimate value ($\beta=1.525$), the odds for the first bloc being in a natural causation category increase by 4.6 times in comparison to the third bloc. In this case, the log-ordered model shows a negative, but not significant effect for predictor political orientation centre/right ($\beta= -.429$; $p>.05$). This is in line with the results of the analysis of the general consensus, which showed a tendency for both groups to recognise consensus around the causes of the problem. However, observing the distribution of the categories related to causation over the three blocs (Figure 12), half of the centre/right sample represents anthropogenic causes, and the remaining half is split into not considering the causes, representing climate change as natural or mostly natural phenomenon, and balancing the natural and anthropogenic causes. However, in the third bloc the recognition of anthropogenic causes slightly increases, further supporting the hypothesis of a shift of the sceptical arguments from causes to consequences. In contrast, for the centre/left-leaning newspapers the attribution of climate change to natural causes represents a negligible percentage that tends to disappear over time (Figure 13). There

¹⁰³ The ordinal regression was adopted due to the ordinal nature of the dependent variable, which includes the following five ordered categories: anthropogenic (score 1), mostly anthropogenic (score 2), balanced (score 3), mostly natural (score 4) and natural (score 5). A location-scale model was adopted after testing that the variability of the terms in the scale model significantly contributed towards explaining the variability of the dependent variable.

¹⁰⁴ Positive skewness= 2.82 and significance for Pearson and Deviance goodness-of-fit measures for the complementary log-log model.

is also a slight decrease in representing anthropogenic causes and an increase in no longer mentioning the causes. This might be explained by the fact that climate change has been progressively recognised as mainly "human-induced" and there is no longer need to debate its causes (see also Grundmann & Krishnamurthy, 2010; Nerlich et al., 2012).

Table 20. Political Orientation and bloc of years' effects on causation

Dependent Variables	B	Std. Error	Odds ratio
Model Fit: chi-square=85.042 (p=0.000); Goodness of Fit: Person chi-square=18.290 (p=.194); Deviance chi-square=19.654 (p=.141); Nagelkerke= .196			
Anthropogenic	2.893*	.293	18.0
Mostly Anthropogenic	3.649*	.346	38.4
Balanced	5.884*	.795	359.2
Mostly natural	8.177*	1.449	3558.2
Natural	Ref.		
Independent Variables	B	Std. Error	Odds ratio
Centre/right	-.429	.901	0.7
Centre/left	Ref.		
1988-1997	1.525*	.510	4.6
1998-2007	-.717	1.052	0.5
2008-2016	Ref.		
Model Fit: chi-square=110.418 (p=0.000); Goodness of Fit: Person chi-square=15.396 (p=.052); Deviance chi-square=13.964 (p=.083); Nagelkerke= .207			

*p<0.001

Figure 12. Centre/right-leaning news articles' distribution of causation frame across the three blocs of years (percentage values calculated on the total number of causation frames adopted by the group per bloc of years)

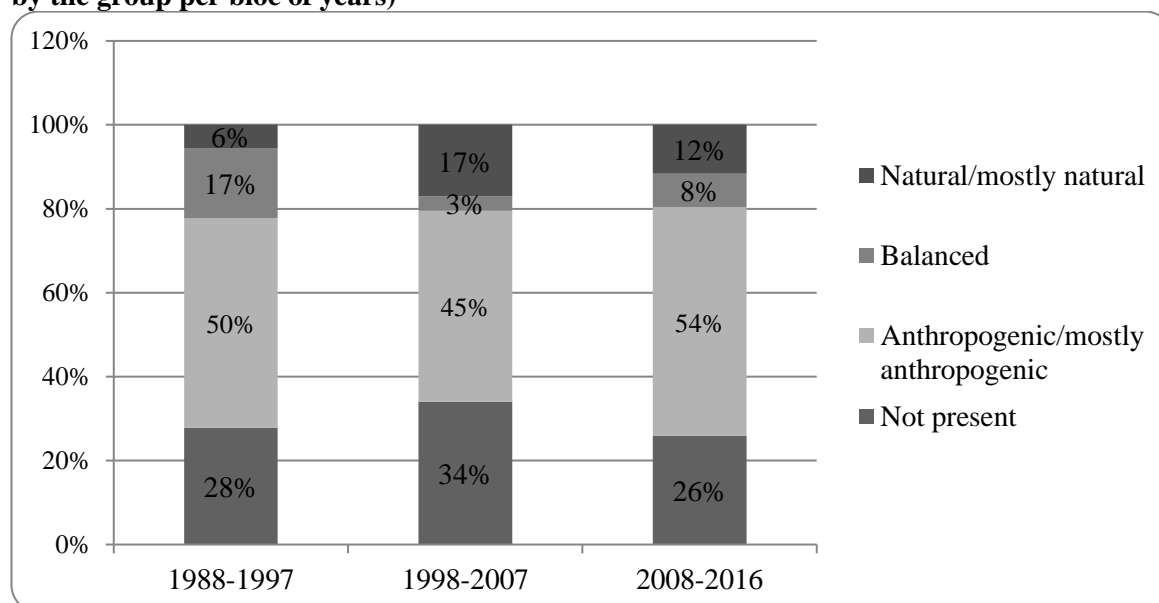
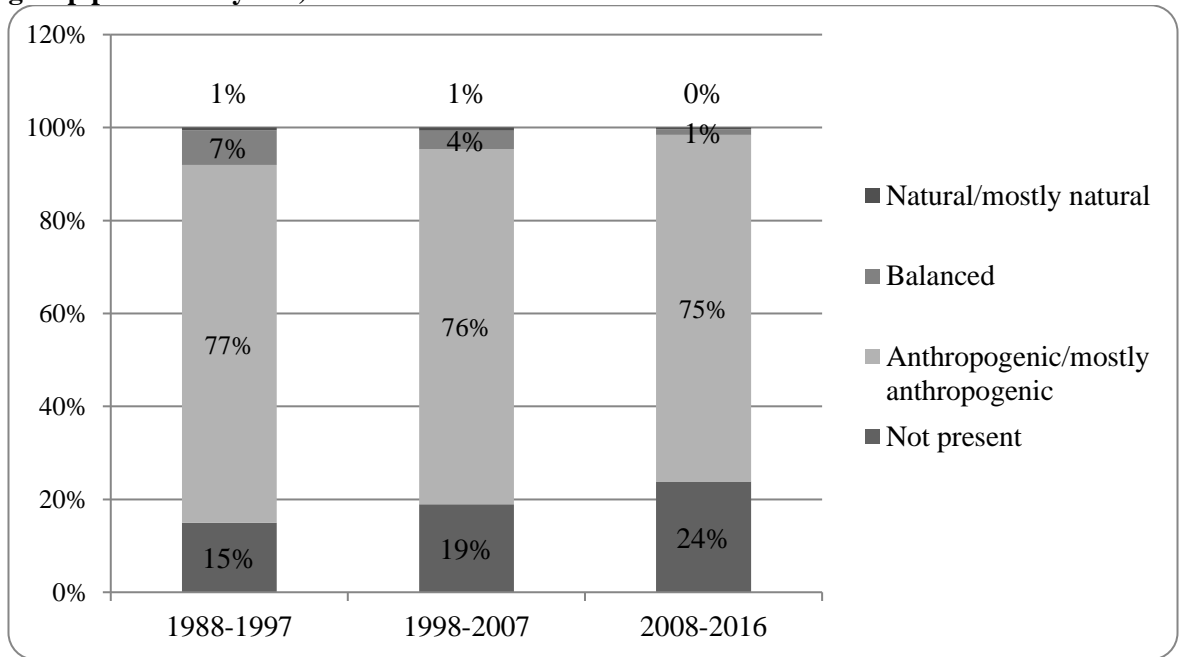


Figure 13. Centre/left-leaning news articles' distribution of causation across the three blocs of years (percentage values calculated on the total number of causation frames adopted by the group per bloc of years)



4.4. The Opinion and Attitude Themes Component: some considerations

The analysis of the "Opinion and Attitude Themes Component" showed the emergence of specific folk devils and narratives that present distinct orientations in terms of causes and risks related to the problem. Overall, climate change is represented as a risk. However, the centre/right-leaning newspapers are more likely to highlight the benefits of climate change; whereas their counterparts tend to describe climate change as a risk or take into account both its advantages and disadvantages. The comparison between the two groups shows a distinction regarding the creation of folk devils. The association between the centre/left orientation and the representation of sceptics, businesses, industrialised countries and climate change as folk devils, and between the centre/right orientation and the representation of scientists, environmentalists/NGOs, and uncertainty as folk devils, supports the hypothesis that more than a unique category of folk devils can be identified in the British newspaper debate around climate change. This also helps explain the contrasting findings obtained by Rohloff (2011a, 2013b) who identifies climate sceptics/deniers as folk devils (together with other economic and political actors), and by Brisman and South (2015), who identify mainstream climate scientists as "folk devils", suggesting that these opposite results should be read in relation to two distinct moral panics.

The decrease in attributing natural causes to climate change for the centre/right and the increase in not mentioning the causes for the centre/left is in line with an increasing recognition of "human-induced" climate change over time and the end of the debate about its causes (Grundmann & Krishnamurthy, 2010; Nerlich et al., 2012). The persistence of questioning the anthropogenic causes of climate change by the centre/right-leaning newspapers further reinforces the observed tendency of centre/right-leaning newspapers to balance the debate in comparison to their counterparts.

However, the political orientation was found to be not significantly associated with the adoption of specific causation frames.

5. The Rescue and Remedy Component. Sensitisation, Prediction and action

The fourth section of the questionnaire investigates the sensitisation process and the kinds of solutions/actions proposed, debated and refuted by the newspapers, what Cohen defines as "rescue and remedy phase of the process". The sensitisation is connected to all those symptoms that are identified to prove (or disprove) climate change existence. The societal control culture, as defined by Cohen, is examined in relation to the kind of countermeasures taken into consideration by the news articles.

5.1. Symptomatic frame

In the case of the symptomatic frame, the relation between political orientation and frame selected was found to be not statistically significant in any case (Table 21). However, the odds of a centre-right leaning news article representing ecological, health and social symptoms are less likely in all three cases compared to the centre-left. Moreover, the literature review shows a connection between symptoms of climate change and climate symbols (see e.g. Gavin et al., 2011). This aspect will be taken into account in the qualitative analysis to explore how the two groups combine these elements in their narratives. In fact, the representation of symptoms might suggest that climate change is already causing damages to both the natural and human environment.

Table 21. Summary of contingency tables between political orientation and symptomatic frame¹⁰⁵

Symptomatic frame	Odds Ratio	Phi value
	Centre-right vs Centre-Left	Centre-right vs Centre-Left
Ecological symptoms (present vs not present) p=.43	0.71	-.065
Health symptoms (present vs not present) p=.95	0.97	-.002
Social symptoms (present vs not present) p=.063	0.47	-0.60

¹⁰⁵ Symptoms (1=present, 0=not present) and political orientations (1=centre-left, 0=centre-right) were coded as dummy variables.

5.2. Action/Prediction frame

Table 22 shows a statistically significant association between the political orientation of newspapers and the discussion of policy making solutions (weak negative association with centre/right-leaning newspapers, $\phi=-.115$), societal actions (negligible negative association with centre/right-leaning newspapers, $\phi=-.070$), and natural predictions (positive association with centre/right-leaning newspapers, $\phi=.297$). As expected (see Table 5, chapter four), technological solutions and political orientation tend to be independent, whereas the discussion of climate change as a natural phenomenon (which does not require intervention) is around 18 times more likely to be present in centre-right leaning narratives (see Table 22). Unexpectedly, the discussion of economic actions is not significantly associated with right-leaning newspapers. Comparing the two groups in terms of discussing actions, there is a decrease in the percentage of articles belonging to the centre/left that discuss actions between the first and the second bloc (respectively 91% and 85%), which remains constant in the third bloc. In the centre/right group, this percentage decreases in the second bloc (from 86% to 84%) and slightly increases in the third one (87%). Observing the distribution of the types of action described over time (Figure 14 and Figure 15)¹⁰⁶, in the case of the centre/left-leaning newspapers the mention of solutions related to science decreases over time compared to other kinds of solutions (from 25% to 9%), whereas in the case of centre/right newspapers it decreases between the first and the second bloc (from 19% to 9%), but increases again in the third bloc (16% of the total actions discussed). By contrast, the percentage of solutions related to natural processes/evolution decreases over time (from 13% to 10%). However, this aspect might depend on a tendency of the centre/right newspapers to invoke the need for further research to understand the climate change phenomenon.

Table 22. Summary of contingency tables between political orientation and action frame¹⁰⁷

Action frame	Odds Ratio	Phi value
	Centre-right vs Centre-Left	Centre-right vs Centre-Left
Economic actions/solutions (present vs not present) p=.100	0.71	-.053
Techno solutions (present vs not present) p=.325	0.83	-0.32
Policy-making actions/solutions (present vs not present) p=.000	0.58	-.115
Research/science solutions (present vs not present) p=.863	0.96	-.006
Societal action (present vs not present) p=.030	0.54	-0.70
Natural prediction (present vs not present) p=.000	18.3	.297

¹⁰⁶ An article may mention more than one action.

¹⁰⁷ Action frames (1=present, 0=not present) and political orientations (1=centre-left, 0=centre-right) were coded as dummy variables.

Figure 14. Percentage of types of actions per bloc of years and centre/right orientation

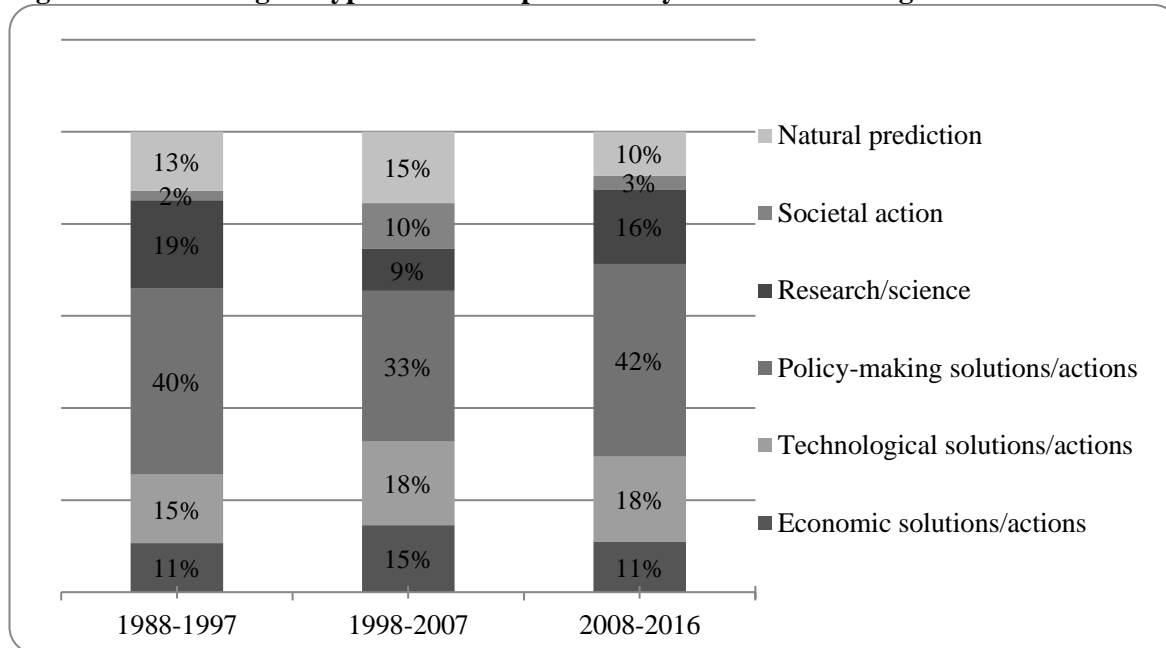
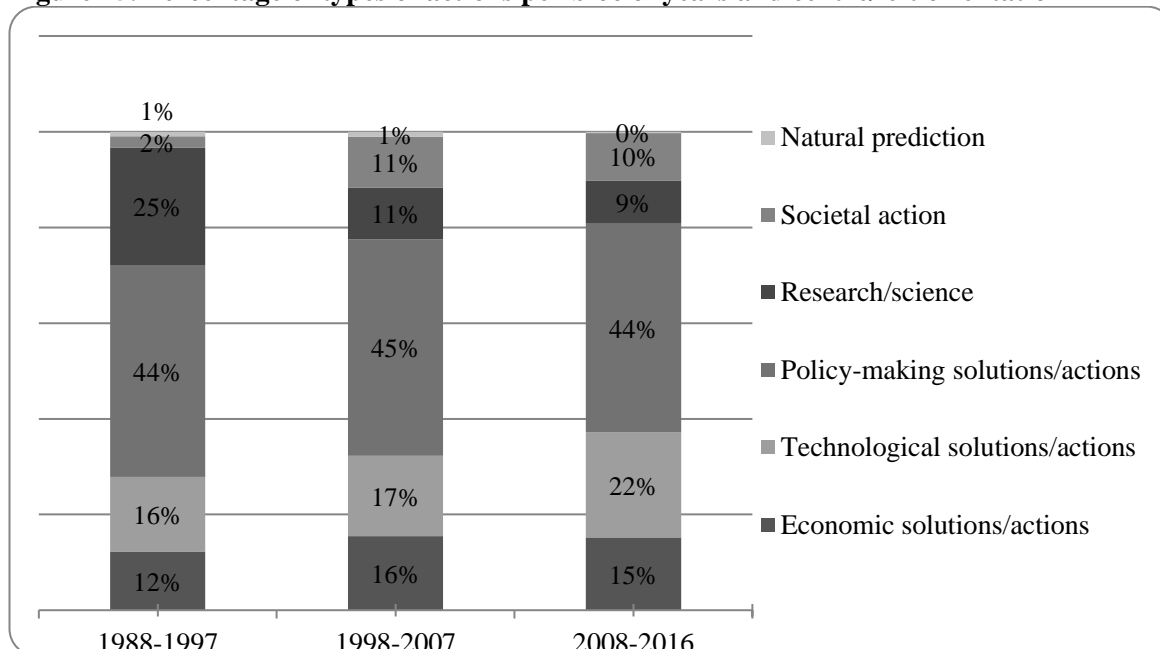


Figure 15. Percentage of types of actions per bloc of years and centre/left orientation



5.3. The Rescue and Remedy Component: some considerations

From the analysis of the rescue and remedy component there is no significant association between political orientation and symptoms (aspect that will be further explored in the next chapter). Both groups tend to mention actions over time. The "No need" for action, in relation to the natural evolution of the phenomenon, is almost entirely related to the centre/right group, but it decreases between the second and the third bloc-period. In the same period, this group tends to give more space to scientific solutions. This might suggest that the centre/right-leaning newspapers tend to adopt scientific perspectives to support their positions (more often related to sceptics). In fact, the need for research might imply that there is still uncertainty around climate change that should be clarified before acting (see also Union of Concerned Scientists, 2007).

6. Traces of Moral Panic in British Newspaper Reporting: the multidimensionality of climate change

The next step of the analysis aims to reduce the number of dimensions to explain the variance of the sample to understand if the hypothesis of the existence of two different moral panics is satisfied in relation to a division between sceptics (mainly related to centre/right-leaning newspapers) and advocates (mainly related to centre/left-leaning newspapers). A Nonlinear Principal Component Analysis (Categorical Principal Component Analysis - CATPCA) was performed¹⁰⁸. The extraction of four dimensions was based on the criterion of Eigen value greater than 1 and a value of Cronbach's alpha around .6 explaining the 43% of the variance (Table 23)¹⁰⁹. The Cronbach's alpha is less than .7 for the third and fourth dimensions indicating inferior levels of internal consistency (Bland & Altman, 1997). However, this value might be conditioned by the high number of items included (Cortina, 1993). At the same time, it shows that the first two dimensions (which are the most explicative) are the most consistent. From the fifth dimension onward, the Eigen value accounted less than 6% of the variance. Hence, the first four dimensions were considered the most explicative (Table 24). The varimax rotation was adopted in order to identify only those aspects that are clearly associated with each independent dimension.

Table 23. CATPCA with 4 dimensions

Dimension	Cronbach's Alpha	Eigenvalue*	% Variance
1	.872	5.914	19
2	.781	3.207	10
3	.592	2.304	7
4	.632	2.055	7
Total	.957	13.480	43.482

*Rotation Method: Varimax with Kaiser Normalization.

Only those variables showing significance in distinguishing the two groups were included. This reveals the characteristics identified by the previous analyses and how they combine to generate multidimensionality in climate narratives. Moreover, to reduce the number of variables to be included in the model, the following ordinal categories were transformed and synthesised into three variables¹¹⁰: with regards to the general frame, one includes "consensus" and "partial consensus" (defined as "consensus frame"), one relates to the neutral category, one includes "partial scepticism" and "scepticism" (defined as "sceptical frame"); for the balance frame, one category includes "certainty" and "mostly certain" (labelled as "certainty frame"), one refers to balanced consequences, one includes "uncertain" and "mostly uncertain" consequences (labelled as "uncertainty"); the

¹⁰⁸ The Nonlinear Component Analysis is appropriate for data reduction when variables are categorical (nominal and ordinal) (Linting et al., 2007). All variables were included in the model as nominal.

¹⁰⁹ The amount of variance depends on the high number of variables included in the model. However, almost 40% of this variance is strongly influenced by the political orientation. This does not mean that the contribution of the political orientation disappears if a higher number of dimensions is extracted, but it decreases in favour of other specific traits of the dimensions.

¹¹⁰ The categories were synthesised in relation to their proximity in the scale used.

dramatization frame is split into "dramatic frame" ("extremely dramatic" and "dramatic"), "neutral frame" ("neutral" and "slightly dramatic")¹¹¹, and "mockery"; the causation frame includes "anthropogenic causes" ("anthropogenic" and "mostly anthropogenic"), "balanced causes", "natural causes" ("natural" and "mostly natural")¹¹².

Table 24. Rotated Component Loadings

Components	Dimensions			
	1	2	3	4
Political Orientation				
Centre/left	-.564	.349	-.018	-.276
Centre/right	.564	-.349	.018	.276
Claim makers				
Scientists (claim-makers)	-.054	.038	.639	.056
Celebrities	.014	-.086	-.115	.260
Problem Definition				
Scientific frame	.155	-.113	.577	-.239
Civil Society frame	-.082	.124	.117	.565
General consensus				
Consensus frame (consensus+partial consensus)	-.641	.612	.006	.092
Neutral definition frame	-.047	-.741	-.040	.048
Scepticism frame (scepticism+partial scepticism)	.828	-.151	.029	-.154
Dramatization				
Dramatic frame (extremely dramatic+dramatic)	-.169	.372	.002	.711
Neutral tone (neutral+slightly dramatic)	-.235	-.329	.383	-.384
Mockery frame	.869	.009	-.018	-.066
Balance				
Certain consequences (certain+mostly certain consequences)	-.409	.446	.361	.410
Balanced consequences (balance)	-.038	-.716	.019	-.031
Uncertain consequences (uncertain+mostly uncertain)	.867	-.017	.036	-.131
Morality				
CC as benefit	.226	-.192	.012	.042

¹¹¹ In this case, the neutral frame includes neutral and slightly dramatic because in both cases the consequences are not exactly estimated. The definition for slightly dramatic is "the consequences of climate change might cause negative consequences, but not exactly measurable or specified"; whereas the definition of neutral frame is "consequences are evaluated neither positive nor negative".

¹¹² Given the degree of proximity of the categories synthesised, the choice of reducing the number of variables does not affect the explanatory capacity of the results.

Table 24. Rotated Component Loadings

CC as a risk	-.423	.348	.248	.490
Folk Devils				
Scientists	.736	.056	.102	-.126
Sceptics	-.118	.167	.117	-.379
NGOs/Environmentalists	.622	.042	-.027	-.024
Businesses	-.117	.147	-.194	-.143
Industrialised countries	-.128	.145	-.455	-.037
Developing countries	-.013	-.007	-.253	.069
Climate change uncertainty	-.254	.299	.508	.292
	-.046	-.462	.170	-.078
Causation				
Anthropogenic causes (anthropogenic+mostly anthropogenic)	-.409	.400	-.310	-.059
Balanced causes	.127	-.538	.129	-.020
Natural causes (natural+mostly natural)	.693	.088	.111	-.107
Action				
Policy-making solutions/actions	-.158	.150	-.646	.029
Societal actions	-.111	-.019	-.012	.192
Natural evolution	.645	-.067	.162	-.061

6.1. Sceptical dimension

The first dimension (Table 24), which accounts for the 20% of the total variance, can be labelled as "sceptical dimension" (Figure 16) given the prevalence of sceptical frames to define climate change (.83), the representation of uncertain consequences (.87), the use of mockery (.87), the attribution of the causes to natural factors (.69), and the attribution of solutions to natural processes (.64). This dimension also relates to the representation of both scientists (.74) and environmentalists (.62) as folk devils, and the representation of climate change as a benefit (.23). Even though this dimension relates to sceptical items, the scientific definition frame has a not substantial but positive contribution to the dimension (.15). This dimension is characterised by the highest positive contribution of right-leaning newspapers.

Most of the elements included in this dimension can be found in the extracts from an article published by the *Daily Mail* titles "Does this prove that global warming's all hot air?" (Phillips, 2006):

"The driving message of the eco-doomsters has been 'green plants good, man bad'. This has become a received wisdom that simply cannot be questioned. It is taught in our schools as fact. It has spurred each of our political parties to turn a deeper shade of green than the others. Anyone foolhardy enough to challenge this orthodoxy is mercilessly mocked or vilified as stupid, insane or in the pay of the evil oil lobby".

In the opening section, the advocates (labelled as "eco-doomsters") are immediately identified as folk devils who spread a religious faith that cannot be challenged. Environmentalism is described as

a form of "totalitarianism" that is instilled in the mind of people through education and politics. Sceptics are identified as victims of this system. Then the article continues:

"These experts who constantly preach about plants and greenhouse gases were all entirely ignorant of what greenhouse gases are actually produced by plants [...]. So, far from destroying the planet, cutting down the rain forests may actually be a way of preventing global warming! [...]. The 'important new understanding' is actually that the old understanding is completely wrong, and that climate-change scientists have been talking through their collective green hat".

The article questions climate science (and scientists) by attributing the carbon dioxide production to natural processes. The science seems to contradict itself by publishing studies that challenge the entire assumptions upon which climate change research is based. It also ("ironically") suggests that cutting trees might "save" the planet from global warming, and that climate scientists are conditioned by their "environmentalist vocation". The core of the article combines mocking and scientific language:

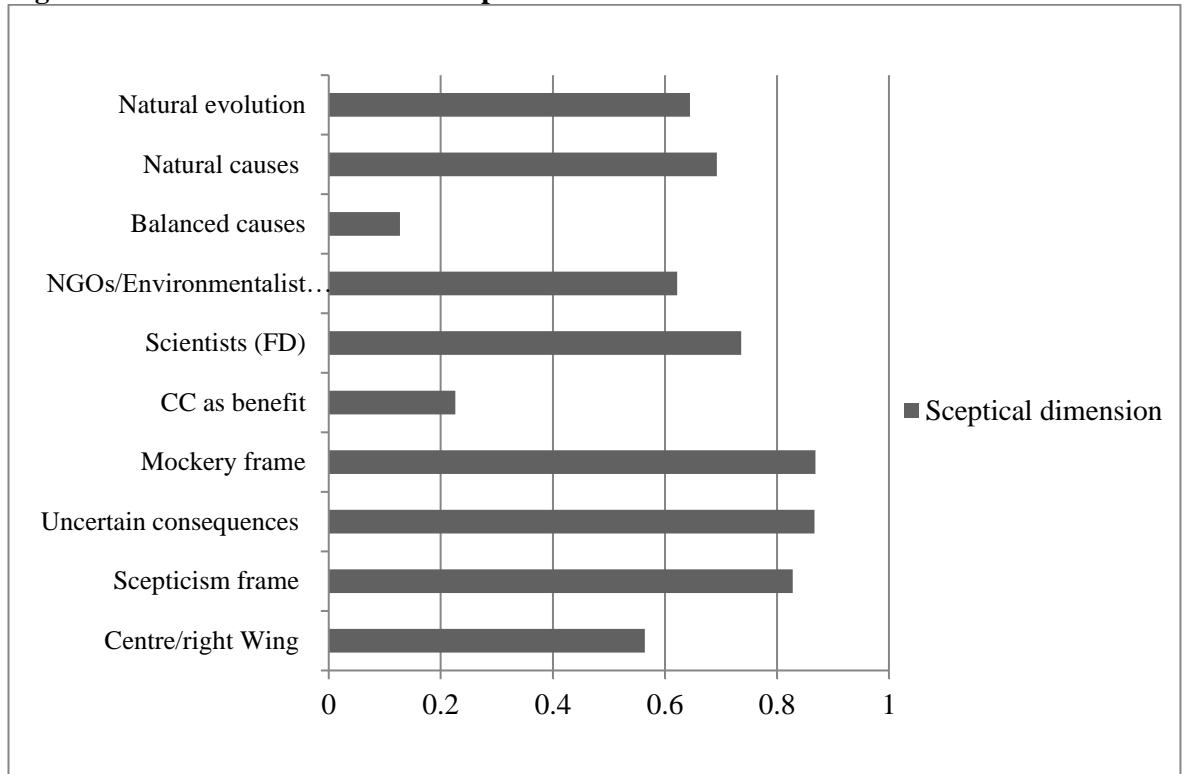
"If scientists can't even get the mundane activities of the plant world right, we are entitled to wonder what else they have got wrong in their prediction of environmental catastrophe for the entire planet [...]. There is no proof that manmade emissions are the villain of the drama [...]. The key evidence at the core of the conclusion by the Intergovernmental Panel on Climate Change that global warming was happening and human activities were responsible was the 'hockey-stick' curve, which purportedly showed a 700-year period when temperatures remained relatively constant followed by the last 100-plus years when temperatures shot upwards".

The article adopts a "scientific frame" to describe the controversy by referencing the author of the new research and IPCC findings, using technical language (e.g. "hockey-stick" curve), and questioning some symptoms of climate change (such as rising temperature, melting ice sheets and rising seas). However, all these symptoms are attributed to natural variations that create an equilibrium between raising and falling, cooling and warming in different parts of the world. In the concluding section, some points are remarked and no need for action is invoked:

"Computer models, which have created global warming theory, simply cannot deal with all these factors [...]. The second factor is the ideological agenda at the heart of the green movement which is anti-capitalism, anti-big business and anti-America. And the third is the sheer weight of conformity, in which the surest way to obtain research funding is to produce yet another study confirming global warming".

The anthropogenic causes are further questioned, and climate science is mocked by attributing unrealistic apocalyptic visions to it. The article suggests that scientists belonging to an "ideological green lobby" created the "global warming industry" for their own stakes against capitalism and growth. In this situation, politicians are pushed to act by this "powerful industry" even though there is no need for action.

Figure 16. Variance accounted for sceptical dimension



6.2. Advocate dimension

The second dimension (Table 24), which accounts for the 10% of the total variance, can be labelled as "advocate dimension" (Figure 17). In fact, it mainly relates to the use of consensus around climate change science (.61), representation of climate change as human-induced (.40), and certainty around the consequences (.45) associated with use of dramatic frames (.37) and the representation of climate change as a risk (.35). The main folk devil is represented by climate change (.30), but also businesses (.15), industrialised countries (.14), and sceptics (.17) slightly positively contribute to this dimension. Both scientists as claim-makers and scientific frame do not contribute to this dimension, by contrast, there is a weak but positive association with the use of civil society frames (.12). The centre-left has a positive contribution to this dimension (.35).

An example of "advocate dimension" can be found in the article published by *The Independent* in 2016 titled "Farmer suicides soar in India as deadly heat wave hits 51 degrees Celsius" (Johnston, 2016a):

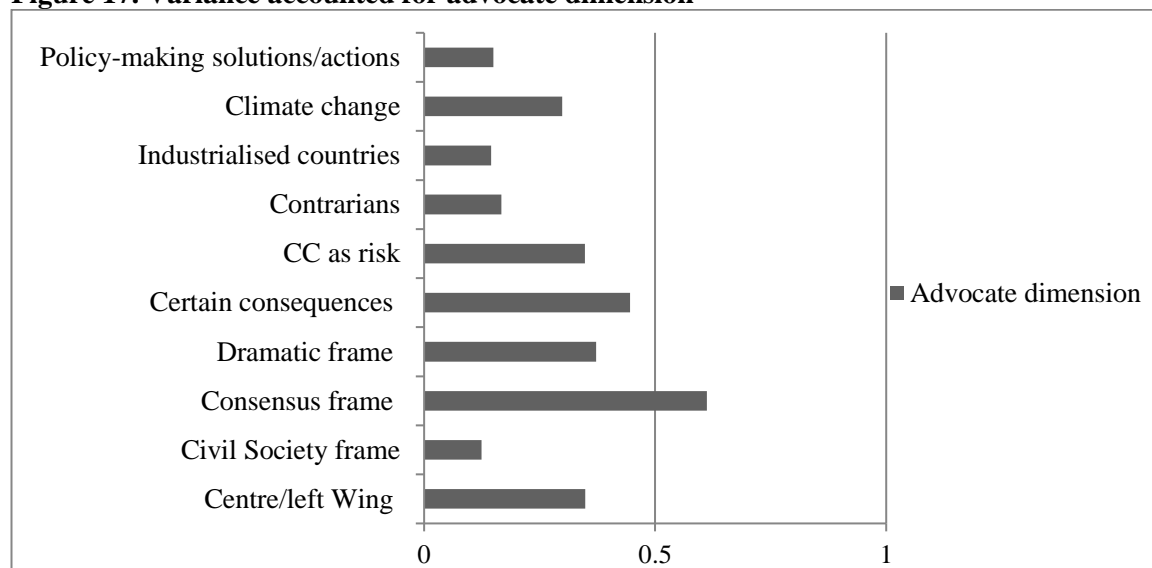
"India has set a new record for its highest-ever recorded temperature - a searing 51 degrees Celsius or 123.8F - amid a devastating heatwave that has ravaged much of the country for weeks. Hundreds of people have died as crops have withered in the fields [...]. Others have killed themselves rather than go to live in urban shanty towns".

The opening paragraph connects the rising temperatures in India (and related social consequences) to climate change, which is represented as a real and extremely dramatic threat. The dramatization is emphasised by describing farmers' suicide as a symbol of climate change consequences. Moreover, further consequences and their related drama are expected to increase.

After listing a number of specific cases, which are directly affected by climate change, the article refers to the anthropogenic causes of climate change and consensus around the reality of it:

"The main reason is the excessive use of energy and emission of carbon dioxide. Factors like urbanization and industrialization too have added to the global warming phenomenon. I think similar trend would be maintained in Rajasthan in coming days' [Dr Laxman Singh Rathore said] [...]. At the time, Government minister Harsh Vardhan said: '[...]. It's not just an unusually hot summer, it is climate change'".

Figure 17. Variance accounted for advocate dimension



6.3. Natural/science dimension

The third dimension (Table 24), which accounts for the 7% of the total variance, can be labelled as "natural/science dimension" (Figure 18) given its positive association with the use of both scientists as claim-makers (.64) and scientific frames (.58), and no contribution of the political orientation. Moreover, this dimension is influenced by a positive contribution of certain consequences (.36), and related use of neutral tones (.38). There is slightly positive contribution of items related to natural aspects, such as the natural evolution of climate change (.16), balanced (.13) or natural causation of climate change (.11). However, the folk devil is represented by climate change (.51) which is represented as a risk (.25). The positive (weak) association with the natural aspects of the problem can be explained by the reference to studies that focus on specific aspects that can contribute towards increasing or alleviating climate change, such as e.g. the role of oceans (Schoon, 1990b) and plankton (Tickell, 1996) in regulating the planet's climate and related uncertainties. Moreover, the positive contribution of both scientists and sceptics as folk devils might relate to the "attack" against those scientists that deny either entirely or partially climate change such as in the case of connecting climate change to solar activity (in this case the natural causation is examined but the scientists responsible for promoting this theory are depicted as folk devils) (see e.g. Randerson, 2007).

One article published by *The Independent* in 1991 ("This much is certain: it's an unearthly gamble") includes most of the characteristics of this dimension (Leggett, 1991). The opening paragraph mentions the political context in which actions/inactions against climate change are

invoked. Then, the focus shifts towards framing the problem in ecological and scientific terms. In this section, neutrality is adopted to report two different positions about the interpretations of causes and potential responses to the phenomenon. In the following, a scientific framework is adopted to describe the potential influences on climate change:

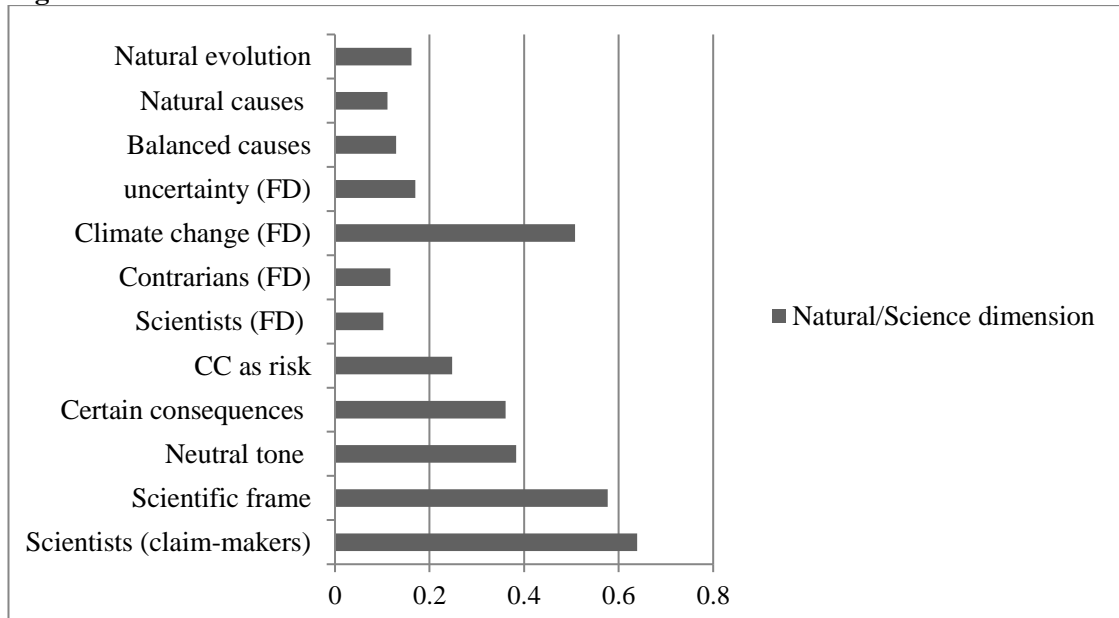
"In Science magazine on 23 August, however, no less than 17 climate modelling teams from around the world summarised their results and found that, depending on the behaviour of clouds above melting snowy terrain, the snow feedback ranged from strongly positive to weakly negative. 'Snow feedback is associated with a multitude of complexities', concluded the long list of authors. In other words, the more we look, the more uncertainties we uncover. Also emerging are the first results of a major international investigation of the oceans, the Joint Global Ocean Flux Study (JGOFS). This is studying how much carbon dioxide goes down from the atmosphere into the oceans, and how much carbon dioxide flows up out of them".

While the first section refers to the anthropogenic nature of climate change, this assumption is then balanced by focusing on the natural factors that can amplify climate warming. The report of natural symptoms and causes is supported by referencing studies, authoritative voices (such as IPCC) and scientific models. This section also refers to the importance of progressing in climate research in order to explain the uncertain aspects of the phenomenon. It continues:

"Every climate model in the world now predicts rates of warming 10, perhaps 100 times, faster than living systems have ever had to face while humans have walked on the planet".

Climate change is represented as a risk and the "folk devil" that threatens the society. Consequences are expected to produce disorders and, even though they are not exactly predictable, there is a need to be prepared to deal with them.

Figure 18. Variance accounted for natural/science dimension



6.4. Drama dimension

The fourth dimension (Table 24), which accounts for the 7% of the variance, can be labelled as "drama dimension" (Figure 19), given the strongest positive contribution of dramatization (.71). The

positive contribution of climate change as both a threat (.49) and folk devil (.29) shows that there is a recognition of the consequences (.41). Moreover, accordingly, the problem definition is more orientated to a civil society frame (.56). The science-related components do not influence this component, whereas the celebrities as claim-makers have a positive association. As in the case of the first dimension, the third component is positively associated with the centre/right-leaning newspapers.

Most of the aspects included in this dimension can be found in an article published by *The MailOnline* titled "Climate change delegates agree on a draft plan to reduce global emissions after FOUR YEARS of negotiations - but warn a binding agreement is STILL some way off" (Calderwood, 2015):

"more than 50 celebrities and personalities committed to the fight against climate change, from Sean Penn and Leonardo DiCaprio to U.S. billionaire Michael Bloomberg and Chinese internet tycoon Jack Ma, flocked to the conference in Le Bourget to encourage the efforts. 'Perhaps this is the most exciting time in human history', said Penn, at a special conference event. '[...] Now we live in a time where there are no choices. We have certainty [...]".

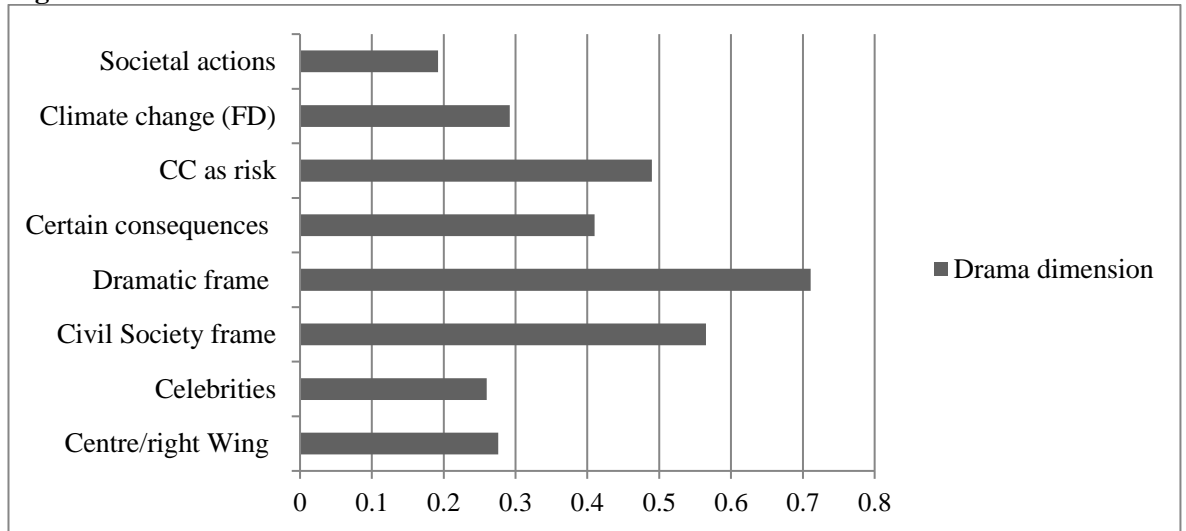
The opening paragraph uses celebrities' statements to confirm that climate change is happening and need to be tackled. The problem is described as a collective concern that needs collective effort (using for example the pronoun "we"). The tones become dramatic when describing the consequences of climate change on the "future of life":

"Current plans would put the world on track for a potentially disastrous warming of anywhere from about 2.7C to 3.5C by 2100 [...]. The French President Francois Hollande said: 'Never have the stakes of an international meeting been so high because it concerns the future of the planet, the future of life. The hope of all of humanity rests on all of your shoulders' [...]. It comes as scientists warn of a world that will be increasingly inhospitable to human life, with massive storms, drought and rising sea levels that swamp vast areas of land becoming routine".

Although dramatic frames are used to describe the consequences of global warming, the article stresses the incapacity of political actors to find an international agreement to tackle the problem increasing the chances of failure. In fact, the possibility of reaching agreements at the Paris UN meeting is compromised by a "blaming game" between developing and developed countries:

"What are the chances of success? So far this year, 183 of 195 nations have issued long-term plans for tackling climate change [...]. But issues may arise over how to make the deal legally binding and how it would be enforced as happened in Copenhagen six years ago when talks collapsed [...]. Many poor nations insist rich countries bear the most responsibility for tackling the problem because they have burnt the most fossil fuels since the Industrial Revolution on their way to prosperity. But developed nations insist more must be done by emerging countries, which are voraciously burning coal - the most carbon-emitting of the main fossil energies - to power their fast-growing economies".

Figure 19. Variance accounted for Drama dimension



To sum up in salient points, from the CATPCA four dimensions emerge that are related to different aspects of climate change and explain the 44% of the variance of the entire sample:

- The sceptical dimension is mainly characterised by uncertainty in terms of consequences and action to be taken, scepticism around the causes and amongst scientists. In addition to these aspects, the mockery of the consequences of the phenomenon prevails. This dimension also relates to the representation of advocates as folk devils and it is influenced by a centre/right orientation of the newspapers.
- The advocate dimension is characterised by the strongest contribution of consensus and certainty around both causes and severity of consequences, and climate change is the prevailing folk devil. This dimension is associated with a societal-oriented problem definition but not with specific claim-makers. This is the dimension with the highest contribution of the centre/left political orientation.
- The natural/scientific dimension mainly relates to the scientific aspects of climate change. This is characterised by the adoption of more neutral tones and balance of the causes, but certainty about consequences. In this case, the prevailing folk devil is represented by climate change.
- The drama dimension is related to the representation of climate change as a problem that produces real consequences. This dimension is also positively associated with dramatic/extremely dramatic frames and a social component of the problem. This dimension is also positively influenced by centre/right orientation of newspapers.

The CATPCA shows that when the sceptical-oriented items prevail (first dimension), there is also a positive association with the centre/right wing orientation, whereas the consensus-oriented items are associated with the centre/left wing orientation. However, the most controversial aspect is related to the fourth dimension (drama dimension) that in contrast to the first one, adopts dramatization, certainty of consequences, and climate change as a folk devil. This aspect, will be further explored through the qualitative analysis of the use of dramatization by newspapers.

Before formulating some considerations around the results emerged so far, another aspect related to the moral panic framework will be taken into account, which is the volatility component.

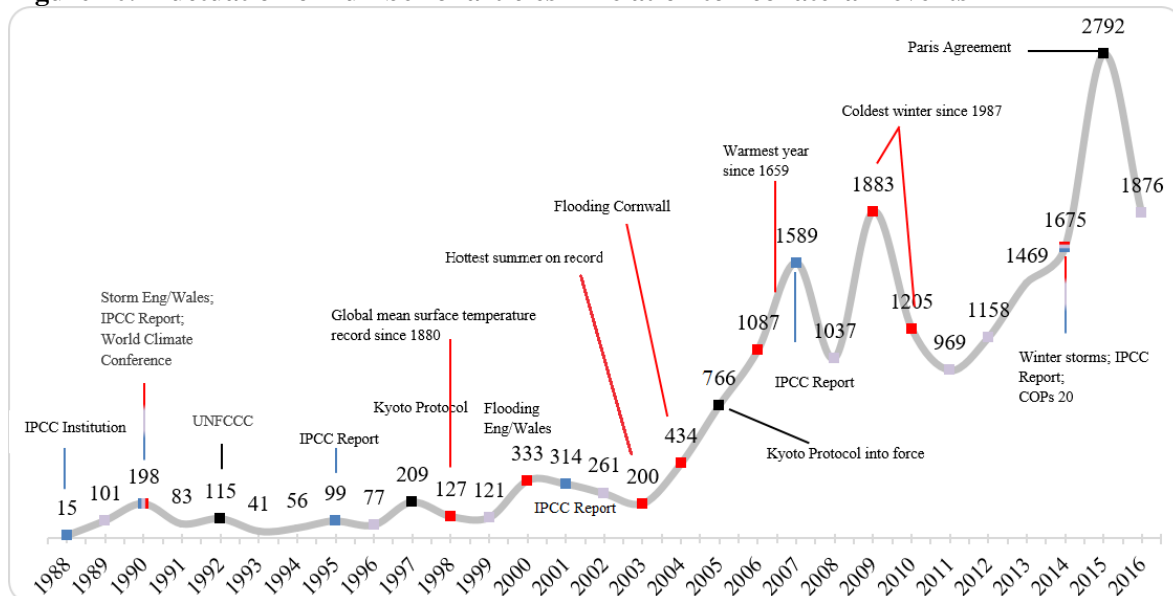
6.5. Volatility and newspaper's reporting

As suggested by Goode and Ben-Yehuda (2009) disproportionality also results from a fluctuation over time, given that in some specific moments the phenomenon can receive greater attention in comparison to previous periods, without any real corresponding increase.

In order to explore the volatility of climate change narratives in newspapers, its appearance (and disappearance) over time was interpreted in relation to "collateral events" such as political events, scientific events, and "extraordinary" weather-related events in the UK. The volume of articles is adopted as a criterion to observe changes in the attention given to the phenomenon over time¹¹³.






As shown in Figure 20, the number of articles retrieved from the Lexis/Nexis database fluctuates over time with some peaks and troughs throughout the period under consideration. For reasons of space, only the political meetings that reached an agreement (such as e.g. the Kyoto Protocol and Paris Agreement) are reported (see Table 2, chapter one, for a complete list of political-related events). The extreme weather-related events occurring in the UK refer to those which caused deaths and severe damages, and had high resonance at the European level. They are: 1) storms across southern Britain (but also northern France, the Netherlands and Germany) which caused deaths and lack of electricity in 1990 (BBC, 2004); 2) widespread flooding across England and Wales in 2000 (Met Office, 2014); 3) hottest summer on record in Europe in 2003, which caused 2000 deaths in Britain (BBC, 2004); 4) considerable damage caused by flooding in Cornwall in 2004 (BBC, 2004); 5) 2006 warmest year since 1659 (Met Office, 2006); 6) coldest weather since 1987 in 2010 (started in mid-December 2009) in particular in the north of England (Met Office, 2014); 7) greatest January rainfall since 1910 in the UK (Met Office, 2014). Finally, the scientific-related events are related to the foundation of the Intergovernmental Panel on Climate Change and the release of its reports in 1990, 1995, 2001, 2007 and 2014.

Figure 20. Fluctuation of number of articles in relation to "collateral" events



¹¹³ The total number of articles is used to observe if there is an increase in correspondence of specific events.

Legend

	Weather-related events in UK
	Convergence of events
	Political events with agreements
	Other political-related events
	Scientific-related events

In order to understand if there is a statistically significant association between these extreme weather events (independent variable) and the log of number of newspaper articles per year (dependent variable)¹¹⁴, an ANOVA was run¹¹⁵. The ANOVA results show that around 40% of the variability of the dependent variable is explained by the linear model ($F(3, 28)=5.3, p=.005$) (Table 25), and that only political events have a positive and statistically significant effect on the number of articles published. The coefficient associated to the variable political event suggests that when they occurred, the number of articles increased by 102% with respect to a period without such events (Table 25). This supports those findings of the existing literature which highlight that climate change reporting is more likely to be connected to political events (and itself interpreted as a political issue), rather than to scientific ones (DiFrancesco & Young, 2011; McKnight, 2010; Rick et al., 2011; Schafer et al., 2013). In the case of scientific-related events there is a negative relation but not statistically significant¹¹⁶.

Table 25. Anova results with "collateral events" as independent variables and log of number of articles per year as dependent variable

	Coefficients (SE)	F	P
$R^2=.39$; Years=29 (1988-2016); MS=1.32; $F(3, 28)=5.3, p=0.005422$			
political events	1.021771 (.28)	3.680776	0.001
scientific events	-0.12549 (.23)	-0.55108	0.58
weather-related events UK	0.080351 (.21)	0.388569	0.700

7. Traces of Moral Panic in British Newspaper Reporting: overall considerations

The analysis shows that the first hypothesis related to the applicability of a moral panic framework of analysis to the study of media reporting on climate change is supported in the context of British newspapers, only if two different contrasting forces (characterised by some traits connected to moral panics) are considered. In fact, the politicisation of climate change supports the second hypothesis related to the existence of two polarised forces (two distinctive moral panics). Accordingly, both the

¹¹⁴ The base 10 logarithm was applied to ensure the normality distribution assumption.

¹¹⁵ The choice of ANOVA to analyse the variance was related to the categorical nature of the independent variable and the continuous nature of the dependent variable (Pagano, 2009).

¹¹⁶ Finally, exploring the distribution of the articles during the specific months in which the extreme events happened, there is an increase in the numbers of articles in both July and August only in 2003 and 2004, and in January 2014.

regression analyses and the analysis of associations showed a significant association of some specific traits with political orientation. Moreover, the CATCPA shows a contribution of both the sceptical dimension and the advocate dimension. They are the most consistent and strongly connected to the items related to scepticism/consensus. The extraction of a higher number of dimensions would increase the variance explained by the model, but from the fifth dimension onward, this diminishes the influence of these variables - each of them accounting for a limited percentage of variance. However, a third "drama-component" related to the right-leaning newspapers' dimension increases the variance explained by the model up to almost 40% showing distinct peculiarities of these polarised narratives. Moreover, this dimension shows that the dramatization is not exclusively the domain of the centre-left leaning articles. This raises questions about the multidimensionality of the right-leaning narratives that needs to be further explored through in-depth analysis of news articles. It should be also noted that the natural/science dimension tends to be orientated towards a neutrality in terms of political orientation, thus suggesting an additional scientific dimensionality of the problem that is common to both groups. This also highlights that not only differences but also similarities can be found between the two groups, supporting the notion that climate narratives are multifaceted (Jaspal & Nerlich, 2014b).

Focusing on those dimensions influenced by the political component, and combining them with the results emerged from both the regression analyses and the analysis of associations, unexpectedly (see also Table 5, chapter four, and Table 26 below) in relation to the "inventory component", claim-makers "businesses", "scientists" and "environmentalists/NGOs/activists" do not play a key role in distinguishing the sceptical and advocate dimensions. By contrast, in line with previous findings, celebrities contribute towards right-leaning narratives (Anderson, 2011). The problem definition frame does not contribute to these dimensions substantially. However, there is a positive contribution of the scientific frame in the sceptical dimension and a societal orientation in the advocate dimension. Furthermore, as shown in the first part of this chapter, a significant relationship was found between centre/right-leaning news articles and adoption of scientific frames, and between this group and employment of scientists as claim-makers, supporting the existing literature that links the use of scientific evidence to conservative media to support sceptical positions (McKnight, 2010; Moser, 2010).

As expected, the frames related to consensus among scientists, certainty around consequences, and anthropogenic causes positively contribute to the advocate dimension and negatively contribute to the sceptical one. These findings further support the existence of two prevailing narratives of climate change rooted in the political-economy of the problem: it appears that a "false balance" persists in newspaper reporting of climate change (also in the last bloc of years 2008-2016, see Figure 5) connected to the political orientation of newspapers (see e.g. Boykoff & Mansfield, 2008). Combining the results obtained by the CATCPA and those reported in the first sections of this chapter, it is possible to identify a tendency of the centre/right newspapers to give more space to sceptical positions, even though they are not recognised as authoritative by the scientific community (Akerlof et al., 2012; Boykoff, 2013; Freudenburg & Muselli, 2010; Rahmstorf, 2012; Tosse, 2013). Although the general "consensus" component prevails for both groups (see Figure 4), in the case of

centre/right-leaning news articles, the representation of general consensus amongst scientists, consensus around the causes, and consensus around the consequences is balanced either by the adoption of sceptical and balanced frames, or not mentioning the issues. This might be interpreted as a "strategy" to generate "uncertainty" amongst the readers. However, the drama dimension shows another side of the right-leaning narratives which recognise and dramatize the consequences of climate change. This raises questions on the reasons why some articles go in this direction. Indeed, in terms of dramatization, in line with the literature (Carvalho, 2005, 2007; Carvalho & Burgess, 2005; Ereaut & Segnit, 2006), the sceptical dimension emphasises mocking tones, whereas the advocate one is more influenced by dramatic frames. This is also supported by the differences emerging from the multinomial regression, which show how those articles belonging to the centre/right-leaning newspapers are more likely to adopt a mockery frame than any other form of dramatization; whereas the centre/left-leaning newspapers are oriented to higher degrees of dramatization. However, the mockery frames and dramatic tones continue to grow over the entire period under consideration in the case of centre/right-leaning newspapers, supporting the idea of an evolution of scepticism over time from questioning the consensus around the causes towards the consequences (Maneri, 2013). Accordingly, the drama dimension captures the tendency of the centre-right to use drama frames connected to the consequences of climate change. From this classification, it is evident that the "Pandora's box" frame (which outlines an "Armageddon scenario"), as defined by Nisbet (2009), is not an exclusive domain of the advocate dimension. This suggests that the centre-right tends to either mock the consequences or dramatize the problem, further reinforcing the confusion around the effects of climate change (but also suggesting impossibility/no need for action).

The analysis of the symbolisation frames in relation to the political orientation did not show any significant distinction in quantitative terms between the two groups. Unexpectedly, the left-leaning articles are not associated with any specific symbols. However, this does not mean that symbols cannot be used with different aims. In fact, the literature often cites this aspect as a component of climate narratives (Braasch, 2013; O'Neill, 2013), especially in association with polar bears (Ballantyne et al., 2016; Manzo, 2010a). For this reason, the use of symbols will be further investigated through Corpus Assisted Discourse Analysis.

In terms of driving opinions and attitudes (second component of Cohen's approach), the dimensions related to scepticism and advocacy confirm a positive relation with the representation of climate change as a risk in the case of advocates, and a negative relation with sceptics (by contrast positively associated to climate change as a benefit). In the case of sceptics, those findings that interpret climate change as an "a-moral" issue, which does not need to "be righted" (Goode & Ben-Yehuda, 2009; Markowitz & Shariff, 2012), are supported. Moreover, the distribution of the moral frame over time also shows that when the centre/left-leaning newspapers highlight the benefits of climate change, they also tend to account for the risks deriving from it. However, the drama dimension shows a positive contribution of both centre-right orientation and representation of climate change as a risk. This aspect will be further investigated in the next section to understand the contexts in which climate change represents a serious threat with severe consequences.

In terms of folk devils, the CATCPA confirms a positive association between the sceptical dimension and representation of advocates as folk devils (scientists and environmentalists), and a positive relation between the advocate dimension and climate change as a folk devil, and a slight contribution of sceptics, businesses and industrialised countries as folk devils. However, the fact that the advocate dimension does not show a strong contribution of "sceptics as folk devils", seems to be in contrast with Rohloff's (2011a, 2013b) findings that identify climate sceptics/deniers as main folk devils (together with other economic and political actors). By contrast, it seems to support Brisman and South' (2015) findings, which identify mainstream climate scientists as "folk devils". However, both the tetrachoric analysis and the advocate dimension showed a significant association between centre/left orientation and representation of sceptics as folk devils, confirming that this apparent contradiction might be solved if the two different groups of folk devils (characterised by political connotation) are analysed individually. However, the drama dimension captures a positive contribution of climate change as a folk devil, which suggests a multidimensionality in the representation of folk devils even in the case of the centre-right group.

In the rescue and remedy component, the sensitisation (in terms of symptoms) does not play a key role in distinguishing the two groups. However, since the literature shows that symbols are often connected to existing symptoms of climate change (e.g. melting glaciers that affect polar bears), this aspect will be further explored in combination with symbols in the qualitative analysis.

In terms of action/solutions, the association of solutions to natural processes prevails in the sceptical dimension. Unexpectedly, the sign associated with societal action is negative in the case of advocate dimension; but positive in terms of need for policy-intervention. By contrast, the societal action is invoked in the drama dimension. Moreover, unexpectedly, the association between political orientation and economic, techno, science solutions is not significant. This suggests that both groups discuss these solutions, but as shown in the next chapter, some differences between these narratives emerge¹¹⁷.

To sum up, the analyses suggest a partial polarisation between two parties that offer opposite interpretations of the phenomenon. The centre/right group tends to inflame hostility against specific folk devils (identified in scientists and environmentalists), whereas the centre/left tends to "propagate fear" (through dramatization) against a problem that is not always associated with specific figures (sometimes associated with sceptics, but more often with the dramatic consequences of climate change). These results are in line with the partisan orientation found in news content in the UK context by Boykoff (2008) and Carvalho (2005, 2007). Both authors connect the nature of climate change narratives to the political-economy dimension of the phenomenon. This is for some aspects in line with the interpretation of moral panics as based on a Propaganda Model, as suggested in the second chapter of this work. In fact, in Herman and Chomsky's model (1988) the media serve the dominant elite, due to ownership filters, market forces or state power, and advertising filters, which influence the political content of the media. This also happens in moral panics, when media mechanisms serve the structure and interests of powerful groups (see e.g. Hall et al., 1978).

¹¹⁷ Actions will be not a focus of the qualitative analysis, but some aspects will emerge from the analysis of the adoption of scientific frames.

Moreover, in both the PM and moral panic's models the media refer to filters (called "flak filters" in the PM and "counter-reaction" of the folk devils in moral panics) as tool to discipline the media (Hier, 2002a; Mullen, 2010b; Thornton, 1994). This aspect might be connected to the "hostility element" enhanced by moral panics ("anti-factor" element in the PM) against specific folk devils. The "elite consensus" (Mullen, 2010a) plays a primary role both in supporting an ideological orientation and in generating panics by emphasising a unique "version of the story". The absence of this "universality" in the context of climate change might be read as a "flak filter" to support the status quo. In fact, from the analysis of news articles a form of "conflicted moral panics" (Maneri, 2013) results, in which the political orientation plays a role in differentiating the two groups (characterised by specific framing attributes). Using the categories adopted in the introduction of this work related to "Who", "How", and "Why" moral panics arise, the results support the two hypotheses related to the application of the moral panic framework to British newspapers' reporting on climate change (hypothesis 1) as useful tool to capture the traits of a polarisation (hypothesis 2). In fact, the existence of two moral panics characterised by both specific voices "Who" speak for the climate and strategies through which ("How") they are constructed, emerges. However, simultaneously considering the two narratives, the overall image, resulting from both conflicted panics ("centre-left vs centre-right") and from the multidimensionality within the same politicised narrative (such as in the case of the drama dimension in which the problem is "dramatized" also in the case of the centre-right), might evolve into "stillborn moral panics"¹¹⁸. This means that the confusion generated by such contrasting narratives might favour the "sceptical instance" (and its related "non-intervention strategy"), which is rooted in economic, social, and political stakes (Herman & Chomsky, 1988). This might explain the reasons "Why" each moral panic goes in different directions but with an overall "success" of "a status quo instance", given the lack of a unique a coherent "storyline" that increases the uncertainty around climate change. In fact, these considerations around the conflictual character of climate change reporting support the idea of a division among the elite powers (Hallin, 1986; Bennett, 1990), which promote confusion to justify policy uncertainty, rather than reflecting a "genuine" plurality of viewpoints. However, in addition to the political orientation of newspapers, the reasons behind such a tendency will be further explored in chapter seven aimed at identifying potential influences of conservative think tanks on newspaper reporting.

Finally, the politicisation of climate change (DiFrancesco & Young, 2011; McKnight, 2010; Rick et al., 2011; Shafer et al., 2013) is also shown by the connection between political events and increase in the number of articles published. However, the moral panics construction cannot be read as a progression from "inventory phases" to "rescue and remedy" ones. In fact, the dichotomisation seems to be crystallised in the climate narratives presenting all the components simultaneously. The narrative slightly evolves over time in relation to an increase in the use of both dramatization and mockery by the centre/right over the three blocs and a decrease in using dramatic and extremely dramatic frames for the centre/left.

¹¹⁸ Maneri (2013: 182) refers to "stillborn moral panics" when "the emergency is vigorously and successfully denied by a primary definer".

Table 26. Comparison between the dimensions hypothesised in Table 5 and the characteristics emerged from the quantitative analyses in relation to the political orientation of newspapers

		Expected scenario		Real scenario		
Moral Panic Comp	Frame	Variables	Scept dim	Adv dim	Scept/ Drama dim	Adv dim
Media Inventory	Claim- makers	Government/ Politicians	X	X	NS*	NS
		Businesses	X		NS	NS
		Scientists/NGO/ activists/ associations		X	NE	NE**
		Public/Civil Society	X	X	-/+	+
		Other media	X	X	NS	NS
		Others (Celebrities/ Justice/law enforcement)	X	X	NS	NS
		Consensus/ Partial Consensus		X	-	+
	General frame	Neutral		X	NE	-
		Scepticism/ Partial Scepticism	X		+/-	-
		Scientific		X	+/-	NE
	Problem Definition	Political	X	X	NS	NS
		Economic and Energy	X		NS	NS
		Technological	X		NS	NS
		Ecological	X	X	NS	NS
		Civil Society		X	NE/+	+
		Mockery	X		+NE	NE
	Drama	Slightly dramatic/Neutral		X	-	-
		Dramatic/ extremely dramatic	X	X	-/+	+
		Certainty/ slightly certain		X	-/+	+
	Balance	Balanced	X		NE	-
		Mostly uncertain/ uncertainty	X		+/-	NE

Table 26. Comparison between the dimensions hypothesised in Table 5 and the characteristics emerged from the quantitative analyses in relation to the political orientation of newspapers

Opinion and Attitude	Symbols	Nature		X	NS	NS
		Humans		X	NS	NS
		Religious symbols	X		NS	NS
	Morality	CC as a benefit	X		+/-	-
		CC as a risk		X	-/+	+
	Folk Devils	Advocates	X		+/-	-
		Climate change	X		-/+	+
	Causation	Sceptics		X	-	+
		Anthropogenic/ mostly anthropogenic		X	-/NE	+
		Balanced	X		+/NE	-
Mostly natural/natural		X		+/-	NE	
Rescue and Remedy	Symptoms	Ecological		X	NS	NS
		Health/Social		X	NS	NS
	Action/ Prediction	Financial and economic action	X		NS	NS
		Policy-making		X	-/NE	+
		Technological solutions	X	X	NS	+
		Scientific solutions		X	NS	NS
		societal actions		X	-/+	NE
		Natural evolution	X		+/NE	NE

*Not significant

** Not essential for the dimension

+ Positive contribution to the dimension

- Negative contribution to the dimension

Summary

The CATCPA shows the emergence of four components. All frames related to consensus among scientists, certainty around consequences and anthropogenic causes positively contribute to the advocate dimension and negatively contribute to the sceptical dimension. It appears that a "false balance" persists in newspaper reporting of climate change (also in the last bloc of years 2008-2016) connected to the political orientation of newspapers. The scientific consensus around both causes and consequences is a characteristic related to centre/left-leaning newspapers, whereas the scepticism is associated with centre/right-political orientation. The "politicisation" of climate change also results from the connection between political events and increase of the number of articles published. This suggests a polarisation between two parties that offer opposite interpretations of the phenomenon. The centre/right group tends to inflame hostility against

specific folk devils (identified in scientists and environmentalists), whereas the centre/left tends to "propagate fear" (through dramatization) against a problem that not always is associated with specific figures (sometimes associated with sceptics, but more often with the dramatic consequences of climate change). This is for some aspects in line with the interpretation of moral panics as based on a Propaganda Model, which interprets the media as serving the dominant elite, because of ownership filters, market forces or state power, and advertising filters, which influence the political content of the media. This also happens in moral panics, when media mechanisms serve the structure and interests of powerful groups. Moreover, in both the PM and moral panic models the media refer to filters (called "flak filters" in the PM and "counter-reaction" of the folk devils in moral panic) as tool to discipline the media. This aspect might be connected to the "hostility element" enhanced by moral panics ("anti-factor" element in the PM) against specific folk devils. The "elite consensus" plays a role both in supporting an ideological orientation and in generating panics by emphasising a unique "version of the story". The absence of this "universality" in the context of climate change might be read as a "flak filter" to support the status quo. The analysis of news articles shows the emergence of "conflicted moral panics", in which the political orientation plays an influential role in differentiating the two groups. However, the resulting "confusing image" from these conflicted panics might evolve into "stillborn moral panics", because it might support "a status quo instance", which is rooted in economic, social, and political interests. These considerations around the conflictual character of climate change reporting seem to support the idea of a division among the elite power, which promotes confusion to justify policy uncertainty, rather than reflecting a "genuine" plurality of viewpoints.

Chapter 6 Qualitative analysis of scientific frames, dramatization, symptoms and symbols

Key points

Chapter six reports the results of the qualitative analysis of the data by focusing on those aspects that the quantitative analysis could not investigate in depth. It explores the use of scientists as claim-makers (section one); the adoption of dramatization to report on climate change (section two); and the use of symbols and symptoms of climate change (section three). This helps provide a more detailed answer to the second research question related to the contribution of moral panics to explaining the characteristics of rival narratives, especially in terms of "who" the claim-makers are, and "how" moral panic strategies can be activated.

1. Introduction to the use of scientific frames between 1988-2016

Chapter five identified the main differences between two political polarised narratives of climate change. This chapter will focus on those aspects which emerged from the quantitative analysis of the data, which need in-depth investigation, such as in the case of adoption of scientific frames and scientists as claim-makers, use of dramatic tones, use of symbols and symptoms (in combination with symbols). This analysis aims to clarify the main differences between the two groups, especially in terms of "who" the claim-makers are and "how" newspapers activate moral panics, to provide a more detailed answer to the second research question relative to the moral panic application to capture the characteristics of a polarisation in British newspapers' narratives. In fact, it focuses on scientists as claim-makers ("who"), and dramatization as a strategy to spread moral panic ("how"), and sensitisation and symbolisation processes ("how").

After grouping the words most frequently used per macro-areas, 33 words were found to be related to scientists between 1988 and 1997, 31 words between 1998 and 2007, and 38 words between 2008 and 2016¹¹⁹. All the words related to science were analysed in the context used¹²⁰. The entire articles were read and coded in relation to the emerging topic supported by the science. The choice of in-depth analysis of the words directly connected to scientists was related to the results which emerged from the quantitative analysis of the data, which showed a tendency of the centre-right leaning newspapers to portray scientists as claim-makers despite a higher inclination to scepticism. Moreover, when adopting scientific frames, articles tend to use scientists as claim-makers. Finally, in the majority of cases scientific figures are used in conjunction with all the other "keywords" that are connected to their work/research. The following sections report the results relative to the adoption of scientists as claim-makers and related macro-contexts in which they are deployed over the three blocs. The final section will connect these findings to the moral panic frame and provide answers to the second research question.

¹¹⁹ The words considered were present at least six times.

¹²⁰ More than one word can appear in the same text.

1.1. Centre-left scientific frames between 1988-1997

The qualitative analysis of the articles belonging to the first bloc of years shows the emergence of some macro themes and their related sub-themes (see Table 27). The first topic relates to scientific consensus, especially around the causes and future consequences for (and responses by) both humans and the natural environment. The centre-left emphasises agreement among the scientific community around both causes and consequences by referring to specific scholars, but also often using the scientific community as a unique voice. This happens from the beginning of the bloc (1988) and continues throughout the period under consideration (some additional examples related the scientific community as a whole can be found in Appendix 3)¹²¹. Science is engaged to highlight consensus on attributing ecological variations to climate change, as well as consequences on both humans' health and lifestyle. References to research also highlight the adaptive capacity of both ecological and human systems to a changing climate. Moreover, as evident from the quantitative analysis of the data, the centre-left leaning news articles tend to represent climate change as a risk. However, when articles refer to the benefits of climate change, they also frequently mention the negative consequences.

A second macro-area (Table 27) relates to the representation of scientists as political advisors. Scientific frames are also used to encourage/support political action, especially in relation to the need to implement new policies aimed at reducing greenhouse gases. At the same time, science can be used to criticise the political direction and the choices made to tackle the problem. These articles tend to endorse investment in renewable sources of energy, oppose the further use of oil and coal, and support the future development of nuclear power.

A third theme (Table 27) is connected to the need to invest in research to improve climate change research. These articles use scientific frames to describe new research techniques and studies that might help better frame the climate-change issue. Even when the articles refer to unknown aspects related to measurements of specific features, they tend to emphasise either the reality or risk of climate change. Sometimes, extracts from scientific reports are reproduced in which the uncertainty is described as a driver to improve scientific knowledge about climate variations. Moreover, some articles are directly authored by scientists. Connected to uncertainty is also the instrumentalisation of climate change-related issues.

This introduces the fourth macro-theme related to "confutation of scepticism" (Table 27). These articles tend to use both scientists and scientific framework to confute those sceptical positions that underpin political-economic interests in supporting oil industry advantages and delaying action. The political-economic interests are mainly identified in funding provided by corporations to both governments and some research institutes/scientists. Despite advances in terms of scientific awareness, these articles suggest that the politicisation of climate change, and the "corruption" of some scientists by oil companies, is the main cause of persistent scepticism. Few articles also tend to balance the reporting by referring to both "sceptical" and "advocate" positions, by analysing their arguments. In these cases, there is no clear position sustained by the journalists, and the uncertainty is interpreted as the main problem that science faces. One article (Pearce, 1993) emphasises that the

¹²¹ For reasons of space, only few quotes are reported. Appendix 3 reports a more detailed list of quotes representative of each theme.

uncertainty around climate change precludes appropriate strategies of intervention. In this case, what emerges is the idea that opposite positions within the scientific community exist.

Table 27. Centre-left scientific topics in use between 1988 and 1997

Macro-theme	Sub-theme	Typical use
Scientific consensus	General Consensus	"What worries the scientists and environmentalists [...] is the rate of change. For last week's Conference on the Changing Atmosphere, attended by scientists and policymakers from 48 nations, as well as international agencies and non-governmental organisations such as Friends of the Earth, Dr Irving Mintzer of the World Resources Institute had put together a number of models of what might happen" (Radford, 1988).
	Consequences on both humans and nature	"The broad consensus among scientists is that average global temperatures will rise by 1.5-4.5C by 2030 [...], with disastrous results. [...] Professor Jose Goldemberg and his colleagues have calculated the direct energy needs of a human being, allowing a lifestyle involving adequate lighting, space heating, space cooling, food preservation, cooking, hot water, and leisure" (Leggett, 1989).
	Adaptation capacity	"WILL THE EARTH go on getting warmer? If it does, how will it affect us? [...] If the English can adopt a food like curry, anything is possible. So people will change their eating and drinking habits to suit the new climate" (Kington, 1990, p.18).
	Climate change as a risk/benefit issue	"They are certain that global warming will occur, but their tentative predictions suggest benefits and dangers" (Erllichman, 1991).
Scientists as political advisors		"The committee calls for the Government's research budget of pounds 16m a year on the greenhouse effect to be increased drastically [...]. Nuclear power stations, which do not emit carbon dioxide, have only a modest part to play [...]. The Government should spend more on researching and developing renewable energy forms such as wind and tidal power" (Schoon, 1989b).
Need for further research to unmask unknown aspects		"So to that extent, global warming ranks as a 'known' [...]. These present 'knowns' were unknown until recently [...]" (Myers, 1992, p.28).
Scepticism confutation	Political-economic interests behind uncertainty	"But there are powerful interests in politics and business claiming the threat of global warming has been exaggerated, and that action taken now to reduce fossil fuel consumption would be over-hasty and damaging to economies. Hence the emphasis on the unremarkable fact that the satellites found no evidence of warming" (Schoon, 1990a, p.15).
	Corporation funding	"These scientists, who oppose the general scientific consensus on global warming, have had their voices greatly amplified by fossil fuel interests and are flown around the world to speak at conferences organised or backed by industry opponents of global warming" (Brown & Vidal, 1997, p.4).

Table 27. Centre-left scientific topics in use between 1988 and 1997

Advocates vs sceptics	"This uncertainty leads to two extreme views, either 'the scientists have got it wrong and there is nothing to worry about', or 'the world is doomed to catastrophic climate change'" (Perkins, 1993, p.16).
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1.1.1. Centre-right scientific frames between 1988-1997

The centre-right group is characterised by macro-themes (and sub-themes, see Table 28) related to: i) promotion of scepticism by emphasising scientific disagreement, attributing representativeness to minor voices, and exacerbating the uncertainty as a limit to intervention; ii) consequences of climate change related to faraway places, and future time, and mainly affecting nature; iii) scientific evaluations provided by scientists who are not climate experts, and considering changes as potentially beneficial. Finally, a minority of articles agree that scientists are reaching some degree of consensus.

This group often uses specific scientific figures to highlight contradictory/sceptical positions within the scientific community. Some articles also emphasise that the level of scientific knowledge is not adequate to understand climate change, which is still uncertain. This means that the understanding of the phenomenon is far from being certain about a number of different aspects. The extracts from the news articles (see Table 28 and Appendix 3) show that there is a tendency to use a journalistic style that emphasises uncertainty around climate change. In fact, the frequent references to natural factors, mistakes and uncertainty, such as when referring to "natural cyclical fluctuation" (McCarthy, 1989a), "best guess" (McCarthy, 1989b), "yet to be convinced", "before we could be certain" (Hawkes, 1990), "don't know the answers" (Andrews, 1996), "experts may have got very wrong" (Simons, 1997), "scientists disagree" (Hosenball, 1990), effectively serve to question and undermine the scientific consensus on climate change.

In some cases, sceptical positions are clearly advanced, by questioning the need for action and giving to sceptics a scientific "aura". Climate change is represented as a "myth", according to those "scientific findings" that suggest the inexistence of the phenomenon. Scientific consensus is contested by giving the same authority to both "advocates" and "sceptics". Moreover, economic damages are highlighted if climate change is tackled. Sceptical positions are advanced by using scientific frames and referring to institutions that legitimise that climate scientists are wrong. In general, when global warming is somehow recognised, it is described as too complicated and uncertain to be tackled due to scientific/political disagreement on any kind of actions needed. Moreover, scientific evidence is often described as both uncertain and resulting from a limited number of scientific studies. Expressions such as "some scientists believe" (McCarthy, 1992a), "it is possible this can be related" (McCarthy, 1992c), "before they can make more accurate predictions" (Roy, 1989) are examples of this tendency. The consequences of climate change, when recognised as real, are connected to faraway places or distant in time and disagreement over possible interventions which precludes a clear course of action. The impacts are also described as affecting nature, such as in the case of polar icecaps (see e.g. Nuttall, 1992; Roy, 1989), and wildlife in general (Daily Mail, 1994a; McCarthy, 1992a, 1992b, 1992c). Benefits are also mentioned in terms of

economic advantages (e.g. for tourist sector and wine producers), and medical advances (thanks to the increase of some plants). One aspect to be noted is that when evaluating climate change as a risk (especially for nature), the use of words such as "claim", "amassed", indirectly affect the scientific rigours behind the studies. Moreover, the use of expressions such as "it says to prove", instead of emphasising the certainty of the results, further indirectly affects its credibility. Finally, the use of metaphors such as e.g. "climatic time bomb", while "dramatizing" the situation described, does not reflect scientific language (see Daily Mail, 1994a). The centre-right also gives space to scientists from other fields (especially economists) to evaluate the potential effects of climatic changes and energy solutions. Few articles "genuinely" recognise that a scientific consensus actually exists (Table 28).

Table 28. Centre-right scientific topics in use between 1988 and 1997

Macro-theme	Sub-theme	Typical use
Scepticism	Scientific disagreement	"The chairman of the working group that produced it, John Houghton, chief executive of the Meteorological Office, said that it would be 15 years before we could be certain whether human activities were influencing the global climate" (Hawkes, 1990).
	Scientific aura of scepticism	"The Meteorological Office has revealed that global warming 'is a myth' [...]. Scientists [...] are now saying that the rate of warming could be as little as 0.15 degrees per decade [...]. Met Office scientists are saying that sulphur in the atmosphere actually exerts a protective effect, offsetting the impact of greenhouse gases such as carbon dioxide - one form of pollution is cancelling out the other" (Daily Mail, 1994b, p.8).
	Uncertainty around effects or actions to be taken	"Given the fact that scientists disagree over the imminence and peril of global warming, the sceptics argue, is it economically prudent to start investing huge amounts of money in anti-pollution measures which may not be needed?" (Hosenball, 1990).
Consequences	Far away problem	"The report by the Inter-governmental Panel on Climate Change [...] says that human activity will warm the Earth's atmosphere by up to 3C (5.4F) over the next century [...]. But there was disagreement on what targets should be set for international reductions in greenhouse gases into the next century" (Capella, 1996).
	Effects on nature	"WIDESPREAD changes in the behaviour of British wildlife may be the first tangible signs of global warming, some scientists believe" (McCarthy, 1992a).
Scientific evaluations	CC as a risk/benefit	"Greenhouse effect [...] could provide a cure [...]" (Daily Mail, 1992).
	Evaluations from other fields	"Dr Michael Norton, director of the Parliamentary Office of Science and Technology, an advisory and research body for MPs, says: 'It is difficult to see how the government could achieve its targets without greater use of nuclear power. It is unlikely that other sources of energy, such as the wind, will be able to meet demand for enough clean power'" (Mail on Sunday, 1997, p.8).
	Reaching consensus	"Global warming has been a subject of scientific controversy for some years; this is the first official

Table 28. Centre-right scientific topics in use between 1988 and 1997

scientific consensus that serious warming of the Earth's atmosphere is inevitable unless action is taken" (McCarthy, 1990).

1.2. Centre-left scientific frames between 1998-2007

The qualitative analysis of the articles belonging to the second bloc of years shows similar patterns (macro themes and sub-themes) to those identified in the first bloc (see Table 29). However, some additional sub-topics emerge related to climate "(in)justice", and climate change evidence in terms of extreme weather events and other ecological symptoms. An evolution in terms of scientific advances is emphasised by highlighting increasing consensus among scientists. However, if in the first bloc further research is invoked to clarify several uncertain aspects of climate change, in this bloc this need focuses on better shaping responses to changes. Moreover, scepticism is confirmed to be connected to political and economic interests: in addition to corporations and politicians, educational institutions and other media are also held responsible for the dissemination of misinformation.

The first topic is related to scientific consensus (Table 29), confirming a tendency to support consensus amongst scientists on the basis that global warming is a fact and that it is human-induced. Climate change is represented as dangerous and "serious" as the nuclear threat (see Appendix 3 for additional quotations). Predictions about the negative consequences deriving from human action on the environment are counterbalanced by positive messages by highlighting that changing the current course of action can limit/avoid the damages. Natural events that occurred in the past are represented as useful starting point for further understanding of the environment and the causes of climatic changes, especially in relation to the release of greenhouse gases, and the potential responses of ecological systems. Climate change represents a risk for both nature and humans. The damages to the environment and the occurrence of extreme weather events produce effects on humans' life, by affecting people's lifestyle, health, but also basic livelihoods. Some benefits are also recognised by emphasising the human capacity to adapt to changing environments. However, risks are listed as well. When climate change is described as affecting basic livelihoods of people, additional threats are associated with it, especially in relation to migration processes, which might cause massive movements of people. This is connected to another sub-topic related to the consequences of climate change on people's life, which is discussed in the context of a wider debate of "global (in)justice" (see Table 29). This theme is manifest in those articles which argue that those countries that are the least responsible for causing the problem, are the most affected. The occurrence of extreme or exceptional weather events becomes a driver for establishing connections with climate change. Scientific evidence and voices are often used to support potential connections. When contrasting results are reported, this group of articles tends to objectively analyse the different scientific positions, however pointing out that the reality of climate change is accepted and demonstrated by the scientific community. In fact, discussing the potential connections between the increasing number of hurricanes and climatic changes, *The Independent* (McCarthy, 2007) reports the contrasting findings emerging from different studies and papers, still confirming the scientific consensus around

climate change. Furthermore, other "ecological victims", already identified by the literature as symbols of climate change (see e.g. Manzo, 2010a; Shanahan, 2007) emerge, such as in the case of polar bear and polar glaciers. However, the use of evidence associated with other natural components is frequent, such as in the case of coral reefs (and marine life in general), plants and trees, desert, and animals (see Table 29 and Appendix 3).

As in the first bloc, a second macro-theme is related to policy-makers, who are often encouraged to take action by paying attention to what science suggests. This tendency is often related to the occurrence of international political summits in which policy-makers are called to take action. Science can also be used to criticise political directions, in particular when international efforts are undermined by the unwillingness of some countries to respect agreements and follow scientific recommendations (especially referring to the USA). Scientists' recommendations are also promoted in relation to energy-related measures to be taken by governments, and climate change impacts are evaluated in economic terms, exploring solutions for both adapting to impacts and reducing the causes of it.

Compared to the first bloc, the need for further research in relation to the unknown aspects is less mentioned. There is no longer a need to debate the connections between human activities and climate change so often. However, the need for further research is still invoked in relation to uncertain consequences, which are under exploration. In this case, the reality of climate change is supported. In fact, sometimes, the disagreement is related to the severity of the impacts, which however, will happen. The need for inter-disciplinary efforts is invoked when energy solutions are discussed (see Table 29 and Appendix 3).

In common with the first bloc, scepticism is linked to economic and political interests, which are in turn connected to economic advantages of certain oil corporations, or countries. Moreover, it is once again suggested that the oil industry economically supports some studies. Scientists' voices are used to highlight that the increasing politicisation of climate science affects public awareness by manipulating scientific facts. The dissemination of inaccurate information about climate change is identified as the cause of disinformation about the reality of climate change and polarisation of the public.

Two articles were found to use science to present sceptical positions about causes and negative consequences of global warming on both natural and human environments. In one case (Lawson, 2007), anthropogenic causes are questioned by using mocking tones, and referring to Durkin's documentary broadcasted by Channel 4 in 2007, which reports some scientific mistakes¹²² around climate change. However, this article is "counter-balanced" by the presence of several other articles published around the same time, which strongly criticise the misleading information by referencing scientific arguments and voices (see Connor, 2007b; Monbiot, 2007; Randerson, 2007). In another case (Pearce, 1998), the discussion of sunspots' influences on global warming is neutrally presented by referring to different interpretations of the role of the sun in influencing the climate, but none of them is "mocked".

¹²² Boykoff (2008) argues that the documentary manipulated data, graphs, and interviews to argue that climate change is not human-induced.

Table 29. Centre-left scientific topics in use between 1998 and 2007

Macro-theme	Sub-theme	Typical use
Scientific consensus	The climate is changing	"Rajendra Pachauri, the IPCC chairman, told Reuters: 'There are a lot of signs and evidence in this report which clearly establish not only the fact that climate change is taking place, but also that it really is human activity that is influencing that change'" (Adam, 2007, p.4).
	Climate change can be tackled	"'I'm not really saying there is no hope', [Lovelock] insists. 'My message is that the lush, comfortable world we are used to is going rapidly and will soon be gone completely. But it doesn't mean the end of everything'" (Connor, 2006a).
	Environmental understanding	"The scientists also found that the Arctic is currently experiencing one of the fastest temperature rises on record, with more sea ice melting each summer than at any time in hundreds and possibly thousands of years" (Connor, 2006b, p.11).
	Climate change as a risk/benefit	"A GOVERNMENT report [by the Expert Group on Climate Change and Health] to be published today warns that climate changes over the next 50 years will cause death and destruction on a major scale in Britain unless preventive action is taken now" (Laurance, 2001, p.2).
	Climate "(in)justice"	"Peru contributes just 0.4% of global carbon emissions but reaps disproportionate consequences because of geography - its deserts, mountains and tropical forests are especially sensitive to change - and its poverty" (Carroll, 2007).
	Signs of climate change	"Ten of the past 14 years have been the hottest recorded, and this is linked by scientists to a rapid rise in levels of greenhouse gas concentrations in the atmosphere" (Vidal, 2004).
Scientists as economic and political advisors	Political Support	"Scientists have urged the government to consider the full impact of global warming when drawing up plans to protect Britain from flooding" (Morris & Jha, 2007).
	Economic/ Energy support	"Britain's plans to build new coal-fired power stations as part of the country's efforts to address its looming energy crisis will completely undermine the Bali agreement on climate change and discredit Gordon Brown's commitments to reduce greenhouse gases, according to one of the world's leading climate scientists" (Connor, 2007c, p.2).
Uncertainty as a driver for further research		"Computer models of the world's climate predict that if changes take place, they will take place in the Arctic earlier and faster than anywhere else on the planet [...]. If global warming really is found to be responsible for the melting of the Arctic, it has two sets of consequences - one direct, the other demonstrative" (Meek, 2000).
Scepticism confutation	Political-economic interests behind uncertainty	"As George Bush and his friends in the Texas oil industry try to turn the clock back on commitments the United States has made on fighting global warming, a new report by America's leading scientists confirms the serious effects of climate change on the world's most

Table 29. Centre-left scientific topics in use between 1998 and 2007

	prosperous and polluting nation" (Brown, 2001b, p.15).
Corporation funding	"Exxon Mobil has also provided funding for maverick scientists who claim there is insufficient evidence of a human factor in climate change" (Brookes & Borger, 2001).
Dissemination of misleading information	"[Lord May of Oxford, the president of the Royal Society] accused the [Daily Mail] of misleading its readers with a misinformed campaign [...]. 'It brings to mind the ill-fated and disreputable campaign by The Sunday Times during the early 1990s to deny that HIV causes Aids [...]', he said" (Connor, 2005).
Advocates vs sceptics	"Climate researchers still do not agree on whether the earth will become warmer during the coming century [...]. We have nothing to fear but the fear mongers themselves" (Avery, 1999).

1.2.1. Centre-right scientific frames between 1998-2007

Some additional themes and sub-themes emerge in the centre-right group (see Table 30) in the second bloc. Disagreement among scientists, as a core feature of climate change debate, is confirmed alongside the "scientific dishonesty" deriving from scientists' need for funding. Mocking tones, in addition to the definition of climate science as a "cult" tends to undermine science credibility. In this bloc, a new theme related to consensus can be identified. However, some peculiarities emerge in relation to the instrumental use of consensus either to support market mechanisms, technological advances, and energy solutions (such as nuclear power), or to emphasise the impossibility of tackling the problem for both scientists and politicians. Consensus is also used to blame society for causing the problem, to emphasise the unwillingness to change western lifestyles in favour of less advantaged societies, and the unwillingness of external/international actors to intervene. However, some articles highlight scientific consensus on both causes and consequences (Table 30).

Climate science credibility tends to be diminished in the centre-right leaning newspapers by emphasising the existence of polarised positions. Climate change still tends to be attributed to natural variations. Mainstream scientists are labelled as "lobby" (Jenkins, 2006), "global warming brigade" (Hanlon, 2006), "renegade bunch of scientists" (Nott, 2005), "opposing scientists" who receive a significant amount of funding for their "loyalty to the greenhouse idea" (Simons, 1998). The prediction of future weather variations is defined as "an art rather a science" (Simons, 1998). Moreover, scientists appear to blame society for being responsible for the current situation even though CO2 emissions are potentially beneficial for combating global warming. As shown in Table 30, the centre-right group supports the idea that the consensus does not regard the majority of the scientific community, because it seems that only "some scientists" have promoted the "global warming theory" (Matthews, 2003). Some differences can be identified in the lexicon used to describe the polarisation between sceptics and supporters, such as e.g. in an article authored by Matthews (2003): those scientists who support the existence of climate change are labelled as "environmentalists", whereas those who "support" the journalist's orientation are labelled as "scientists". This article also references findings published in the "Climate Research" journal by Soon

and Baliunas (2003a). This publication raised concerns about the peer-review process of the journal among the scientific community, with the consequent resignation of three editors (Kinne, 2003). The paper, followed by an extended version (Soon & Baliunas, 2003b) was criticised in relation to methodological errors and inconsistency (Mann et al., 2003)¹²³. Moreover, Greenpeace (2013) found that Soon was funded by ExxonMobil, the American Petroleum Institute and Koch Industries, even though he denied he was influenced by this funding (see Vidal, 2011). Another similar example is an article published by the same newspaper that uses a scientific voice to justify climate change denial (Clover, 2000). In this case, the article references a physicist (Fred Singer) without mentioning that he has been found to have several connections with oil corporations (such as e.g. ExxonMobil) and conservative think tanks (e.g. The Heartland Institute) and receive financial support from them (Dunlap & McCright, 2010). Fred Singer, referenced in this article to support the lack of evidence of climate change, founded the Non-Governmental Panel on Climate Change (NIPCC), which publishes a parallel climate report aimed at criticising the official IPCC report (Dunlap & Jacques, 2013).

Some articles recognise the existence of the problem, but the use of mocking tones (especially around the consequences of climate change) questions the validity of climate science. Mocking tones are also used with regard to some experiments to tackle climate change. The idea that money is invested in minor projects that do not solve the problem, is supported. Climate change science is also described as an "orthodoxy" and "a faith" that cannot be questioned (see Table 30 and Appendix 3). The credibility of science is diminished by casting doubts about its capacity to understand reality, and the inadequate instruments used to explore the phenomenon, which, if real, is likely to be natural. For example, one article (Phillips, 2006) refers to the "hockey-stick" curve used to represent the variations in temperatures of Northern Hemisphere over the past millennium (Mann et al., 1998). The graph was also reported in the 2001 IPCC report and questioned by McIntyre and McKittrick (2003), respectively an economist and a mining consultant, in relation to the methodology used. After examination, the scientific community supported Mann's findings, identifying some errors in the statistics used, which however did not affect the overall picture (Brumfiel, 2006). Another article (Bellamy, 2004) refers to the "Oregon petition" (linked to the ExxonMobil, see McKnight, 2010; Monbiot, 2006), which, as detailed in chapter two, might be considered as an attempt to activate "flak mechanism" or "counter-reaction" aimed at contesting scientific advances. Science credibility is further damaged by controversies among scientists, e.g. about how to measure climate change, and how to reduce greenhouse gases production.

In this bloc, consequences on humans are said to affect faraway places or to mainly affect the natural environment. Benefits from potential climate change are identified in hotter summers that can increase the number of tourists in the UK, and new opportunities for people despite the loss of some species. The account for the negative effects produced by climate change in some areas is balanced by listing the benefits in others. It is suggested that the impacts of climatic changes will be limited to a shift between regions across the world, and it will produce both negative and positive outcomes, and changes in practices. *The Times* gives space to sceptical scientists from fields different from climate science, as e.g. in the case of Philippe Stott (2003; see also Daily Mail, 2002; Matthews, 2003) who often criticises policy intervention in the context of climate change. Stott recalls the topic

¹²³ The authors replied to this criticism in the same journal (Soon & Baliunas, 2003b).

of global justice by highlighting that global warming is diverting from other priorities in the developing world. Moreover, climate science is associated with a religious faith, which demands "unnecessary sacrifices". Another article published by *The Times* (Searjeant, 2004) reinforces the idea that it is impossible to reconcile the mission of tackling poverty in developing countries with that of fighting climate change. Even when climate change is accepted as real and dangerous, it is described as solvable by free-market mechanisms, economic and technological progress or by referring e.g. to the opportunity to develop new "fashion trends" (Winter, 2004). Mocking tones (such as "Oscar fever", see Baker, 2007; "Phew-nited Kingdom" see Winter, 2004) alternate with extremely dramatic tones (such as "impacts of climate change will be devastating", see Winter, 2004).

Consensus among scientists is also recognised by the centre-right leaning news articles. However, some peculiarities can be identified, for example in highlighting consensus within the scientific community and simultaneously referencing the sceptical counterparts. In one article published by *The Times* (L. Smith, 2007), the corpus of the text reports scientific evidence of human influence on climate variations, however the title, "How global warming erupted 55m years ago", might be misleading by showing a direct connection between global warming and natural events. Consensus among scientists is also accompanied by extremely dramatic tones, and pessimistic predictions about human adaptation capacity (in relation to the slowness of the scientific advances). One aspect to be noted is the insistence on the attribution of climate change causes to the society. This means that the causes are not "genuinely" attributed to anthropogenic activities, but "pointing the finger" against people. This might also explain the adoption of societal frameworks which emerged from the CATCPA (drama dimension) and the related dramatization. In fact, even though scientists might be certain about their findings, pessimistic predictions about political responses, make the problem difficult to be tackled. Finally, consensus is recognised when the culprits are external actors, especially the USA.

When scientists are authors of the articles, the consensus emerges, together with genuine scientific uncertainty that drives the need for new research. "Genuine" consensus can also be found in a limited number of articles authored by specific journalists.

Table 30. Centre-right scientific topics in use between 1998 and 2007

Macro-theme	Sub-theme	Typical use
Scepticism	Scientific dishonesty	"Actually, the doom-mongers of climate change are always coming up with contradictions [...]. Lovelock - and the rest of the global warming brigade - ignore the contradictions, the nuances and uncertainties of climate science and always plump for the absolute, we're all going-to-die, scenario" (Hanlon, 2006, p.12).
	Scientific aura of scepticism	"From the outset of the global warming debate in the late 1980s, environmentalists have said that temperatures are rising higher and faster than ever before [...]. Such claims have now been sharply contradicted [...]. A review of more than 240 scientific studies [...] carried out by a team from Harvard University, [...] allow[s] scientists to [confirm] suspicions that today's 'unprecedented' temperatures are simply the result of examining temperature change over too short a period of time" (Matthews, 2003, p.16).

Table 30. Centre-right scientific topics in use between 1998 and 2007

	Climate jokes	"The Intergovernmental Panel on Climate Change, whose work underpins the Kyoto accord, projects various 'scenarios', but the assumptions do not stand up to rigorous scientific analysis, and the extreme projections, the ones that make the best headlines, are well into the world of fantasy" (Collins, 2004, p. 20).
	Conflicts amongst scientists	"[...] since the scientists never agree with one another I now have to make contingency plans both ways" (Nott, 2005, p.31).
Consequences	Far away problem	"Scientists predict that some of the worst effects of global warming on agriculture will be felt in India" (Wade, 2007, p.9).
	Effects on nature	"'Badgers are most vulnerable to food shortages during extended summer droughts, when the ground can become too dry, and winter frosts, when the ground is too cold or hard for earthworms to surface' [Dr Newman said]" (Smith, 2001).
Scientific evaluations	CC as a risk/benefit	"Recent spells of temperate weather and the onset of global warming are slowly providing the perfect conditions for producing rivals to the Chardonnays and Sauvignons of France and beyond" (Lambie, 2005, p.19).
	Evaluations from other fields	"On present policies, the rise of China and India from poverty is incompatible with any attempt to slow, let alone halt, global warming. A choice has to be made to keep poor people poor or to take our chances on the environment" (Searjeant, 2004, p.69).
	Market/techno optimism	"Nearly all studies of the amount of carbon dioxide (CO2) released by different power sources show that atomic power stations rival hydroelectric dams and wind turbines in lifetime emissions per unit of electricity" (Searjeant, 2005, p.46).
Instrumental consensus	Balance	"POWERFUL evidence for global warming has been discovered by scientists funded by the US Government [...]. Dr Hulme said that while the results further confirm the overwhelming scientific consensus that man-made global warming is a proven phenomenon, he would be surprised if it were accepted by critics" (Henderson, 2004, p.4).
	Extremely dramatic tones	"THE WORLD faces dramatic and potentially disastrous climate changes caused by global warming before the end of the century, a report warned yesterday [...]. By the turn of the 22nd century, human suffering could increase dramatically with droughts, famine and floods on an unimaginable scale" (Harding & Martin, 2001, p.6).
	Blaming People	"SCIENTISTS are now overwhelmingly confident that mankind is to blame for the warming of the global climate" (Clover, 2007a, p.16).
	Blaming external actors	"If international agreements to control such gases continue to be delayed, it will be too late to prevent a major impact, Bert Metz, of the Intergovernmental Panel on Climate Change (IPCC), told the international climate summit in Bonn" (Henderson, 2001).

Table 30. Centre-right scientific topics in use between 1998 and 2007

Genuine consensus	"The world's best climate scientists are telling us it is time to do something about it. Carbon dioxide is such an important greenhouse gas because it stays around in the atmosphere for so long [...]. The changes we are seeing now in our climate are the result of emissions dating back many decades" (Hardaker ¹²⁴ , 2007, p.16).
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1.3. Centre-left scientific frames between 2008-2016

The qualitative analysis of the articles belonging to the third bloc of years shows similar patterns to those observed in the first and second blocs (see Table 31). However, additional macro and sub-topics emerge. Under the consensus macro-theme, there is emphasis on investing in adaptation strategies and discussing techno-solutions available. One new macro-theme is related to support climate mobilisation and innovative tools for involving people in understanding climate science. Moreover, new sub-themes emerge under the "sceptical confutation" in relation to the need to "defend" the science from both "climate scandals" and sceptics' strategies to delay action against climate change.

The first topic is related to consensus (Table 31). Climate science is represented as settled, and scientists are sure about both causes and consequences of climate change. However, the severity of the consequences is still under examination. Compared to the previous blocs, the need to act is represented as more urgent because climate change is happening and its symptoms are evident. A need to trust science and climate models for planning a strategy of intervention is emphasised. Weather variations can also be read as symptom of climate change. It is suggested that further research will improve the precision of predictions. In fact, scientists agree about the kind of consequences (which are partially already in action), but they still cannot be certain about the exact severity of further future variations. As with the second bloc, the possibility of tackling climate change, despite difficulties and "dramatic" consequences if action is not taken, emerges. Adaptation strategies are needed to deal with the consequences of climate change. Accordingly, tackling climate change can also produce benefits in economic terms. Technological progress (e.g. carbon capture and storage technology) is discussed as an additional means of limiting human influence on the climate. However, the lack of political commitment makes research advances harder to obtain. Some experiments are examined with suspicion and described as controversial, especially because some of them only tackle the consequences without considering the causes. Neutral tones are also used when referring to opposite positions about climate change, but supporting in specific cases common instances, such as in the case of developing carbon capture and storage technologies. As in the first two blocs, climate change is represented mainly as a threat for both nature and humans (and their lifestyle): climate change will cause natural changes as well as social changes. In these articles both natural and human symbols emerge. Climate change represents a risk, not only for the environment and economy, but also for people's health and their life. Compared to the first two blocs, climate change is more strongly represented as a risk that should be treated as a "moral obligation", because it involves global and social justice-related challenges. As in the second bloc, policy-makers and

¹²⁴ Paul Hardaker was Chief Executive of the Royal Meteorological Society from 2006 to 2012.

economic actors are "envisaged" to follow scientists' suggestions. Science can also support new economic and energy development. In this vein, economic actors, together with policy-makers, should collaborate with scientists to promote innovative strategies. Market-mechanisms are criticised as not appropriate to deal with environmental-related issues, because political intervention is needed to regulate the market.

"Climate mobilisation", aimed at protecting the environment from exploitation and "wrong" investments, is supported. Political weakness and scientific evidence are the basis for the climate movement and protesters to act. Involving and supporting the society in climate understanding/action is emphasised as the key to improving public understanding of the climate, fighting scepticism and empowering people.

The third bloc confirms a tendency to counter-attack contrarian positions (Table 31). The political and economic interests behind inaction become particularly relevant when the articles refer to the Trump presidency. Climate sceptics (and the Trump Presidency) are criticised for stoking controversies that do not exist among the scientific community. This is mainly because they aim to delay interventions to limit climate change. The sceptics' attempt to delay intervention is highlighted in relation to "climate scandals" and often coincides with international summits, such as e.g. the 21st Conference of the Parties of the UNFCCC in Paris. The confutation of sceptical positions especially regards the "Climategate scandal" of November 2009 in relation to the release of more than a thousand emails and documents hacked from the Climate Research Unit - University of East Anglia¹²⁵. Consensus is reinforced by emphasising that both "media scandals" and dissemination of misleading information around climate science are unreasonable attempts to discredit its robustness. Moreover, it is highlighted that the public awareness is undermined by political uncertainty and unfounded scandals, which contribute towards decreasing confidence in science. Instead, politicians are encouraged to follow science indications, by for example promoting the economic advantages deriving from investing in mitigation and renewable energy production systems.

Finally, some sceptical positions about the impacts of climate change emerge when policies are criticised, such as in the case of producing fossil fuel in the developing world. In this case, climate change is not denied, but climate discourses are claimed to be instrumentally used to support political and economic instances. One article also shows balance in describing visions that differ from mainstream science by reporting contrasting positions. Scientists are also mentioned in relation to "controversies" which emerge due to potential "political manoeuvres" for the election of IPCC members in key positions.

Table 31. Centre-left scientific topics in use between 2008-2016

Macro-theme	Sub-theme	Typical use
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¹²⁵ As highlighted by Leiserowitz et al. (2012), the investigation on this scandal produced a number of consequences for the scientists involved, such as e.g. the temporary suspension of Phil Jones as director of the CRU, review of Michael Mann's works, pressure on the Intergovernmental Panel on Climate Change (IPCC) for ignoring contrarian articles in their 4th Assessment Report. Moreover, the identification of some errors in the fourth Assessment Report, inflamed the debate. The House of Commons Science and Technology Committee, the University of East Anglia and the Penn State University in the USA carried on four inquiries. However, none of them discredited climate change evidence, but scientists were recommended to be more transparent (Black, 2011).

Table 31. Centre-left scientific topics in use between 2008-2016

Scientific consensus	The climate is changing: signs of climate change and need to invest in research	"[...] if extreme action is not taken quickly, this century could see an increase of between 50cm and 130cm, according to a report led by the Potsdam Institute for Climate Impact Research" (Bawden, 2016).
	Investing in adaptation can be beneficial	"Carbon dioxide has been pumped underground and turned rapidly into stone, demonstrating a radical new way to tackle climate change [...]. The UN's Intergovernmental Panel on Climate Change has concluded that CCS is hugely important to tackling climate change in the most cost-effective way" (Carrington, 2016).
	Geo-engineering debate	"Geo-engineering has been advocated as a solution to climate chaos [...]. Many of these options, however, attempt to deal with the effects of climate change, not its causes [...]. Each option has strengths and weaknesses" (Caldecott, 2012).
	Climate change as a risk	"America's agricultural economy is set to undergo dramatic changes over the next three decades, as warmer temperatures devastate crops, according to a US government report" (Vidal, 2013b).
	Climate as a moral issue and global "(in)justice"	"Averting the worst consequences of human-induced climate change is a 'great moral issue' on a par with slavery, according to the leading NASA climate scientist Prof Jim Hansen" (Carrell, 2012).
Scientists as economic and political advisors	Political Support	"One of the world's greatest innovators, Elon Musk, says the key to tackling climate change and driving clean energy innovation is a carbon price very similar to the one Australia abolished" (Taylor, 2015).
	Economic/Energy support	"With a wariness about renewables, low fuel prices and little political incentive, the onus is on numerous trials to convince shipping companies of the benefit. 'The sector is risk-adverse so expanding uptake requires a high burden of proof', says Conor Walsh, research associate on shipping at the Tyndall Centre for Climate Change Research [...]. One fast-track solution could be [...] the use of more efficient, low-carbon ships" (Levitt, 2016).
	Critiques to market mechanisms	"So if we were serious we would acknowledge that neoliberal market economics just won't do [...]. We should at last acknowledge that climate change is real, and prepare for it as urgently as our grandparents prepared for the second world war (except that the present threat is bigger)" (Tudge, 2013).
Climate mobilisation/dissemination	"Dozens of protesters gathered in front of the presidential palace in Quito yesterday to	

Table 31. Centre-left scientific topics in use between 2008-2016

		vent their frustration at the failure of the scheme [...]. Preserving the trees now under threat from oil production would have helped to curb climate change, since forests are a major carbon sink, absorbing the carbon dioxide that most scientists agree is a key contributor to global warming" (Bawden, 2013).
Scepticism confutation	Political-economic interests behind uncertainty	"Trump will be forced to rely on his advisors, but he's surrounded himself with Big Oil cronies, and his chief of staff has said that Trump's default position on climate science is that 'most of it is a bunch of bunk'" (Nuccitelli, 2016b).
	Delay in action	"The slowdown in temperatures has been used by climate sceptics [...] to undermine the science of climate change, claiming that global warming has stopped despite a continuing rise in industrial emissions of greenhouse gases - set to reach a record 36 billion tons in 2013" (Connor, 2013).
	Dissemination of misleading information/Climate scandals	"The recent furore around 'Climategate' has [...] led to increasing calls for the issue to be pushed down the priority list [...]. What people have lost sight of is that serious climate-change scientists have always argued that the climate is changing gradually, that temperatures are rising and that one factor - and probably the main one - is the increase in greenhouse gases in the atmosphere" (Asthana, 2010, p.4).
Advocates vs sceptics		"CSIRO chief Larry Marshall said the reaction to his planned cuts to climate science in the organisation is more like religion than science, and compared climate science with the oil lobby in the 1970s" (Slezak, 2016a).

1.3.1. Centre-right scientific frames between 2008-2016

Compared to the first two blocs, the third bloc still "condemns" climate scientists for their "dishonesty", but scientists are more often accused of manipulating data to support their cause. Mocking tones still prevail in sceptical articles and climate science is described as a "cult" that cannot be questioned. However, some additional themes and sub-themes emerge (see Table 32). In relation to the macro-theme "scepticism", greater attention is given to the politicisation of climate scientists and how public money is spent to finance their cause. A new sub-topic is connected to an "apparent neutrality" used to report both sceptical and advocate positions. In this case, some elements, such as e.g. the title, highlights, and the reference to natural factors, tend to support the idea that climate change is either natural or "constructed". The topic related to the consequences of climate change on the environment includes an additional sub-theme related to the natural mechanisms that respond to

changes. A new topic relates to the "climategate scandal" and its associated different interpretations. Finally, under the "consensus" macro-area, there is still a tendency to support agreement amongst scientists when climate change affects faraway places and nature. However, sometimes extremely dramatic tones, uncertainty around consequences and actions to be taken, in addition to conflicts among decision-makers, and between these and scientists, send a message of impossibility of acting.

The right-leaning articles appear extremely critical against climate science, assuming that it is an "industry" (Delingpole, 2013) built up to support economic interests and increase taxes. Mocking tones diminish the authority of scientists calling them "brigade", "orthodox", "propagandists", "tyranny", "climate change zealots", "warmists", and "fraudulent scientists" (see Table 32 and Appendix 3). It is claimed that this "dishonesty" is also promoted by the media, such as *The Guardian* (Delingpole, 2013) and *The BBC* (Booker, 2009; Delingpole, 2011b).

The third bloc confirms a scientific "aura" of scepticism by involving scientists who are not climate scholars. Doubts are cast around how public money is spent to finance climate change project/research, also assuming that climate scientists promote the idea of climate change to receive funding and support new taxes (see Table 32). Climate science is said to be a religious cult that cannot be contested. Moreover, attacks to scientists, e.g. James Lovelock¹²⁶, are reinforced in this bloc by highlighting that climate science is completely uncertain. Disagreement among scientists is highlighted, and the politicisation of climate science is emphasised. Contrasting positions are also balanced, but in some cases the "apparent neutral" tones tend to support sceptical positions. For example, a piece of news published by the *Daily Mail* (Webb & Smith, 2013) reports contrasting positions. However, both the highlights and the opening paragraph state that climate change consequences are overestimated, and the title of the article follows the same direction ("Global warming has STALLED since 1998: Met Office admits Earth's temperature is rising slower than first thought"). Neutral tones are also used when referring to climate research by not emphasising any specific position about the causes of climate change, even though the reference to ancient period and natural events suggests that climate change is part of natural processes (see e.g. Pettit, 2016).

As in the previous bloc, there is a recognition of potential negative consequences of climate change (still under examination), and even though they can be "extremely dramatic", they are mainly located either in the future or in faraway places. Nature will be affected by climate change, however, in some cases "natural remedies" are described as spontaneously protecting species and their environment.

This bloc reinforces the idea of a positive impact of climate change that, despite some negative consequences (related to other places different from the UK), might produce benefits. Techno and market optimism is reinforced.

The "climategate scandal" is treated in different ways (using critical, neutral and supportive tones) depending on the authors of the article. In some cases, the reference to the "scandal" is made in relation to other topics, always related to sceptical positions, such as for example discussing the release of new documentaries, and referring to a letter sent to *The Times* (Monaghan, 2011) in which the newspaper is asked to stop its attack to climate science in 2016. In this article, there is still a reference to the "climategate". It is stated that the Research Unit was "cleaned", but by one of those

¹²⁶ James Lovelock is an environmental scientist who developed the hypothesis that the earth is an interacting and self-regulatory system (Gaia hypothesis, see Lovelock, 1975).

who signed the letter. In another case, neutral tones are used to describe the "scandal" (Gray, 2011b). Finally, in one case the accusations against the scientists are "mocked" and scientists' credibility is defended (Douglas, 2009).

In some cases, consensus is highlighted, but the simultaneous use of a mixture of tones in the same article, which goes from extremely dramatic to reductive (e.g. by referring to controversies between scientists), generates confusion. In some other cases, consensus might be relative to specific causes, but uncertainty is about consequences, and actions. Some technological solutions are also taken into account (e.g. geo-engineering experiments) together with their drawbacks. Moreover, even when consensus is recognised within the scientific community, the conflicts among the political actors, and between scientists and policy-makers, communicate a message that it is difficult to act. Consensus also emerges when "external actors" are held responsible, principally Australia in this bloc. Some articles tend to highlight consensus among scientists, especially if articles report direct interviews, and some others show genuine consensus around the risks.

Table 32. Centre-right scientific topics in use between 2008-2016

Macro-theme	Sub-theme	Typical use
Scepticism	Scientific dishonesty	"The Mail on Sunday today presents irrefutable evidence that official predictions of global climate warming have been catastrophically flawed [...]. Dr David Whitehouse, author of a new report on the pause published on Friday by Lord Lawson's Global Warming Policy Foundation ¹²⁷ , said: '[...] Global warming should no longer be the main determinant of anyone's economic or energy policy'" (Rose, 2013).
	Scientific aura of scepticism	"We are always being told that climate change sceptics are on the wrong side of science but it is remarkable how many of the most prominent voices in the climate change lobby are themselves not scientists" (Clark, 2013).
	Economic interests behind climate science	"In total 33.5 billion of public money has been paid out or allocated to projects addressing climate change abroad since 2007-08 [...]. Dr Benny Peiser, director of the Global Warming Policy Foundation [...], also questioned the effectiveness of the money going abroad to tackle climate change" (Gray, 2012).
	Climate science as a religious cult	"The US-based Norwegian physicist, chief technology officer at Applied Biophysics Inc [...], added: 'Global warming has become the new religion'" (Sherwell, 2011).
	Conflicts amongst scientists	"Campaigning to stop climate change is 'Left-wing', disputing its existence or extent is 'Right-

¹²⁷ As highlighted by Dunlap and Jacques (2013), the Global Warming Policy Foundation is a think tank based in the UK and registered as an educational charity in 2009 by Lord Lawson of Blaby (see also chapter seven). The Foundation questions climate science, especially in relation to the costs and implications of actions. In 2013 Bob Ward (see <http://blogs.lse.ac.uk/politicsandpolicy/does-the-global-warming-policy-foundation-have-charitable-objectives/>), policy and communications director at the Grantham Research Institute, registered a formal complaint with the Charity Commission in relation to the political activity carried out by the Foundation, which contrasts its charity purposes.

Table 32. Centre-right scientific topics in use between 2008-2016

		wing' [...]. The answers to questions such as 'Is the planet warming up?' and 'If so, why?' should be value-neutral [...]. Instead, we have a level of hysteria that's enough to make anyone neutral feel green around the gills" (Radford, 2009).
	Apparent neutrality	"Chip Knappenberger of the Cato Institute, who doesn't doubt that human-caused climate change is happening but does not agree with mainstream scientists who say the problem is enormous, said this shows 'how messy the procedures are in putting the satellite data together'" (Associated Press, 2016).
Consequences	Far away problem	"The map shows that much of North Africa, India and equatorial parts of South America will face summer temperatures in July that regularly exceed 45°C" (Gray, 2015b).
	Effects on nature and protective natural mechanisms	"Earth is protecting humanity from the full effects of global warming by soaking up increasing amounts of carbon, research has shown [...]" (Daily Mail, 2012a).
Scientific evaluations	CC as a risk/benefit	"As climate change warms Greenland, and more ice melts and makes its way into the sea, the ice sheet is potentially becoming a more important source of nutrients" (Austin, 2016).
	Market/techno optimism	"Experts could be able to 'suck' carbon dioxide out of the air by using an experimental system called BECCS -Bio-energy with Carbon Capture and Storage" (Spencer, 2014).
Climategate	Pro-climategate	"The [...] IPCC has an image problem [...]. Its credibility has been severely damaged by what came to be known as 'climategate', in which leading scientists appeared to be manipulating results to hide declines in temperature measurements" (The Times, 2013, p.30).
	Neutral	"Extracts circulating on the blogosphere include references to 'deleting emails', hiding 'dirty laundry' and not being 'too optimistic' about climate change. However Phil Jones, the head of the Climatic Research Unit (CRU) and the scientist at the centre of the row, said none of the emails appeared to cast doubt on the science" (Gray, 2011).
	Against-climategate	"Harry_read_me.txt has been presented as the proof that the climate change consensus was built on sand. Quite the contrary" (Douglas, 2009).
Instrumental consensus	Extremely dramatic tones combined with simplistic tones	"Global warming is already here, man-made and dangerous [...]. The [IPCC] report [...] also claims it is increasingly likely that the heating trend could be irreversible [...]. John Christy of the University of Alabama, Huntsville, is in the tiny minority of scientists who are sceptical of mainstream science's claim that global warming is a major problem" (Zolfagharifard, 2014b).

Table 32. Centre-right scientific topics in use between 2008-2016

Uncertainty of consequences and actions to be taken	"However, some levels still remain highly controversial [...]. Questions also exist over how strongly, if at all, climate change is affected by variations in radiation given off by the Sun and by aerosols which are released by the burning of fossil fuels and have a cooling effect by deflecting solar radiation away from Earth" (Collins, 2013).
Conflictual character	"The so-called 'carbon bubble' theory argues that shares in the oil industry could plummet due to the need to limit global warming. However, many experts are divided over the most effective course of action to take" (Critchlow, 2015).
Blaming external actors	"Australia has been slammed for its lack of action on climate change by a new report that ranks it the worst performer out of all the industrialised countries" (Radulova, 2014).
Genuine consensus	"Here, University College Cork climate change expert DR JOHN WENGER tells us why it's so hot and what it means for us [...]. THE world is getting hotter because [...] carbon dioxide is produced from burning fossil fuels (petrol, diesel, coal) and traps heat in the atmosphere [...]" (Wenger, 2016, p.8).

1.4. Scientific frames between 1988-2016: some considerations

To provide a preliminary answer to the second research question of this work, the adoption of a moral panic perspective in analysing the use of scientific voices/frames helps identify specific polarised traits that characterise newspapers in relation to their political orientation. These traits are kept constant throughout the period by maintaining certain directions and suggesting certain interpretations of the phenomenon (Iyengar & Simon, 1993), which for the centre-left group tend to support the reality of climate change and its consequences, and for the centre-right tend to question its reality. However, within these macro-areas it is possible to identify an evolution of both narratives.

In line with those studies that highlighted the tendency of left wing newspapers to report scientific consensus on climate change in the UK (see e.g. Carvalho's, 2005, 2007), the left-leaning group adopts scientists as claim-makers to show an increasing consensus around both causes and consequences over the three blocs. Even though the uncertainty issue is debated by these articles, the space given to contrarian voices is limited. Those articles that report uncertainty tend to support the need for further investing in research to unmask the unknown aspects (especially in the first two blocs). In the first bloc, the uncertainty focuses on several aspects, especially in relation to the consequences, but it tends to be considered as a driver for improving knowledge around the unknown aspects. However, in this bloc consensus is generally accepted regarding the anthropogenic causes of the phenomenon. Political choices are often criticised for not following scientific evidence, and investments in renewable energy are supported. By contrast, nuclear power is often criticised for not solving the problem and adding environmental degradation. Moreover, sceptical positions are frequently questioned by referring to scientific evidence, and assuming that economic/political

interests lie behind the denial of the problem. In fact, some corporations are cited as funders of *ad hoc* research institutes (such as e.g. the Global Climate Coalition, the Frontiers of Freedom Institute and the George C. Marshall Institute) aimed at "diminishing" climate science credibility. However, few articles use scientific figures either to balance the debate (by providing the points of view of both sceptics and advocates), or to question the consensus among scientists.

In this group, the tones used to describe the consequences and risk deriving from climate change tend to be dramatic, and even when potential benefits are identified, the drawbacks are however highlighted. Starting from the second bloc, positive framing characterises those articles that deal with action and potential solutions (especially in the third bloc). There is a shift from trying to affirm the consensus among scientists in the first bloc, towards considering the actions needed (implicitly assuming that climate science is settled). Responses are taken into account in a more systematic way and the need for further research shifts from exploring the consequences to planning intervention. However, there is a tendency (especially evident in the third bloc in relation to the climategate scandal) to assume "defensive positions" to "protect" the integrity of the science against sceptics' attacks. The "morality" of climate change emerges, especially starting from the second bloc, in relation to the risks connected to it, the "(in)justice" and inequalities between developed and developing countries (but also vulnerable people), climate mobilisation (conceptualised as a "moral imperative"), and need to act to safeguard the environment and living being's existence. Climate change is the main folk devil that threatens the "societal order", but also those who deny its existence are responsible for the situation because they are motivated by economic/political interests.

In the case of the centre-right group, the hypothesis set out in the introduction of this work is partially confirmed. Mainstream scientists are frequently targeted as folk devils rather than primary definers of the problem. The centre-right group tends to adopt a scientific frame to support the denial or partial denial of climate change-related issues. In fact, a minority of contrarian scientists (often belonging to fields different from climate studies), "non-scientists" (but surrounded by a scientific aura), and scientific frames (e.g. reference to data and adoption of a "specialised language") are used to emphasise conflicts and a lack of consensus around different aspects of the phenomenon. This is consistent with the literature on how denial strategies use scientific voices that lack of expertise in climate science (see e.g. Dunlap & McCright, 2010; Mulvey & Shulman, 2015). In fact, as Moser (2010) argues, the "carbon-heavy status quo" is defended by the lobbies by creating *ad hoc* think tanks that channel their messages (using "unqualified scientists") through the mass media. This parallelism suggests ties between these actors and journalists/newspapers. However, the qualitative analysis of the texts more clearly highlights an evolution from questioning the climate change as a whole, with specific focus on the causes (especially in the first bloc) towards questioning the consequences that preclude the design of specific strategies of action (starting from the second bloc). It also highlights an evolution of strategies adopted to dispute climate science. In fact, starting from the second bloc, it seems that the level of consensus increases among scientists. However, the styles and the tones used to describe climate change-related issues show that, especially in the third bloc, there are several and sometimes opposite ways to instrumentalise the consensus. In fact, the dramatization increases (by emphasising the impossibility of solving the problem that is out of humans' control), but at the same time the uncertainty about the reality and the possibility of "calculating" the severity of these "extremely damaging" consequences is questioned. Moreover,

consequences can also be beneficial by producing positive outcomes at the local level (e.g. warmer seasons, tourist activity and production of wine); climate change is associated with the damage to natural environment, but also to people who live in "faraway" places (especially in the developing world) and thus are "invisible" (see also Ungar, 1995, 2001 about the "invisibility" and "incalculability" of climate change); the consensus among scientists cannot convince the decision-makers, and those responsible are mainly external actors (promoting an "us versus them" logic, see Olausson, 2010 for a similar result in Swedish newspapers). This also suggests that the threat is amplified when specific deviants are allowed to identify a community ("us") against a common "enemy/folk devil" ("them") (Maneri, 2013).

Confirming the results obtained by the quantitative analysis, both mocking and dramatic tones increased over time in the centre-right group. The adoption of a "flood myth" narrative (Von Burg, 2012) combined with extremely mocking and critical tones against science and scientists contribute towards creating a "confusing image" of climate change, which is further reinforced by a minority of articles that genuinely support climate science findings. In this sense, climate change appears to be an "a-moral" issue (Goode & Ben-Yehuda, 2009) interpreted either as a "vindication" of the nature out of humans' control, or as too "uncertain" risk that might also produce positive changes. Scientists and climate advocates are frequently represented as the threat (folk devils) to the "moral order", given their dishonesty, and tendency to hold societies and people responsible for a "dubious" climate change. These results are in line with the literature which shows the aims behind sceptics' opposition in terms of casting doubts around the need for economic and policy intervention (Dunlap & Jacques, 2013). As highlighted in chapter two this is consistent with Brisman (2012, 2013) and Brisman and South's (2015) interpretation of climate scientists as "folk devils", and of the media as "accomplices" in accommodating not only climate change scepticism, but also individual and collective inaction. Accordingly, the literature highlights how science-driven progress might be challenging for governments and economies heavily dependent upon fossil fuel resources (Van Rensburg & Head, 2017). This is confirmed in British newspaper reporting among the right-leaning group in which, as shown by the analysis, corporations' interests and the "status-quo" are explicitly and implicitly defended, especially when the "uncertainty" is instrumentally used to justify inaction on climate change. In this sense, the moral panic seems to "work in reverse" (Brisman, 2012). This means that sceptics tend to highlight a lack of scientific consensus around climate change, firstly in terms of not reaching an adequate level of knowledge around its existence, then in terms of consequences (Moser, 2010). Even when the characteristics of moral panic in terms of "increasing the size, the seriousness, the negative consequences of a phenomenon, reporting 'false' stories, focusing media attention on a specific phenomenon" (Cohen, 1972) are present in these narratives, they seem to support a non-intervention strategy because of the inability to cope with this "uncontrollable" phenomenon.

The moral panic frame helps show more differences than similarities between newspapers in relation to their political orientation. It emerges that sometimes the newspapers belonging to the two groups use the same claim-makers and sources of information but in different contexts and with different aims. For example, referencing the IPCC as an "authoritative voice", *The Independent* describes a study published by the George C. Marshall Institute as "not credible" and aimed at delaying actions (Nicholson-Lord & Connor, 1990). By contrast, *The Times* puts positive emphasis on the hostility provided by the Institute, and using "mocking tones" underlines the disagreement and

contrasting positions around climate change (North, 1990). Differences can also be found with regard to James Lovelock's prediction that "the Earth has passed the point of no return for global warming" (McCarthy, 2006). In the case of centre-left articles, Lovelock is mentioned as an authoritative voice (McCarthy, 2006). By contrast, Lovelock's authority is often questioned by the centre-right by connecting climate change to religious beliefs and fatalism (Hanlon, 2006; Jenkins, 2006). In another case, referencing John Houghton, Director-General of the Meteorological Office, the centre-left-leaning newspapers report his voice to confirm certainty around climate change (and potential uncertainty in political terms), for example by referring to "further evidence of global warming" (Brown, 1990a), and discussing measures to reduce carbon emissions (Brown, 1990c; Brown & Williams, 1990; Timmins, 1990). *The Times* uses this claim-maker to support consensus, but as the title of the article highlights, "Scientists agree for first time on rate of global warming" (McCarthy, 1990), and despite the uncertainties that characterised climate science for long time, scientists seem to be only starting to agree.

Another difference relates to the representation of scientific authority and scientific debate. In the centre-right case, mainstream scientists are "accused" of being motivated by interests different from science, and for these reasons, some academic journals reject articles that do not conform to the mainstream science. For example, an article (Carter, 2014) refers to the rejection by the *Environmental Research Letters* journal of an article submitted by Bengtsson et al. in February 2014 and "accuses" (by using a scientist as claim-maker) climate experts of playing the role of activists rather than scientists¹²⁸. Moreover, in one article published by the *Daily Mail* a personal attack on a scientist is not directly related to her work. In fact, it is claimed that the scientist was stopped by the police because of her abuse of alcohol (Robinson, 2015). This article raises questions about the message that it aims to send to the readers. Would this fact become news, if the person was not a climate scientist? Adopting a moral panic perspective, the attribution of negative behaviours to scientists, who deviate from socially acceptable norms, suggests an attempt of stereotyping individuals to construct a "folk devil" aura around them (Cohen, 1972).

In the centre-left case, there is a tendency to reference studies that demonstrate some "false" understanding of climate causes. However, it appears that these articles assume a "defensive" position (especially in the third bloc) against the "accusations" from their sceptical counterparts (Abraham, 2014). A defensive position can be found in an article published by *The Independent* in the context of a controversy related to the mistakes published by the IPCC Working Group II in the Fourth Assessment Report, due to a wrong reference and calculation errors of Himalayan glaciers' melting (Brisman, 2012). Different interpretations of the "issue" are given by the two groups. The centre-left recognises the errors, but highlights the severity of the consequences of climate change and reaffirms the authority of climate science (Connor, 2010). By contrast, the centre-right discredits mainstream climate science and attributes more authority to "independent scientists" (Delingpole, 2011a, 2012). Moreover, starting from the second bloc, the "hockey-stick curve dispute" (Mann et al., 1998) is used by the centre-right to demonstrate the existence of contrasting positions and highlight the importance of the role played by sceptics in unmasking the manipulation of data carried out by main-stream scientists (Delingpole, 2009; Delingpole, 2011a). By contrast, the centre-left

¹²⁸ The Journal editors replied to this objection by stating that the article was rejected after being peer reviewed and that the Journal rejects about 65-70% of the papers submitted to it (Harvey, 2014).

emphasises Mann's authority (Johnston, 2016d).

The fact that a genuine scientific debate is reported by the media as a controversy in which scientists reciprocally accuse each other of "dishonesty", contributes towards creating the impression that climate science is not settled and some other interests are hidden behind climate change beyond the need for more accurate scientific knowledge. The emerging difference here is that the centre-right group tends to assertively claim that mainstream scientists "are wrong" (e.g. accusing scientists of "alteration of a peer-reviewed result", see Delingpole, 2011a), whereas the centre-left group seems to assume a "defensive position" trying to respond to the "accusations" (e.g. using expressions as "It would be easy to condemn the IPCC for these lapses", see Connor, 2010).

Some differences can be found between the two groups when describing consensus among scientists. In fact, the centre-left tends to emphasise that scientists are a collective voice by using expressions such as "most scientists" (King, 2005), "the evidence is mounting all round" (The Independent, 2006a). By contrast, when scepticism prevails (mainly in centre-right articles), expressions such as "some researchers" (Gray, 2007), "someone" (Clover, 2007b), "some scientists" (Matthews, 2003) can be frequently found. Both groups highlight an "overwhelming consensus", but in different ways and with diverse aims. For example, in attributing the causes of climate change to anthropogenic activities, the centre-left group generically identifies the culprit in "human activities" (see e.g. The Independent, 2006a). By contrast, the centre-right tends to highlight that scientists "condemn" the society and ask people to solve the problem by using expressions such as "it will take changes in the very ways society behaves" (Clover, 2007b), and "scientists are now overwhelmingly confident that mankind is to blame for the warming of the global climate observed" (Clover, 2007a). It appears that politicians and scientists accuse people of causing climate change, and climate change requires people to make sacrifices in terms of their lifestyles (Daily Mail, 2002; Matthews, 2000). Moreover, supporters of the "climate change theory" are labelled as "eco-doomsters", "poor scientists" who overlook the evidence, and climate science as a "global warming industry", which is "wrong" in predicting "catastrophe" (Phillips, 2006, p.19).

In contrast to what is argued by the centre-left news articles, the topic of global "(in)justice" is mentioned by the centre-right group to question the priority of intervening on climate change, since it will not produce any significant change. For example, *The Daily Telegraph* gives space to a sceptical political scientist and statistician, Bjørn Lomborg (2005), who is author of "The Skeptical Environmentalist" (2001), which has been criticised by other scholars for being misleading (see e.g. Cole, 2003; Pielke, 2004; van den Bergh, 2010) and mainly based on secondary sources (Oreskes & Conway, 2008). The author supports the idea that environmental regulation cannot tackle climate change (if real), and that free market mechanisms and technology will provide solutions (Oreskes & Conway, 2008).

The two groups reflect on the role of journalists in reporting scientific facts. *The Guardian* identifies specific journalists such as Christopher Booker and Melanie Phillips (respectively prolific writers about climate change for *The Telegraph*, and for *The Times* and *Daily Mail*), together with other "deniers" of climate change, as folk devils characterised by specific traits (e.g. "almost all men, generally in their sixties or above - who are not paid for their stance, but who have achieved a little post-retirement celebrity", see Monbiot, 2009).

The centre-right describes Professor Philip Stott, who is member of The Global Warming Policy

Foundation Academic Advisory Council, a focal academic reference for sceptics, and author of articles published by centre-right leaning newspapers, as a "victim". Moreover, *The Telegraph* mentions journalists who write for centre-right newspapers as victims of marginalisation for their opinion, therefore identifying mainstream scientists as folk devils (Delingpole, 2010a).

Finally, it should be noted that differences might be acknowledged in relation to the journalists who authored the articles (see also Brüggemann & Engesser, 2017; Hiles & Hinnant, 2014). This supports what the second chapter of this thesis has highlighted regarding the multiplicity of factors (such as e.g. journalists' perspectives, main-stream frames, journalists' reciprocal influence) that can affect the framing process (Hulme, 2009; Lorenzoni & Hulme, 2009; Neuman et al., 1992; Nisbet, 2009; Scheufele, 1999). For example, in the case of the centre-left group, Dominic Lawson¹²⁹ tends to criticise climate science and policy choices on climate change (see e.g. Lawson, 2006, 2007, 2008). This suggests that the framing process results from a combination of journalists' interpretation of science (science frame) and political economic context in which the issue is contextualised (political-economic frame), and their expectations in terms of influencing public understanding (audience frame). Considering these individual interpretations in the context of the identified macro-tendencies, it suggests that news workers "interiorise" a routine in their work by combining and negotiating editorial lines (external pressure) and their own perspectives (internal forces) (Tuchman, 1973, 1978). However, it is not possible to speculate on newsroom mechanisms and dynamics. This opens new questions and the possibility of further investigating the degree of journalists' intentionality to generate moral panics in relation to editorial pressures, their personal opinions, and knowledge about climate change.

To conclude, the analysis supports the second hypothesis of this work that moral panics help understand and explain the polarisation in the media debate on climate change. Two narratives present opposite characteristics that can be associated with moral panic in relation to the partisan nature of climate change. This is particularly important, considering that these polarised narratives might influence or reinforce the opinions of newspapers' readers, whose support is fundamental for policy-making. However, looking at the overall picture resulting from these two representations, the confusing image that characterises the media representation of climate change, especially in relation to the use of mainstream scientists either as claim-makers (mainly centre-left leaning newspapers) or folk devils (mainly centre-right newspapers), supports the sceptical crusade. In fact, the consequent polarisation and opposing representations tend to generate confusion, which in turn favours the "status-quo" instance (DiFrancesco & Young, 2011; Moser, 2010; Takahashi, 2011). This confusion is further increased by the simultaneous presence of contrasting positions in the same group of newspapers (sceptical articles in the left-leaning group and advocate articles in the right-leaning one). In this sense, it supports the idea of an "elite-engineered model" (Goode & Ben-Yehuda, 2009) that reinforces elite groups' interests (in this case represented by all those "powerful actors" which gain advantages from perpetuating damage on the environment). In contrast to what Ungar (1992, 1995) argues about the impossibility of finding "culprits" in the climate change context, specific folk devils (even characterised by stereotyped traits) are identified by each group. However, if both groups are considered together, a confusing image results even in this sense. This is because those who are folk

¹²⁹ Dominic Lawson is son of Nigel Lawson, a British Conservative politician and journalist who founded The Global Warming Policy Foundation (see chapter seven).

heroes for one group become folk devils for their counterpart. To explore further the moral panic traits of these two groups, the following analysis will focus on the use of dramatization.

2. Introduction to the use of dramatization frames between 1988-2016

Some tendencies to dramatize climate narratives emerged from the analysis of the scientific frames. However, this topic was further investigated by analysing the words with potential negative connotations, thus likely to be related to drama (see Appendix 2). 43 words were found to be related to dramatization between 1988 and 1997, 57 between 1998 and 2007, and 42 between 2008 and 2016 (see Appendix 2). All these words were analysed in the context used¹³⁰ by reading the entire articles. They were used as guidelines to identify those topics related to "dramatization". This contributes towards answering the second research question, especially in relation to the identification of differences between newspapers in terms of "how" they might activate moral panics. The following sections report the results relative to the use of dramatization by the two groups over the three blocs. The final section will provide some considerations in relation to the connections with moral panics.

2.1. Centre-left dramatization frames between 1988-1997

The qualitative analysis of dramatization frames between 1988 and 1997 shows the emergence of nine different contexts in which dramatic tones were used (see Table 33). First of all, some articles dramatize (ranging from dramatic to "extremely dramatic")¹³¹ the headings and sub-titles by using expressions such as "inexorably altering the climate" (Redford, 1989b), "a scale not seen since ice ages" (North & Schoon, 1989), "climatic disaster" (Leggett, 1989), "horrors" (Myers, 1992), "the consequences [...] are catastrophic" (Brown, 1996b) (see Table 33 and Appendix 4 for additional examples). Dramatization also characterises the corpora of the articles that describe climate change as a global problem, which will affect everyone and every nation because of e.g. the "catastrophic rise" in sea levels (Schoon, 1989b; Kelly, 1989) and temperature (Nicholson-Lord & Connor, 1990), the lack of adaptation strategies of "agricultural nations" (Nicholson-Lord, 1997; Radford, 1989), the disappearance of entire countries (Brown, 1995a), and "destruction" of people's way of life (Brown, 1995d). Moreover, a third theme connected to the use of dramatization relates to the potential disruptive consequences deriving from inaction. However, in this case, there is still a "hope" either to stabilise or to "contain" the potential "irreversible and disastrous climatic changes" (Donovan & Travis, 1989) before it is "too late" (Wilkie, 1990). By contrast, "extremely dramatic" tones are used to criticise political choices, suggesting that so far "too little" has occurred to limit "catastrophic rise" of global temperatures (Nicholson-Lord, 1995), and political intervention is "still far" from what is

¹³⁰ More than one word can appear in the same text, and some words (e.g. "increase", "damage", "harmful") can be used without particular emphasis. E.g. in the following example: "cutting fossil fuel consumption without damaging the economy" (Schoon, 1989a), the keyword "damage" does not "dramatize" the problem. After exploring all the words in the context used, only those cases connected to "negative" impacts/meaning were retained.

¹³¹ In chapter four the category "dramatic" is defined as "representation of consequences of climate change as negative, but not as beyond humans' control"; whereas the category "extremely dramatic/alarmist" as "representation of consequences of global warming as catastrophic, irreversible and beyond humans' control" (see also Dirix & Gelders, 2010a for a similar definition).

necessary to avoid "devastating" consequences (Brown, 1997).

Some events and ecological symptoms are identified as evidence of existing changes by emphasising the need to "pay attention" to what "wildlife" is "telling humans about" "potentially disastrous" alteration of the earth's climate" (Schoon, 1997). As in the previous case, there is still "time" to avoid the "catastrophe" if these warnings are heeded. Dramatization is also used to suggest that even though there is uncertainty about "when and how" the consequences will be averted (Schoon, 1990a; Vidal, 1990), they will be "harmful" (Schoon, 1994). This is the reason why action is confirmed to be urgent (Brown, 1990b). Dramatic or extremely dramatic tones are associated with the description of climate change consequences on people (especially affecting their health and threatening their life) and society (disappearance of places and disruption of lifestyle). In a similar direction, vulnerable categories, such as e.g. poorer people (see e.g. North & Schoon, 1989; Schoon, 1992) and disadvantaged societies (developing countries) become symbols of "climate injustice", by attributing to them the worst negative consequences of climate change, even though they are the least responsible. In some cases, the idea is advanced that it is too late to contain the damage, in some others action is invoked urgently. A similar pattern pertains to the "ecological drama" deriving from climate change. Dramatic tones are also used to describe potential or certain consequences in economic terms, especially in relation to the costs of adaptation and insurance costs to repair the damages.

Table 33. Centre-left Dramatization in use between 1988-1997

Theme	Type of Dramatization	Typical use
Headings and subtitles	Dramatic	"Millions 'could go hungry due to global warming'" (Schoon, 1992, p.4).
	Extremely dramatic	"Climate pledge 'too little too late'" (Brown & Williams, 1990).
Global drama	Dramatic	"[...] the consensus of the 2,500 world scientists who had concluded that man-made greenhouse gases were contributing to a dangerous ecological situation that threatened to impact on everyone" (Brown & Vidal, 1997, p.4).
	Extremely dramatic	"NO MATTER where you live, there's no escaping the recent changes in global climate. The effects of catastrophic hurricanes and floods across the world are creeping into our everyday lives" (Simons, 1995, p.9).
Drama of inaction	Dramatic	"20 per cent reduction target by 2020 is vital to avert the worst of global warming" (Brown, 1995b, p.4).
	Extremely dramatic	"It is an energy plan [the Chinese nuclear programme] which spells death-by-climate for millions and disaster for all" (Leggett, 1989).
Signs of drama	Dramatic	"Christmas Island provides a warning of the sudden and devastating changes" (Parry, 1997, p.14).

Table 33. Centre-left Dramatization in use between 1988-1997

Uncertainty	Dramatic	"The size and regional variations of the change are still uncertain [...], but there will be changes and more rapid than the Earth has seen over the last 10,000 years. It is a problem that must be addressed urgently" (Brown, 1990b).
Health, people, society	Dramatic	"Rain and windstorms will become more frequent in Britain and do more damage than at present. A rise in the sea level of up to one foot (35cm) on the east coast will threaten to low-lying areas" (Brown, 1996a, p.1).
	Extremely dramatic	"The consequences for us and our children over the next 10, 20, 50 years could be catastrophic and will certainly be far-reaching [...]. The risks of widespread, climate- caused death, disease and famine are ever higher" (Schoon, 1996, p.12).
Climate "(in)justice"	Dramatic	"The science suggests they [developing countries] will be the first victims of climate change. Kyoto is seen by many as the last chance to advance the world environment agenda" (Brown, 1997, p.15).
	Extremely dramatic	"[...] the 32 members of the Alliance of Small Island States (Aosis) [...] thought the mandate was not enough [...]. The lumbering negotiation process would yield too little too late to stop the worst effects of climate change" (Brown, 1995c, p.5).
Ecological drama	Dramatic	"One international study [...] concluded that a rise of 2C above the pre-industrial level might overstep a threshold beyond which 'risks of grave danger to ecosystems are expected to increase rapidly'" (Leggett, 1992, p16).
	Extremely dramatic	"Climate change also spells disaster for plant life [...]. Climate change threatens not just the mountains but all eco-systems" (Brown, 1996b, p. 30).
Economic/energy/techno drama	Dramatic	"PEOPLE living in flood-prone areas could face higher insurance premiums as a result of insurers investigating the effect of global warming on coastal storm patterns [...]. Last week's floods in Scotland are not thought to have been caused by a storm surge and, although the damage to homes was devastating, insurers are not bracing themselves for huge claims" (Scott, 1993).

2.1.1. Centre-right dramatization frames between 1988-1997

As identified from the quantitative analysis, the centre-right group is not particularly characterised

by the use of dramatization in the first bloc of years. However, the qualitative analysis of dramatization frames shows the emergence of different contexts in which dramatic tones are applied. One of the main contexts relates to the potential severe consequences, simultaneously claiming that scientists are still evaluating/debating the causes, reality, severity and time-scale (see Table 34 and Appendix 4 for further examples). In one case, scientists are represented as starting to reach some degree of consensus (McCarthy, 1990), in another only "some scientists" claim extremely dramatic consequences (Simons, 1997). Dramatic tones are also used either to "mock" the consequences e.g. using expressions such as "parts of Swansea will look better under water" (Parris, 1989), or to emphasise the "exaggeration" that surrounds the climate change debate.

Moreover, dramatic tones refer to a "political drama", which despite the potential severity of consequences, does not allow appropriate measures to tackle the problem to be implemented. The drama here derives from the conflicts between politicians and scientists, between politicians and public opinion, and between policy-makers and environmentalists, which make it impossible to find solutions.

In some cases, dramatic or extremely dramatic tones appear in the headings, attracting attention on potential dramatic consequences. However, the corpus of these articles presents specific characteristics that confirm what is noted in the analysis of the scientific frames. In fact, in some cases higher degrees of dramatization are associated with "faraway" contexts (Capella, 1996; Nuttall, 1995) or natural environment (Daily Mail, 1994a), which will experience the "worst" consequences of climate change. In another case, an article casts doubts about the degree of certainty around the consequences (Dibben, 1990).

Table 34. Centre-right dramatization in use between 1988-1997

Theme	Type of dramatization	Typical use
Drama vs they might be wrong	Dramatic	"There is no consensus between weather experts on the effects, if any, of global warming. But they do agree that recent weather trends show the world has moved into a period of greater extremes" (Dibben, 1990).
Mockery of drama/ Accusations of exaggeration	(deliberately) extremely dramatic	"It is a scientific debate which has lately taken on the intensity and bitterness of a theological dispute [...]. Is the greenhouse effect an alleged scientific phenomenon in which industrial pollution causes [...] an environmental catastrophe [...]? Or is the current brouhaha over global warming simply the latest hypochondriac fad to capture the attention of an impressionable international television audience?" (Hosenball, 1990).
Political drama	Dramatic	"The political will [...] was not there. It did not exist because public opinion was not aware of the scale of change that government would have to ask. Governments did not have the political support to implement the necessary change. Mr David Heathcoat-Amory, Under Secretary of State for the Environment, said that the unchecked build-up of greenhouse gases would lead to consequences

Table 34. Centre-right dramatization in use between 1988-1997

		difficult to predict, but likely to be serious and possibly catastrophic" (The Times, 1989).
Headings	Dramatic	"Climate experts predict 100-year drought in Africa" (Nuttall, 1995).
	Extremely dramatic	"Why warmer waters spell death for coral islands" (Daily Mail, 1994a, p.28).
Drama in faraway or natural environment	Extremely dramatic	"GLOBAL warming is destroying the world's most beautiful coral reefs and causing chaotic changes in the weather, Greenpeace claimed yesterday [...] that a 'climatic timebomb' [...] is already taking its toll" (Daily Mail, 1994a, p.28).

2.2. Centre-left dramatization frames between 1998-2007

The qualitative analysis of dramatization frames between 1998 and 2007 shows some similar patterns identified in the first bloc. However, new themes and differences can be identified in terms of giving less space to some topics while emphasising and adding others (see Table 35).

Headings and subtitles reinforce their use of dramatization by creating an image of climate change as serious threat that may cause catastrophe, chaos, death for both people and nature, "disasters", "extreme", and "fearful" consequences, in addition to potentially irreversible economic damage (see Appendix 4). Moreover, the need to "save the planet" from the devastating effects of climate change is emphasised.

The corpora of the articles confirm the idea of climate change as a global risk equal to criminality (D. Smith, 2007), terrorism (Jowit, 2004) and nuclear weapons (Connor, 2007a). It is described as an "apocalypse, equally man-made and equally destructive" (Meek, 2000), a "full-scale environmental emergency" (Nuttall, 1999), and a threat to "civilisation" (Connor, 2005). The consequences will be felt worldwide due to global "alarming heating", "coastal flooding" and rising sea levels, "ocean acidification", and economic damage (see Table 35 and Appendix 4).

In this bloc, larger space is given to the drama caused by not acting to solve the causes of the problem, despite the "urgent call" by scientists and environmentalist groups to politically act to stabilise man-made greenhouse gases emissions. A need for both international agreements and national measures is highlighted. Climate change is also described as political failure, but there is still a "hope" (McKie, 2005a; McKie, 2005b; Monbiot, 2003) if it is "addressed" as one of the most urgent challenge.

In comparison to the first bloc, the signs of a drama that is already happening are more frequently cited, and less space is given to uncertainty. In fact, climatic extremes, melting glaciers, alteration of oceans and marine life, and declining species (see Table 35 and Appendix 4) are described as threatening the habitability of the planet.

The uncertainty is connected to either the degree of severity of the consequences or political incapacity/unwillingness to deal with the problem. However, climate change is represented as a real

threat, and it is evident in some parts of the world (see Table 35 and Appendix 4).

Extremely dramatic tones are used to connect the effects of climate change on people's health and lives, their livelihood, lifestyle, and on the society in general. In this case, less space is given to "hope" because the consequences are described as "devastating" people's lives (see Table 35 and Appendix 4).

In this bloc a wider "moral frame" can be identified, which includes two subthemes related to attribution of responsibility of obligations ("moral duty drama") and climate "(in)justice". The moral duty to act is attributed to those nations mainly responsible for causing the problem, but also to individual action, which requires adopting new sustainable lifestyle choices.

In common with the first bloc, the dramatization of climate "(in)justice" emerges, but it can be contextualised in a wider "moral frame" given its connection to social and global inequalities, which have to be internationally (and morally) addressed. The disparity in terms of benefits gained by the industrialised world, and drawbacks for developing countries are often underlined, by describing the developing countries as victims despite their negligible contribution to the problem. A "justice frame" is used to describe legal actions initiated by disadvantaged groups to defend their "human rights" against their "extinction" caused by powerful actors and other nations.

As in the first bloc, climate change is dramatic not only for humans but also for the ecosystems. Similarly to what happens for the "human drama", "disasters" for habitats, plants, and animal species (especially polar bears) are often included among the consequences.

Dramatization also characterises the debate about the kind of economic damages mainly resulting from weather extremes connected to climate change, and potential energy and technological responses.

A new topic relates to the reflection on the use of dramatization in newspapers' reporting. These self-reflections provide opposite perspectives on dramatization styles, both by emphasising the necessity to "shock" the public to increase their awareness (Jack, 2007, 2005), and by criticising the "hopelessly doom-laden" narratives (Avery, 1999; Bennett, 2009; Vidal, 2007, p.31) and the "Hollywoodisation of climate change" (Jowit, 2007, p.24), which produce apathy among the readers (Duff, 2006). It is also interesting to notice that an article published by *The Independent* (Lawson, 2007) explicitly refers to the attempts to generate moral panics by documentaries (such as *The Day After Tomorrow*) that describe a "dreadful scenario", while their producers (Al Gore in this case) do not provide good examples to tackle the problem (see Table 35). Another article, authored by the same journalist, describes the dramatization around climate change as "excessive" and advances some hypotheses of economic interests behind this "exaggeration" to gain funding for new research (Lawson, 2006, p.31).

Table 35. Centre-left dramatization in use between 1998-2007

Theme	Type of dramatization	Typical use
Headings and subtitles	Dramatic	"Planet in Peril: Condemned to death by degrees if we fail to act" (McKie, 2005b).
	Extremely dramatic	"Death and devastation on the frontline of global warming" (The Independent, 2007, p.2).

Table 35. Centre-left dramatization in use between 1998-2007

Global drama	Dramatic	"[...] climate change [...] is possibly mankind's greatest challenge" (Antonowicz, 2006, p.20).
	Extremely dramatic	"AFRICA: Richest ecosystem will be wiped out [...]. ANTARCTICA: Ice shelf melts [...]. EUROPE: Britain's North Sea disaster [...]. NORTH AMERICA: World's breadbasket in peril [...]. AUSTRALIA: Drought to get worse [...]. SOUTH AMERICA: Amazon 'doomed'" (Lean, 2007).
Drama of inaction	Dramatic	"And if history has a message for us on this issue, it is that we still have choices. We can still select a path to survival [...] or we can ignore the mounting crisis and suffer - or possibly even be wiped out" (McKie, 2005b).
	Extremely dramatic	"Meeting the needs of the anxious people waking up in a new world - in the world risk society - is the great political challenge of our time. This is plain enough when it comes to the incalculable, unpredictable character of terrorism. But it is also true for the losers of globalisation and the costs of climate change" (Beck, 2007).
Signs of drama	Dramatic	"Extreme weather is here to stay unless global warming can be reversed [...]. The ruinous floods in Carlisle in January and the tornado that ripped the roofs off houses in Birmingham in the summer were dramatic proof of its power" (Husband, 2005, p.1-2).
Drama of uncertainty	Dramatic	"[...] the best world leaders managed to agree was: 'Climate change is a serious and long-term challenge that has the potential to affect every part of the globe... While uncertainties remain in our understanding of climate science, we know enough to act now'" (Brown, 2005).
	Extremely dramatic	"Achim Steiner, executive director of the United Nations Environment Programme, says [...] 'we still lack the capacity to understand the full consequences of these changes' [...]. Here, the effects of climate change are dramatic. And they are happening now" (Swain, 2006).
Health, People, Society	Extremely dramatic	"Keith Briffa, a climate researcher at the University of East Anglia, paints a more dramatic picture of Britain in 2050 [...]. He said: 'The mild winters [...] could lead to plagues [...], and we may even see an increase in malarial parasites'" (Sayid, 1999, p.6).

Table 35. Centre-left dramatization in use between 1998-2007

	Moral duty	Dramatic	"The likely impacts of climate change therefore present a global ethical challenge as well as a development and scientific challenge" (Grice, 2006).
Moral drama	Climate "(in)justice"	Dramatic	"Millions living in Britain and other northern climes would gain from milder winters [...] but, further south, people would suffer the consequences of intense heatwaves that would kill many unused to extreme temperatures" (Brown, 2001a).
		Extremely dramatic	"Melting sea ice, rising seas and the impact on the animals they rely on for food threatens their [Inuit] existence" (Buncombe, 2007).
Ecological drama		Dramatic	"Unless we take drastic action soon, fossilised plants may be all that remain of the Amazon rainforest in the not-too-distant future" (Ravilious, 2004).
		Extremely dramatic	"Global warming in the Arctic could be soaring out of control [...]. The decline threatens wildlife in the region" (Adam, 2005).
Economic/energy/techno drama		Dramatic	"Analysts say any delay could be a disaster for emerging carbon markets, the preferred solution to bring down the bulk of emissions" (Adam, 2007, p.4).
Reflection on dramatization		-	"That may sound like a lot, but it isn't. In an address last week to the US Media Ethics Summit Gore described climate change as 'the most important moral, ethical, spiritual and political issue humankind has ever faced' [...]. It must have crossed the minds of some of the media ethicists present that if Al Gore truly believed that countless future African babies will die as a result of excessive American use of electricity at this very moment, then he would behave in a very different way; and if he does not act as though the impact is as dreadful as his movie makes out, then perhaps the rest of us should not be stampeded into moral panic" (Lawson, 2007, p. 48).

2.2.1. Centre-right dramatization frames between 1998-2007

Following a similar pattern identified in the first bloc, the qualitative analysis of dramatization frames confirms the use of dramatic tones in similar contexts characterising the first bloc. However, in this bloc four articles were found to adopt dramatization in two additional occasions: two articles use drama to highlight the severity of the situation and for promoting action; and two dramatize the consequences to emphasise a techno-faith which might solve the problem (see Table 36).

Climate change might cause dramatic consequences, but scientists are still evaluating/debating

the causes and their connections with extreme weather events. In some cases, contrasting positions are simultaneously presented by highlighting an "overwhelming consensus" among scientists, but also referring to previous sceptical contestations of scientific evidence, and potential new criticisms that can arise against scientific advances or attempts to create panic (Bone, 2007; Henderson, 2004). Accordingly, the hypocrisy of climate change supporters (such as e.g. celebrities) is denounced because they encourage other people to change their lifestyle, without correcting their own wrong practices (e.g. frequent flights for conferences) (Palmer, 2006). This bloc confirms the use of dramatic tones to "mock" the capacity of scientists to understand climate variations and provide "satisfactory explanation", the scientific evaluation of potential consequences, and the attempt of the "global warming industry" to attribute responsibility to people and gain funding for "disputable" research projects, by also resorting to "Hollywoodian" mechanisms to scare people (Baker, 2007; Johns, 2006).

The "accusation" of exaggeration against climate change advocates becomes more evident. This topic is also strongly related to the mentioned "mocking tendency" due to the frequent use of dramatization to "diminish" climate knowledge credibility. In fact, climate change advocates are described as "constructing" their predictions on "fantasies" and "non-existent" evidence (see Table 36 and Appendix 4). Extreme weather events may cause dramatic consequences, but there is no demonstrable connection with climate change because the causes of the warming are unclear and not attributable to human activities. There is also an emphasis on how advocates use exaggeration to "indoctrinate", especially young people (Daily Mail, 2007), and spread panic (Jenkins, 2006; Phillips, 2006) in order to reinforce their position of power deriving from a "dogma" (Clark, 2005) and an "obsession" (Lomborg, 2005).

Together with "mockery" and accusation of excessive dramatization, the political drama surrounding the climate change debate is one of the most frequent contexts in which dramatization is used. In this case, the dramatic consequences are evident and "potentially disastrous", but the lack of political willingness makes it difficult to challenge the problem. The limited commitments at the international level and the lack of cooperation of some countries (especially the USA and China) undermine every effort made by the UK to tackle climate change. As the analysis of scientific frames found, there is also an attempt to cast doubts on the necessity to politically and economically support developing countries by emphasising the necessity to establish priorities (different from climate change) (Lomborg, 2005; Searjeant, 2004).

The use of dramatization is intensified in the headings and subtitles of the news articles even though in several cases the contents of the articles (or even the same title, see e.g. Aaronovitch, 2006; Galloway, 2007; Lomborg, 2005; Simons, 1998) tend to mock, question or confute the reality of climate change (see e.g. Highfield, 2004; Lewis, 2006; Oddie, 1997).

Devastating consequences of climate change occur especially when the articles refer to environmental damage and dramatic effects in faraway places. Accordingly, developing countries will bear the "worst consequences" of climate change in terms of flooding, sea level rises, and drop of agricultural productivity. Moreover, polar bears, gardens and plants, and animals in general, will be critically affected risking extinction (see Table 36 and Appendix 4).

Two articles were found to use extremely dramatic or dramatic tones to highlight the consequences of climate change: in the first case, extremely dramatic tones emphasise the severity

of the existing climate change consequences; in the second dramatic tones are used to promote political intervention (see Table 36).

Finally, the drama of climate change is balanced in two cases by adopting a techno-faith frame that might solve the problem.

Table 36. Centre-right dramatization in use between 1998-2007

Theme	Type of dramatization	Typical use
Drama vs they might be wrong	Dramatic	"Experts are predicting more bad weather and further disruption and say it may signal the beginning of serious climate change [...]. [Dr Ben Brock, physical geographer at Dundee University] said: 'it is too early to tell if this is definitely a change for the worse. It is tempting to say things will be bad just on the basis of the poor weather we have had in the past couple of years'" (Lambie, 2002, p.21).
Mockery of drama	(deliberately) extremely dramatic	"Next I bet the doom-mongers will be greeting about an impending ice-age [...]. And have you noticed the huge reduction in the number of hoodies who normally clog up our street corners? [...]. If this is global warming, I'm lovin' it - and I'm doing my bit to make it even sunnier by making unnecessary journeys in my gas-guzzling 4x4 and taking short-haul flights as often as possible" (Galloway, 2007).
Accusations of exaggeration	(deliberately) extremely dramatic	"All panics are equal. But some are more equal than others [...]. Last week the BBC's resources were marshalled to produce a royal variety performance of usual suspects: retreating Patagonian glaciers, collapsing Arctic ice shelves, starving Africans, burning rainforests and storm-lashed New Orleans. It was the best of the end of the world, meant to scare us witless" (Jenkins, 2006, p.16).
Political drama	Dramatic	"If international agreements to control such gases continue to be delayed, it will be too late to prevent a major impact [...]. Without American participation, agreement of the European Union, Russia, Eastern Europe and Japan is needed to save the treaty" (Henderson, 2001).
Headings	Dramatic	"Greenpeace accuses BP of destroying the planet's climate. But the facts tell a very different story" (Oddie, 1997, p.8)
	Extremely dramatic	"A volume of detailed analysis shows that cataclysmic climate change may occur as early as 2020" (Flint, 2006, p.3).
Drama in faraway or natural environment	Extremely dramatic	"Scientists predict that some of the worst effects of global warming on agriculture will be felt in India [...]. In Africa an agricultural downturn of 30 per cent is expected" (Wade, 2007, p.9).
Dramatic consequences	Dramatic	"CLIMATE change is simply the biggest long-term challenge we face [...]. Without urgent and decisive action, it is going to have a damaging impact on every one of us - every continent, economy, society

Table 36. Centre-right dramatization in use between 1998-2007

		and every family" (Blair, 2007).
	Extremely dramatic	"2006 was the warmest year ever recorded in Ireland [...]. The pattern is particularly alarming for the thousands of people who suffered appalling flooding this winter" (McCullagh, 2006, p.5).
		"The good news is that global warming is a problem that we can fix. The answer is better technology in our cars and trucks, and cleaner energy choices such as wind and solar power' [said Dr Daniel Lashof, of the NRDC]" (Hardy, 2004, p.4).
Techno-faith	Dramatic	"Researchers will warn that this [rising temperatures] would make many parts of the tropics uninhabitable and destroy ecosystems worldwide. Tony Juniper, director of Friends of the Earth, said he supports plans for carbon capture if the technology can be proven" (Leake, 2005, p.10)

2.3. Centre-left dramatization frames between 2008-2016

The qualitative analysis of dramatization frames between 2008-2016 reflects the pattern identified in the previous bloc. However, the dramatic theme related to uncertainty does not emerge as vigorous as in the previous case (see Table 37).

Headings and subtitles continue to adopt dramatization for describing climate change as causing "massive changes", weather/ecological disasters and extremes, "deadly effects" and "devastation", diseases, human victims and social effects. As in the previous bloc, a need for intervention (especially in political terms) is invoked to "stop" wrong practices and "save" the planet from potential worse consequences before it is too late (see Table 37 and Appendix 4).

Despite different degrees of "severity", the effects of climate change are represented as "dramatic" for the entire world, potentially causing death and "devastation", food crisis, and national security-related issues.

Within the articles, considerable space is devoted to the drama related to either inaction or wrong choices of intervention. The responsibility to act is attributed to both political leaders in charge and political forces in general, and the efforts to tackle the problem are in some instances criticised as unreasonable, insufficient, or palliative rather than effective. By contrast, grass-roots battles are positively described as challenging the political inertia. International and synergistic efforts are judged as essential and necessary to combat the causes of the problem and minimising the negative effects. The USA and Australia are particularly criticised for ignoring environmental issues in the political agenda.

In this bloc, signs of a visible drama are more frequently connected to "melting glaciers", extreme-weather events, sea level rising, and the agricultural productivity crisis (see Table 37 and Appendix 4). It also interesting to note that wars (such as in the case of Syria) are connected to extreme droughts that in turn are linked to global warming, and can cause mass immigration problems (Johnston,

2016b; Naylor, 2016).

In contrast to the first bloc, the "uncertainty" as an independent macro-theme disappears, and as identified in the analysis of political drama, the only uncertainty is related to political incapacity to tackle the problem.

As in the previous bloc, extremely dramatic tones are used to connect the effects of the changing climate to people's health and lives, their livelihood, lifestyle, and to the social order in general.

The third bloc shows a tendency to moralise the action against climate change by emphasising both the moral duty of society to act, and the imbalances between responsible (mainly developed countries) and the main victims of climate change (developing countries and vulnerable people). In this sense, climate change is described as a moral challenge for humanity (Monbiot, 2009), a "great moral issue" (Carrell, 2012) and a "moral obligation" (Brown, 2012). In some cases, the morality of the problem is mentioned when reflecting upon energy production systems, by labelling the nuclear power as a "fantasy" of the right wing that still relies upon the idea of endless growth (Hollo, 2014), in condemning the production of bio-fuel (especially in developing countries) as a further exploitation of land (Lawson, 2008; Mathiesen, 2015), and sometimes supporting alternative energy systems (Nuccitelli, 2016a; Solnit, 2014). Human symbols are used to highlight that vulnerable categories, such as children (Ashdown, 2012; Harvey & Taylor, 2015) and women (Bawden, 2015), will be the most affected by such exploitation.

In this bloc, given the emphasis on the human drama (worldwide and in particular in vulnerable areas) less space is given to the ecological drama (though still present). As identified in the discussion of the visible signs of climate change, ecological symbols are related to melting glaciers, but also bleaching of coral reefs, and ecosystems/wildlife in general.

Compared to the previous blocs, the topics of energy production and techno solutions are more often discussed in relation to seasonal variations caused by climate change, which might represent a serious threat to energy supplies. Key actors in the energy debate, such as oil corporations (e.g. Exxon) and their representatives are criticised for not investing in renewable energy, and both free-market logics and techno-faith are debated, and often questioned for not eradicating the problem plus their potential drawbacks.

Moreover, following a similar pattern already observed in examining the adoption of the scientific frames in the same bloc-period, in connection to the role of oil corporations in obscuring the severity of the problem, the topic related to the "reflection on dramatization" mainly provides considerations on the climate change denial industry, which in a similar way already tried to deny the "dramatic" connection between smoking, cancer and other serious health problems. At the same time, some articles reflect on the hypocrisy behind the "promotion" of climate change to overshadow other priorities such as e.g. "eradication of poverty" in developing countries, and the attention given by the media to "false" stories about sceptic/advocate *querelle*, or by contrast the extraordinary attention devoted to the climate change drama (otherwise ignored) only in coincidence with political events.

Table 37. Centre-left dramatization in use between 2008-2016

Theme	Type of dramatization	Typical use
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Table 37. Centre-left dramatization in use between 2008-2016

Headings and subtitles		Dramatic	"The Paris climate deal is our best chance to save the planet" (The Independent, 2015).
		Extremely dramatic	"Millions face starvation as world warms, say scientists. Parts of Africa will be disaster areas - World unprepared, say food experts" (Vidal, 2013b).
Global drama		Dramatic	"Warming world is a threat to global food supply" (Vidal, 2013b).
		Extremely dramatic	"Life on Earth has already been fundamentally altered by global warming [...]. [...] it will seriously damage food production [...], leading to mass famines and the forced migration of climate refugees" (Johnston, 2016c).
Drama of inaction		Dramatic	"The Independent's climate-change manifesto proposes measures we believe are necessary to safeguard the future of our way of life. The responsibility for action now lies with our leaders" (The Independent, 2006b, p.30).
		Extremely dramatic	"While climate impacts seem to be occurring more quickly than scientists have ever predicted, we may have witnessed in 2013 the permanent failure of 22 years of United Nations-led climate talks" (Razzouk, 2014).
Signs of drama		Dramatic	"World set to hit 'dangerous' global warming by 2050, scientists warn. The events of the Arab Spring and the Syrian civil war were also connected to unrest caused by droughts and crop failures" (Johnston, 2016b).
Health, People, Society Drama		Extremely dramatic	"You probably already know the highlights: chaotic weather, regular records set for warmth on land and at sea (and 2014 heading for an all-time heat high), 355 months in a row of above-average temperatures, more ice melting faster, more ocean acidification, the 'sixth extinction', the spread of tropical diseases, drops in food productivity with consequent famines" (Solnit, 2014).
Moral drama	Moral duty	Dramatic	"Fighting climate change is moral, vital, and in our own interests" (Ashdown, 2012).
	Climate "(in)justice"	Dramatic	"How come trillions of dollars can be found to bail out banks but nothing is found to help the poorest countries avoid catastrophe?" (Vidal, 2012).
		Extremely dramatic	"Leading scientists have told the Observer that food insecurity risks turning parts of Africa into permanent disaster areas" (Vidal, 2013b).

Table 37. Centre-left dramatization in use between 2008-2016

Ecological drama	Dramatic	"New research shows penguins will suffer in a warming world. Penguin population declines are found to occur in hotter years" (Abraham, 2016).
	Extremely dramatic	"If the bleaching is bad enough, or the temperatures remain high for long enough, the corals die, putting the future of reefs at risk" (Slezak, 2016b).
Economic/energy/techno drama	Dramatic	"There is also a tendency to believe technology will be the answer. 'Ministers hold on to the idea, like a comfort blanket, that someone will invent something that will save them'. So action is piecemeal" (The Guardian, 2009).
Reflection on dramatization	-	"Ms [Lenny] Bernstein told The Guardian: [...] 'One thing that occurs to me is the behaviour of the tobacco companies denying the connection between smoking and lung cancer for the sake of profits, but this is an order of magnitude greater moral offence, in my opinion, because what is at stake is the fate of the planet, humanity, and the future of civilisation, not to be melodramatic'" (Johnston, 2015).

2.3.1. Centre-right dramatization frames between 2008-2016

The third bloc confirms the same macro-themes identified in the previous periods connected to the use of dramatization. However, in the third bloc, more space is given to the debate regarding the implementation of new technologies to "solve" the problem and the provision of energy, in addition to the economic consequences (mainly related to the application of climate policies). Moreover, compared to the previous blocs, several articles use dramatic frames to highlight the severity of the situation and the need for action (see Table 38 and Appendix 4).

The drama deriving from potential severe consequences is often accompanied by the reference to sceptical positions around the causes, types of action to be taken, and exact time-line of consequences. Even when consensus is highlighted and the related drama emphasised, there is still mention of controversial aspects (despite cleared) related e.g. to scandals (Gray, 2011), imprecision of the variables used by scientists to construct their models (AFP & Plummer, 2016; Collins, 2013), a minority who are sceptical about climate change in general, or believe that the consequences are either exaggerated (Zolfagharifard, 2014a, 2014b) or might also be positive (Beall, 2016; Prigg, 2014).

As in the first two blocs, the "mockery" of dramatization is the most frequent style adopted by journalists. In contrast to their counterparts, the centre-right articles tend to "mock" the morality behind climate change action, defining scientists as "moral dictators", "Nazis" who want to affect people's lifestyles by introducing "draconian measures" (see Table 38 and Appendix 4). Scientists and advocates are also depicted as "liars", "hypocrites", "opportunists", "climate catastrophists", and

"alarmists" (see Table 38 and Appendix 4). Symbols of climate change are also mocked, for example calling the polar bears "poster boys of global warming" (Graham, 2013).

The mockery frame is also used to highlight a general exaggeration surrounding the phenomenon promoted by the climate change advocates. The mockery and exaggeration tones often overlap within the same articles. Science is depicted as producing both "scary" and "terrifying" reports and spreading panic and "false alarm" by manipulating data and telling "lies" (see Table 38 and Appendix 4). In addition, politicians are "accused" of using exaggeration to support their "radical" decisions. Exaggeration is also highlighted by citing controversies between scientists who publicly claim that they do not want to be associated with alarmist messages, or by referring to scientists who retreat from their positions by admitting to have exaggerated their tones, and advancing evidence that global warming has stopped, or it is an excuse to justify "excessive funding" (see Table 38 and Appendix 4). Together with "mockery of drama" and "accusation of exaggeration", the political drama surrounding the climate change debate is confirmed to be one of the most frequent themes related to dramatization. In this context, climate change is recognised as a real and severe threat, but the weak political response causes the real drama. In this sense, articles emphasise the "disappointing" political reaction to the problem, and coincide with the international summits that produce either chaotic responses or "paralysis" because the major contributors to the problems (USA, China and Australia) do not collaborate (see Table 38 and Appendix 4). From this, some questions arise in relation to the reasons why the UK should implement measures if other countries do not do the same, and political controversies are highlighted around the types of counter-measures. At the same time, the willingness of people and societies to change their lifestyle is questioned.

Headings and subtitles are often extremely dramatic or dramatic (see Table 38), even when the main text questions the alarmism surrounding climate change (see e.g. Ahuja, 2010). Dramatization is also used in the title to explicitly mock the problem or diminish its severity.

This bloc also confirms the use of extremely dramatic tones when the impacts of climate change are related to the natural environment and animals. The consequences of climate change will be felt mainly in faraway places, which are mainly developing countries, but sometimes the need for supporting these countries to adapt is questioned because it is not considered a priority.

In contrast to the previous blocs, more space is given to the dramatization of consequences as a "global problem" that can produce consequences on human health, conflicts and food shortages, overheating and wildfires (see Table 38 and Appendix 4). Action is sometimes promoted.

Finally, in contrast to the previous bloc, the use of dramatic tones is connected to a greater attention given to the debate around technology, energy systems, and economic consequences of climate change and responses from the market. The drama here is not only linked to the reality of climate change, but also to the responses provided in terms of increasing costs of energy, and economic damages for companies deriving from "top-down" policies that try to regulate the market. By contrast, incentives for developing new technology, support for "fracking", and nuclear power, which can help tackle the "energy crisis" are promoted. Existing businesses' efforts to reduce their impact on the environment are emphasised, highlighting their attempts to reduce energy consumption and reducing waste. Renewable energy systems are promoted in one case, as a potential new profitable business: in fact, given that the international agreements are going to force all states to implement climate change policies, businesses might profit from it being the first ones to introduce

innovation (Colley, 2016).

Table 38. Centre-right dramatization in use between 2008-2016

Theme	Type of dramatization	Typical use
Drama vs they might be wrong	Dramatic	"Climate change zealots insist that we're still destroying the planet but now another scientist warns the cast-iron evidence just isn't there" (Carpenter, 2011, p.28).
Mockery of drama	(deliberately) extremely dramatic	"IT WAS another bad week for the 'warmists', now more desperate than ever to whip up alarm over an overheating planet" (Booker, 2009).
Accusations of exaggeration	(deliberately) extremely dramatic	"Today, it is not the mushroom cloud that threatens to suffocate children psychologically but carbon emissions. The new bogeyman is climate change" (Ahuja, 2010).
Political drama	Dramatic	"Last night Labour MP Simon Danczuk [...] accused ministers of trying to hide behind 'the issue of climate change - when the real problem was spending cuts' [...]. Mr Danczuk said: 'The Government shouldn't be using climate change as an excuse for what is a predictable phenomenon'" (Martin, 2015).
Headings	Dramatic	"The UN Climate Change Conference in Paris would have us all terrified about the future of the environment. Here's why I'm not" (Booker, 2015).
	Extremely dramatic	"Ignore climate change and 100m people will die by 2030, shocking new report claims" (Daily Mail, 2012b).
Drama in faraway or natural environment	Extremely dramatic	"The prognosis is not good. According to some forecasts, the entire polar bear community here could die out by 2050, and the Hudson could stop freezing over completely by the early 2020s" (Costello, 2011).
Dramatic consequences	Dramatic	"POPE Francis [...] warned a crowd of more than 11,000 people who gathered to hear him at the White House that the world is at a 'critical moment of history' and that immediate action is needed to clean up the planet" (Gutteridge, 2015).
	Extremely dramatic	"Parasitic flatworms that can cause liver and blood diseases in humans could become more common [...]. The symptoms can include inflammation, fever and can even be fatal" (Gray, 2015a).
Techno/market-faith	Dramatic	"Britain is facing both an energy and a climate-change crisis [...]. Without new energy sources, the result will be higher bills at best and blackouts at worst. That is why we must start 'fracking'" (Straw, 2013, p.18).

2.4. Dramatization frames between 1988-2016: some considerations

The adoption of a moral panic lens identified some specific traits relative to "how" newspapers frame climate change through dramatization, but also an evolution in terms of dramatization over the three blocs in both cases. In the case of the centre-left news articles, an increase was observed between the first and second bloc in terms of frequency and intensity of dramatic tones associated with climate change, which is confirmed in the third bloc. Moreover, in the second bloc climate change-related issues are more often treated as a moral issue, not only in relation to the global (in)justice theme, but also in terms of moral responsibility at all levels (from multilevel political efforts to societal engagement) to tackle and prevent further climate change. The uncertainty related to climate science identified in the first bloc starts to decrease in the second bloc, and disappears as a key topic in the third one, being mainly related to political incapacity to produce appropriate measures. The disappearance of this topic is accompanied by an increase in articles that dramatize the visible signs of climate change, which is happening and might be "catastrophic" in the future. The tendency to moralise the need for action and to highlight the political confusion are reinforced in the third bloc. Finally, starting from the second bloc a reflection on the use of dramatization emerges by presenting different opinions about the effects that dramatic tones can produce on both public opinion and political responses.

In the case of the centre-right newspapers, the adoption of "mocking" tones characterises the entire period. It has been noted that a dramatic style is used both to "mock" the dramatization itself and to highlight the exaggeration of the consequences of climate change promoted by the advocates. However, starting from the second bloc a new topic related to dramatizing the consequences without casting doubts on the reality of them emerges. The mockery of dramatization, in addition to the use of "dramatization" per se, supports the findings of the quantitative analysis relative to an increasing recognition of the centre-right newspapers of the reality of climate change, and a simultaneous tendency to question the severity of the consequences or emphasise the difficulty in coping with the problem. Accordingly, a "politicisation" of the issue has been observed across the three blocs, by recognising the reality of the phenomenon and its severe consequences, but also the impossibility of acting because of a lack of political engagement.

Differences, but also some similarities can be highlighted comparing the two groups. First of all, both groups use dramatic (or extremely dramatic) styles in headings and sub-titles (even though the tendency is higher among the centre-left newspapers). However, in the case of the centre-left, the corpora of the articles follow the same tendency by emphasising the dramatization, whereas the centre-right group frequently uses "dramatic titles" that do not reflect the main text, or they intentionally use exaggeration to mock the debate around climate change.

Second, the dramatization related to climate change as a global issue that produces negative consequences all over the world is a characteristic of the centre-left. By contrast, the centre-right tends to attribute the most negative consequences to faraway places or natural environment. However, when the phenomenon is recognised as a global problem (especially in the third bloc), there is also a tendency to emphasise the difficulty of implementing strategies that can solve it. This is directly connected to the third difference between the two groups in terms of "political/inaction drama". In fact, both groups tend to dramatize the consequences that derive from the political

incapacity to tackle climate change (see also Batta et al., 2013; Evans, 2016; Gordon et al., 2010; Mercado, 2012; Nwabueze & Egbra, 2016). However, the centre-right is oriented to support the idea of impossibility of acting, more frequently attributing the culprit to "other countries". The centre-left is more focused on the need to act and the "hope" that political actors at all levels (from local to international) will find an agreement on the measures to be implemented.

The fourth area, in which both points of contact and division can be found, relates to the signs of drama. For the centre-left they are often included in the articles to testify that climate change is happening and causing severe consequences that will be worse in the future. In the case of the centre-right, the evidence is often counterbalanced by the idea that advocates "might be wrong" and controversial positions exist among the scientific community. Moreover, in the centre-right case the polarisation might be related not only to the consequences but also to the causes. By contrast, when the centre-left highlights uncertainty around the entire range of consequences (especially in the first bloc), these are mainly described as "harmful" in any case.

A fifth area relates to the victims of the consequences, which in the case of the centre-left are both people (and society in general) and ecosystems. Climate change affects people's health and their lifestyle, as well as the capacity of ecosystems to survive and provide the resources for the society in the long term. Moreover, the visible signs of climate change are often connected to natural and weather variations, which in turn affect the humans' world. By contrast, in the case of the centre-right, the "tragedy" is mainly connected to impacts on the natural world, and when people are described as victims, they are mainly located in far-away places.

These considerations are also connected to the next point related to the morality of climate change (Hulme, 2009; Markowitz & Shariff, 2012). The centre-left tends to emphasise the moral duty to act against climate change, firstly giving special attention to the inequalities between developing and developed countries (first bloc), and then expanding the focus on the global, national and social duty to act (starting from the second bloc). In contrast to their counterparts, the centre-right does not pay particular attention to the morality behind climate intervention, further promoting the idea of climate change as an "a-moral" issue, as also suggested by Goode & Ben-Yehuda (2009). Moreover, in some cases the articles mock the morality by denouncing a use of the "moral imperative" to defend economic and political interests behind the "climate change idea". The global justice theme for the centre-right presents the opposite characteristics of the debate on the centre-left. In fact, the financial aids provided to the developing countries are often questioned by casting doubts on the priorities of these countries, which do not include climate change. However, the centre-left group highlights the hypocrisy of developed nations using climate change to further exploit poorer countries (e.g. for the production of fossil fuels that reduces the availability of arable land for food production).

Finally, the "economic/techno/energy drama" is discussed by both groups, with a focus for the centre-left on the negative economic consequences caused by the damage deriving from climate change, on the energy crises deriving from "wrong policies" oriented to "harmful" systems of energy production, and on the potential technology that can help (together with ad hoc policies) to tackle the problem. In a different way, the centre-right often refers to the economic damage (especially to businesses) and to the energy crisis (mainly promoting fracking and nuclear power) deriving from implementing "top-down" climate change policies, and defends a "free market" oriented approach, which despite the development of new technology might solve the problem.

From a moral panic perspective, the drama is a tool for the centre-left group to increase both awareness and alarm about climate change in order to activate "civilisation processes" (Rohloff, 2012, see chapter two) around the need for socially collective efforts to tackle climate change. By contrast, the centre-right uses mocking tones to diminish the drama and increase hostility against scientists (real folk devils). At the same time, the use of dramatization for this group (especially in the last bloc) might be explained in relation to different reasons, which are i) increasing scientific literature that highlights the ineffectiveness of "scary scenarios" to engage the general public; ii) attribution of dramatic consequences to faraway places and distant time; and iii) incapacity of humans to control climate change. However, as the analysis of the scientific components of climate narratives partially showed, both parties present articles that confirm or deny/diminish the drama related to climate change. This means that the simultaneous increase of both mockery and dramatic tones over time for the centre-right, and the prevalence of dramatic and extremely dramatic tones for the centre-left, combined with the presence of articles that deny or support the "devastating" consequences of climate change in both groups, contribute towards creating a "confusing image" of climate change. This confusion is further increased by the tendency of the centre-left to reflect upon the necessity to use dramatic tones to report on climate change. This is also supported by the publication of style guides by newspapers (e.g. The Guardian and Observer style guide, <https://www.theguardian.com/guardian-observer-style-guide-g>) which recommend the use of stronger terms that describe climate change as a "catastrophe for humanity" (Carrington, 2019). This kind of reflection might be genuinely related to the necessity to find the best way to communicate climate-related issues to engage the public. However, as shown by previous studies (see e.g. Greitemeyer, 2013; Morrison & Hatfield-Dodds, 2011; Nolan, 2010; Sakellari, 2014; Von Burg, 2012; Whitmarsh, 2011) they can also cast doubts about the real severity of the consequences and the reasons why the climate change meaning should be "constructed" by the media in certain ways if the science is clear. Moreover, even though the public reaction is not considered in this works, the literature showed that the use of alarmist messages and fear-based communication does not motivate individuals to change their behaviour, and by contrast produces disengagement (Greitemeyer, 2013; Morrison & Hatfield-Dodds, 2011; Sakellari, 2014). Moreover, some studies in the UK showed that media consumers tend to "judge" climate narratives as "too exaggerated" (Whitmarsh, 2011) undermining their confidence in media reporting (O'Neill & Nicholson-Cole, 2009). This might mean that while the centre-left tends to use dramatization to highlight the severity of the consequences, the centre-right might have developed a new narrative strategy over time (increasing dramatization and combining it with mockery) intentionally increasing exaggeration to undermine science credibility.

The hypothesis of a moral panic that "works in reverse" (Brisman, 2012) highlighted by the lack of scientific consensus regarding climate change in terms of both causes and consequences (Moser, 2010) is further supported by the examination of the "dramatization frame". In fact, looking at the overall picture of climate narratives (considering both groups) the persistent reference to the "out of control devastation" on the one hand, and the negation/mockery of the consequences on the other, support the idea that there is still confusion and inability to cope with this "uncontrollable" phenomenon. In turn, this creates a "confusing image" of climate change that contributes towards depicting climate change as an "a-moral" issue (Goode & Ben-Yehuda, 2009). In fact, it is interpreted

either as an "act" of nature out of humans' control, or as too "exaggerated". The analysis of dramatization further reinforces what was suggested by Brisman (2012, 2013) and Brisman and South (2015) in relation to the promotion of individual and collective inaction by the media. Indeed, dramatization is also used, in an instrumental sense, to justify inaction on climate change due to the impossibility of tackling such an uncertain and "out of humans' control" phenomenon.

3. Introduction to the use of ecological symbols

The quantitative analysis showed no statistically significant differences between the centre-right and the centre left in adopting both symbolisation frames and symptomatic frames. However, the literature highlights that the media tend to activate processes of symbolisation of climate change, especially in the UK (O'Neill, 2013), and specific icons have already entered the collective imagery (Braasch, 2013), mostly associated with polar bears (Ballantyne et al., 2016; Manzo, 2010a). The symbolisation process, mainly connected to ecological variation, was also found to be associated with the use of dramatic frames, which as confirmed by the analysis of the dramatic frames, is often combined with fear-leaden themes (see also O'Neill & Smith, 2014). This tendency was observed in both groups. However, the centre-left often adopts dramatic or extremely dramatic tones by simultaneously referring to both humans and the environment, whereas the centre-right shows a greater tendency to associate dramatic tones with "catastrophic" consequences on the natural environment (especially located in the future). For this reason, in contrast to the analysis of scientific and dramatization frames, and given that the some aspects of the use of ecological symbols have already been identified, the present analysis gives a general overview of the most commonly-used words related to ecological elements. The analysis also focuses on the articles identified by the frame analysis as representing visible symptoms, and mainly investigates the combination of natural symbols with perceived symptoms, and the combination of eco-symptoms with social and health impacts (see Table 39). This enables the identification of which group tends to attribute the visible signs of climate change only to the natural environment, or insert them in a wider context in which different components are already affected. However, a general overview of the mostly used ecological symbols (see Table 39 and Appendix 5 for further details) per se gives a picture of how the natural symbols are used over time.

Table 39. Articles that simultaneously combine natural symbols, health related symptoms, social changes and ecological symptoms

	Nature Symbols	Eco- symptoms	Health symptoms	Social changes
Nature Symbols	203	141	6	12
Eco-symptoms	141	326	18	43
Health symptoms	6	18	29	6
Social changes	12	43	6	51

3.1. Use of natural symbols combined with symptoms

Exploring the use of different words related to ecological symbols across the three blocs (see Table 40 and Appendix 5), in the first two blocs the words related to water (in terms of both habitat and its species) prevail, being "water" per se the most mentioned by news articles, followed by words related to glaciers and, in more general terms, animal and plant species and their habitat. By contrast, in the third bloc the most used words relate to glaciers (see Table 40). Moreover, while in the first two blocs, animal populations of glacier's habitat are not often mentioned; in the third bloc, polar bears become a symbol frequently used. By contrast, in the first two blocs, mentions of whales in their marine habitats prevail, and among the terrestrial species frogs and mammals in general are more frequently mentioned (see Appendix 5). Another symbol, which is constantly mentioned by both groups over the three blocs, is related to coral reefs, which are at risk from warming sea temperatures and acidification. This means that, not only are polar bears icons of climate change, but also marine species and water more generally (e.g. in relation to its availability due to droughts and desertification, and the management of excessive water deriving from sea and oceans rises) are associated with the representation of climate change.

Table 40. Natural symbols between 1988-2016

Macro-area	Sub-area ¹³²	Freq 1988-97	Freq 1998-2007	Freq 2008-16
Water	Habitat	747	754	456
	Flora/Fauna	95	81	165
N		842	835	621
Glaciers	Habitat	464	456	522
	Fauna	-	-	144
N		464	456	666
Species	Generic	249	329	229
	Habitat	74	74	95
	Flora/Fauna	31	31	103
N		354	434	427

Although there is no significant difference between the two groups in mentioning symptoms of climate change (see chapter five), the qualitative analysis of the dramatic frames showed a tendency for the centre-right to dramatize the tones when referring to the potential consequences on the environment (especially if located in the future). In a similar way, the centre-left group uses nature as one of the victims of climate change, but often simultaneously referring to both social changes and health related consequences. Narrowing the attention to the use of natural symbols in combination with existing ecological symptoms, 125 articles were found to exclusively refer to ecological effects (excluding any other symptoms) (see Table 41). However, when using natural

¹³² For further details about the classification of the specific words, see Appendix 5.

symbols in connection to existing alterations of the ecological system due to climate change, the centre-right tends to connect the two elements more often compared to the centre-left only in the second bloc.

The following analysis will focus on the combination of the different types of symptoms recorded through the frame schema (health and ecological, social and ecological) to see how the two groups refer to climate change as an existing phenomenon that is not only affecting the natural environment, but also human life.

Table 41. Number of articles combining nature symbols with ecological symptoms

	Centre-Left (CL)	% CL*	Centre-Right (CR)	% CR*
1988-1997	19	59	5	42
1998-2007	52	63	18	82
2008-2016	24	63	7	41
N	95	63	30	59

*% articles that use natural symbols related to eco-symptoms on the total number of articles using natural symbols

3.2. Combination of health, ecological and social symptoms

Since the number of articles related to health and social symptoms combined with ecological effects is limited and no specific changes were observed over time, the following considerations are mainly related to considering the macro-tendencies of newspapers to represent these symptoms. The health symptoms are scarcely considered by either group, particularly when combined with natural symbols (three cases per group). In terms of simultaneously representing ecological and human-health symptoms, the centre-left generated 14 cases, whereas the centre-right produced four articles¹³³.

The centre-left (see Table 42 and Appendix 6) tends to combine ecological effects related to heat waves with health damages, also arguing that the effects of climate change are connected and aggravated by other factors such as a thinner ozone layer that increases the incidence of skin cancer, and pollution that causes diseases. Warming temperatures are also associated with tropical diseases such as e.g. malaria and cholera.

In the centre-right case (see Table 43 and Appendix 6), there is a tendency to balance the negative consequences on human health with the uncertainty of attribution of responsibility to climate change, but also to highlight the positive impacts on health. Finally, one article connects health-related issues to the effects produced by nuclear power production, which is needed to stop greenhouse carbon emissions, but might be causing health damages (although the opinions are presented as controversial on the topic) (Mail on Sunday, 1997).

A higher number of articles simultaneously take into account both social and environmental symptoms, and 12 out of the total (43 articles) also use natural symbols connected to climate change. However, only five articles belong to the centre-right group¹³⁴.

¹³³ Seven articles in total represent health-related symptoms also considering those articles that exclusively focus on health effects excluding the ecological ones.

¹³⁴ In the case of the centre-right group, even considering the articles that only focus on social symptoms, only two additional articles were found to connect climate change consequences to existing social symptoms.

The centre-left group links the changes happening in social structures to climate change mainly in the second and third blocs. These articles focus on the inhabitability/difficulties of those areas already affected by the consequences of climate change due to reduced livelihoods available and resulting migration-related issues, and war for survival. These articles also refer to the phenomenon as "climigration" (Carus, 2011) and to the affected people (mainly from developing countries) as "climate/environmental refugees" (Brown, 1998; The Guardian, 1996; Johnston, 2016c; Vidal, 2013a), and "climate canaries" (Beaumont, 2006). Climate change is also connected to the progressive extinction of local cultures because people are forced to move to other places, often referring to a "moral imperative" to "save" them and to social justice.

Some articles refer to the first signs of climate impacts and highlight the risk that the socio-economic-ecological effects will intensify in the future. They also refer to the social impacts of climate change on everyday life due to damages caused by extreme weather events in terms of increasing homelessness and economic problems.

Finally, four articles simultaneously use all of the three symptoms related to health, social and ecological effects (see Table 42) to highlight the dramatic visible effects of climate change, especially in vulnerable areas, which make it clear that climate change is not a risk located in the future, but it is already happening. These articles also emphasise the need to act to avoid devastating and "out of control" effects.

In common with the centre-left, the centre right tends to combine ecological effects with social symptoms when referring to the most vulnerable countries, which already suffer from emigration and internal conflicts due to sea level rises and the lack of resources (see Table 43). In one case, the social effects already evident in the UK are attributed to changes in lifestyle in terms of new "fashion trends and adjusting working habits" (Winter, 2004). In another case, the combination of the three components related to ecological, social and health symptoms was observed. However, the article also reports a claim of an economist who highlights that the IPCC intentionally "exaggerates" the tones when describing the consequences of climate change.

Table 42. Centre-left combination of symptoms

Combination of symptoms	Topic	Typical use
Health- Ecological	Health damage and heat waves	"In a recent report the commission said heatwaves were likely to be hotter and longer lasting, causing bigger risks of health-related issues" (Rourke, 2013, p.29).
	Diseases and warming temperatures	"The report, by the Expert Group on Climate Change and Health [...] says climate change will have a 'significant effect' on health over the next half century [...]. The 30,000 extra cases of skin cancer assume that no progress is made" (Laurance, 2001, p.2).
Social- Ecological	Migration/War and climate refugees	"A different situation affects Bangladesh. Here climate-linked migration is already triggering violent conflict [...]. Millions have already migrated to India, causing increasingly serious conflicts that are destined to worsen" (McKie, 2007).
	Culture	"THEY ARE dubbed the 'climate canaries' - the

Table 42. Centre-left combination of symptoms

<p>eradication, morality and social justice</p>	<p>people destined to become the first victims of world climate change [...]. Those people [...] now face eradication. Hundreds of thousands of these seasonal herders have already been forced to forsake their traditional culture and settle in Kenya's north eastern province" (Beaumont, 2006)</p>
<p>Everyday life</p>	<p>"As our reporting has sought to demonstrate, the implications [...] are huge for [...] the way we live our everyday lives" (Randerson, 2015).</p>
<p>Risk of intensification</p>	<p>"Scientists first addressed world leaders on the issue four years ago, when they warned: 'Our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms'" (Brown, 1997, p.15).</p>
<p>Health-Social-Ecological effects</p>	<p>"The report emphasises that - despite the recent focus on New Orleans after Hurricane Katrina- 94 per cent of all natural disasters, and 97 per cent of deaths from natural disasters, occur in the developing countries [...]. In Bihar, India, for example [...] flooding [...] brought a six fold increase in cholera in Nicaragua. Mozambique's annual economic growth dropped from 8 per cent to 2 per cent in a year after a cyclone" (McSmith, 2006).</p>
	<p>"You see its effects in the livestock, the huge number of stillborn or deformed animals. But worse is the effect on the people [...]. No wonder then that 500 people from its 5,000 population have started a new life in Spain. Others have gone to Italy and Germany. A few will journey to Britain" (Antonowicz, 2006, p.20).</p>
	<p>"So begins another battle in the struggle for survival on the roof of Latin America. This scene happens almost daily on the mountaintops of Peru [...]. What is new, however, is the abruptness, frequency and ferocity of the hail. 'It comes with virtually no warning. [...]. You have a flourishing crop and then suddenly the hail destroys the leaves. You lose everything' [says Sergio Mamani]" (Carroll, 2007).</p>
<p>"Saudi Arabia, recorded an all-time high temperature of nearly 126 degrees. Southern Morocco's relatively cooler climate suddenly sizzled last month, with temperatures surging to highs between 109 and 116 degrees. In May, record-breaking temperatures in Israel led to a surge in - heat-related illnesses [...]. Analysts point to inadequate government handling of an unprecedented drought in Syria as a trigger for the country's devastating civil war, which has produced extraordinary refugee flows that have spilled into Europe" (Naylor, 2016).</p>	

Table 43. Centre-right combination of symptoms

Combination of symptoms	Topic	Typical use
Health-Ecological	Uncertain health-related symptoms	"Dr Jenkins said it was impossible to attribute the current extreme weather in Britain to global warming [...]. The mild winter has coincided with lower than average rates of winter diseases, according to the latest statistics" (Derbyshire, 2004, p.8)
Social-Ecological	Migration/War and climate refugees	"General Muniruzzaman said there was already a 'trickle' of Bangladeshi people being displaced from rural areas and moving to already-overcrowded slums in Dhaka, due to riverbank erosion and falling crop productivity" (Gosden, 2014).
Health-Social-Ecological effects		"There has been [...] an increase in heat-related deaths in some areas, such as England and Wales [...]. For the past seven years, research in social science has found more links between climate and conflict [...]. [Professor Richard Tol, an economist at the University of Sussex], said the drafts had been changed to make the findings more 'apocalyptic'" (Zolfagharifard, 2014a).

3.3. Use of religious metaphors/symbols

The quantitative analysis showed that for all three symbols captured by the questionnaire, no significant differences exist between the two groups. However, the qualitative investigation of the texts show some differences between them. Among the 32 cases in which religious symbols are used, 20 are attributable to the centre-left, and 12 to the centre-right (see Appendix 7). Five main contexts in which the centre-left uses religious symbols were identified (see Table 44). One is related to extremely dramatic tones, which connect climate consequences to biblical prophecies and apocalypse. A second use of religious symbols connects climate change to a "moral imperative" and moral values to either act or avoid misinterpretation of the relation between humans (dominators) and nature (Hollo, 2014). Moreover, symbols of the religion, such as the church (The Guardian, 2005) and the Pope (Goldenberg, 2015; Randerson, 2015) invite the society to defend the environment's rights. However, religious symbols are also used to condemn "blind" climate change advocacy, which is grounded in "ideological orientations" rather than scientific evidence. Finally, religious symbols are used to reflect upon dramatization and different positions about the use of "apocalypse and religious metaphors" and their potential efficacy/inefficacy. One article adopts religious metaphors to "unmask" false attempts made by businesses to appear "green" by implementing insignificant actions (Mecalister, 2007).

The centre right (see Table 45) uses religious symbols and metaphors to diminish the value of climate science, labelling advocates as "believers" of a religion, and the climate science as a "dogma", "a religious faith", and an "orthodoxy" that unreasonably predicts the "apocalypse", and the "Armageddon".

The conflict between the two parties is represented either as a "war" between two "orthodoxies" (Hosenball, 1990), or as a "monologue" addressed (by the advocates) to the "converted", which does not leave space to their counterparts to reply (Johns, 2006).

Religious symbols are also used in association with "extremely" or "dramatic" "prophecies" about the devastating consequences of climate change.

Table 44. Centre-left use of religious symbols

Religious metaphors/symbols	Typical use
Climate Change and biblical prophecies	"Doom is not what it used to be. In the Book of Revelation [...], the four outriders of the apocalypse appear - seated on steeds representing conquest, war, famine and pestilence. As the new millennium approaches, our ideas about how life might end have both undergone a remarkable transformation - and remained remarkably unchanged [...]. Once known as Acts of God, though perhaps more accurately described as Acts of Man, these include freak weather and unpredictable shifts in the climate" (Nicholson-Lord, 1997, p.4).
Climate Change, religion and morality	"Further, there is an element that comes naturally to Christian ethics which his ethics might need in order to do so. It has to do with whether there are moral imperatives that can be held as objectively true [...]. Tim Mulgan, professor of moral and political philosophy at the University of St Andrews, explained why ethical objectivism may be vital to making a robust ethical case against environmental degradation" (Vermon, 2011).
Religious authorities	"Fossil fuel emissions must contract globally while the international shares in emissions converge on equality per capita [...]. The Church of England says: 'Anyone who thinks this is utopian has simply not looked honestly at the alternatives'" (The Guardian, 2005, p.21).
Condemnation of climate change as religion	"Its most devoted adherents have that characteristic which is a particularly irritating aspect of the self-righteously religious - that sharing in the belief is in itself a sign of virtue. But even if you are of the true faith, you cannot seriously believe in the miracle that you personally have a 'chance to change the climate'" (Lawson, 2006, p.31).
Reflection upon apocalyptic/religious symbols	"[...] words such as 'disaster', 'apocalypse', 'catastrophe' - when they were describing climate change predictions because it led to apathy and fatalism [...]. I suppose we are in that state called denial, though that word suggests a refusal to acknowledge what Hulme wants us to stop calling a looming catastrophe" (Jack, 2007, p.36).

Table 45. Centre-right use of religious symbols

Religious metaphors/symbols	Typical use
Climate change cult	"The Gods Squad, various clerics, imams, vicars, cardinals, archbishops, bishops, Grand Muftis (is there a collective noun for them?) and rabbis, all trooped [...] to fight the good fight against us 'greedy' consumers and our nasty CO2 emissions [...]. Climate change has become the new orthodoxy for our times" (Waterfield, 2008).
Conflicts between religious cults	"It is a scientific debate which has lately taken on the intensity and bitterness of a theological dispute [...]. But recently the debate has begun to degenerate into a slanging match between rival orthodoxies" (Hosenball, 1990).
Dramatic prophecies	"PROPHETIC warnings of how global warming will play havoc with the world's agriculture appear to be coming true, according to

Table 45. Centre-right use of religious symbols

evidence from this year's harvests in Europe and America" (Uhlig, 2003, p.7).

3.4. Natural symbols, Religious symbols and climate symptoms: some considerations

From the analysis of scientific frames/claim-makers and use of dramatization the centre-right group appeared to attribute climate change consequences to the natural environment in the future. On this basis, the qualitative analysis focused on the combination of natural symbols with perceivable symptoms, and on the combination of natural symptoms with health and social effects. This helped to shed lights on some differences between the two groups in terms of attribution of consequences to natural/human world, and representation of consequences either as "future chances" or "already happening".

Both groups connect climate change to natural symbols and ecological variations. However, the centre-left tends to simultaneously connect climate change to a combination of effects that are already happening. These effects can be related to a combination of i) environmental alterations and health consequences, ii) environmental changes and societal symptoms, and iii) environmental, societal and health effects. The analysis of natural symbols and ecological symptoms reinforced what emerged throughout the qualitative analysis. The centre-right mainly locates the ecological variations in the future, and when they are considered as already happening, they are not given for certain. For the centre-right these findings align with those studies that identified the representation of climate change as "invisible" as the main cause for affecting public awareness around the problem (Markowitz & Shariff, 2012; Ungar, 1995, 2001). In fact, this group shows a tendency to balance the contrasting opinions about the possibility that climate change is already happening and to combine extremely dramatic tones with simplistic ones. Moreover, the description of effects that only relate to the environment, contributes towards creating an image of climate change as a "dramatic" but "abstract" phenomenon (Kleinschmit & Sjöstedt, 2014; Markowitz & Shariff, 2012), which is temporally and spatially distant and not "frequently" and "directly" experienced in everyday life (Ungar, 1992, 1995). Furthermore, when the social impacts are considered, they are mainly located in faraway places (especially in developing countries), thus further limiting the activation of "moral alarmism" (Markowitz & Shariff, 2012). This is also confirmed by the analysis of scientific and drama frames, which showed how the consequences of climate change will be dramatic or extremely dramatic in faraway places or they will impact the natural environment.

Moreover, the use of religious symbols does not show statistically significant differences in quantitative terms, but the purposes behind their adoption showed diversities. In the centre-left case, religious symbols tend to reinforce dramatization and connect the need for action to a "moral imperative". They are also used to reflect on the efficacy of their use in communicating climate change-related consequences. However, the centre-left news articles also criticise "advocates" by both providing a "constructive critique" to discourage practices that can be easily criticised for following ideological/religious paths rather than science. On the other hand, the centre-right more frequently condemns advocates' "faith" as completely based on religious beliefs that cannot be

challenged and scientifically demonstrated. Moreover, some articles also tend to use religious symbols to associate climate change with "apocalyptic scenarios". Therefore, it appears that the use of these symbols creates a symmetrically inverted structure in which the centre-left mainly uses religious symbols to highlight the drama related to the effects (but also to reflect on climate narratives' styles); whereas, the centre-right uses the same symbols either to "mock" climate reality or to describe fear-laden scenarios out of humans' control. This further reinforces the translation of "political uncertainty" into "media uncertainty", which represents contrasting voices in relation to political elite conflicts (Bennett, 1990; Hallin, 1986). In turn, this confusion favours the "status quo", which in this case means "inaction", given the uncertain, abstract, or "out of control" nature of climate change.

To sum up, the qualitative analyses show the valuable contribution of adopting moral panic perspectives to studying polarisation in newspapers narratives. Moreover, the analysis supports the existence of two contrasting groups that present some traits of moral panics characterised by specific claim-makers and strategies to activate panics. The dichotomy between the two groups is evident in terms of "construction" of concern around a problem ("climate change vs scientific/political dishonesty"), consensus among the claim-makers ("mainstream scientists vs a minority of experts who are not necessarily climate scientists"), hostility against the threat ("climate change/deniers/polluters vs climate scientists/green politicians/activists/uncertainty"), disproportionality ("apocalyptic vs mocking tones"), and sensitisation/symbolisation processes ("collective problem vs ecological problem"). However, these conflictual forces generate confusion and multiple interpretations (also given that in the same group opposite arguments can be found), which seem to reinforce the "contrarian crusade", meaning that this might be the prevailing moral panic connected to elite groups' interests (in this case represented by all those "powerful actors" which gain advantages from perpetuating damage on the environment). The analysis of the news articles focused on "who" the claim-makers are, and "how" they are used and accompanied by specific processes of dramatization and sensitisation. It highlights the emergence of two contrasting forces, with the "status quo" direction (meaning "no action") eventually prevailing. This is mainly caused by a schizophrenic image resulting from climate narratives that makes it difficult to discern the scientific truth among multiple versions of the story. The issue related to "why" this prevailing moral panic takes shape will be further investigated in the next chapter, which focuses on the connections between newspaper reporting on climate change and conservative think tanks' narratives.

Summary

The analysis showed that the adoption of a moral panic perspective is useful to explore polarisation in newspapers' narratives around climate change. It highlighted both constant traits and evolution of the narratives "constructed" by the two groups especially in terms of "who" the actors involved are, and "how" climate narratives are built. In the left-leaning group, consensus prevails among the claim-makers, and the uncertainty focuses on consequences (first bloc), but it tends to be considered as a driver for improving knowledge around the unknown aspects. The frequency and intensity of dramatic tones associated with climate change increase especially between the first and second bloc. It has been noted a shift from trying to affirm the consensus among scientists in the first bloc, towards considering the actions needed (implicitly assuming that climate science is

settled). Climate change is the main folk devil that threatens the "societal order", and it is causing a combination of effects that are already happening. The moral duty to act against climate change (also using religious symbols) is emphasised.

In the centre-right group, there is an evolution from questioning the climate change phenomenon as a whole (the use of both "non-scientists" and contrarian scientists, who often belong to fields different from climate studies, emphasises a lack of consensus) towards questioning its consequences. The centre-right condemns the advocates' "faith" as completely based on religious beliefs that cannot be challenged and scientifically demonstrated. However, especially in the third bloc, the reference to scientific consensus increases, but it is often instrumentally used. In fact, the dramatization increases by emphasising the impossibility of solving a problem that is out of humans' control and associating climate change with "apocalyptic scenarios". At the same time, the uncertainty about the reality and the possibility of "calculating" the severity of these "extremely damaging" consequences is questioned. Ecological variations are mainly located in the future, and when they are considered as already happening, their link with climate change is not given for certain.

Two different moral panics emerge in relation to the partisan nature of the climate change debate. However, the overall picture resulting from climate narratives (considering both groups), on the one hand shows the persistent reference to the "out of control devastation", and on the other the negation/mockery of the consequences. This supports the idea that there is still confusion and inability to cope with this uncontrollable phenomenon. The resulting confusing image seems to support the sceptical crusade. This confusion is further increased by the simultaneous presence of contrasting positions within the same group of newspapers (limited number of sceptical articles in the left-leaning group, and limited number of consensus-oriented articles in the right-leaning group). In this sense it supports the idea of an "elite-engineered model" that reinforces elite groups' interests (in this case represented by all those "powerful actors" that gain advantages from perpetuating damage on the environment).

1. Introduction to the use of scientific frames, dramatization and symbols by conservative think tanks between 1988-2016

As highlighted in chapter four, the analysis of think tanks' documents focuses on those organisations mainly quoted by the newspapers analysed, which are the Global Climate Coalition (GCC), the CATO institute and the Global Warming Policy Foundation (GWPF). Figure 21¹³⁵ shows that these institutes are part of a wider network in which a constellation of research institutes and fossil fuel industry are interconnected. These connections are often expressed in terms of financial support from corporations to researchers/institutes. In this sense, this chapter contributes towards exploring if these think tanks play a role in activating and inflaming the polarisation characterising media reporting, thus amplifying corporate voices.

This chapter answers the third research question related to potential similarities between newspapers' reporting on climate change and think tanks' narratives. The next section will focus on the main aspects identified in analysing think tanks' press-releases and blog posts, and their similarities with newspapers' narratives. Four macro-areas in which they use scientific frames are connected to scepticism (and related sub-themes: denial of the problem, scientific aura of scepticism, and uncertainty); consequences (on both economy and society); policy-evaluations (in the light of techno-market forces and "developed vs developing countries' commitment"); and identification of folk devils.

The adoption of dramatization characterises two contexts, one related to the negative consequences of adopting climate policies on the economy, environment, and society; a second one aimed at "mocking" the alarmism surrounding mainstream science discourses.

The use of ecological, human, and religious symbols is mainly directed to mock science and deny the consequences of climate change.

¹³⁵ The figure only reports those actors that are mentioned by the newspapers. Exxon/Mobil represents a hub with direct or indirect connections with all the elements in the figure.

Legend

- ¹² Nigel Lawson is a British Conservative politician and a journalist, together with Benny Peiser he launched in 2009 in the House of Lords, The Global Warming Policy Foundation (2014).
- ¹³ Philip Stott is professor of biogeography at the School of Oriental and African Studies, University of London and Chairman of the Global Warming Policy Foundation's Academic Advisory Council (<https://www.thegwpcf.org/new-chairman-of-gwpcf-academic-advisory-council-2/>).
- ¹⁴ Matt Ridley is a British journalist and a member of the GWPF Academic Advisory Council (<https://www.thegwpcf.org/new-chairman-of-gwpcf-academic-advisory-council-2/>).
- ¹⁵ Benny Peiser is the director of the GWPF (<https://www.thegwpcf.org/who-we-are/dr-benny-peiser/>).
- ¹⁶ Richard Tol is professor of economics at the University of Sussex and a member of the GWPF Academic Advisory Council (<https://www.thegwpcf.org/new-chairman-of-gwpcf-academic-advisory-council-2/>).
- ¹⁷ Henrik Svensmark is an astrophysicist and a member of the GWPF Academic Advisory Council (<https://www.thegwpcf.org/who-we-are/academic-advisory-council/>).
- ¹⁸ Lilley Peter is a British conservative politician and a member of the GWPF board of trustees (<https://www.thegwpcf.org/who-we-are/board-of-trustees/>).
- ¹⁹ The George C. Marshall Institute was established in 1984 and financially supported by ExxonMobil since 1998. The Institute supported the Oregon Petition (see note 20) and published a book ("Shattered Consensus") edited by Michaels (2006), which includes the contributions of Sallie Baliunas, John Christy and Willie Soon (see Union of Concerned Scientists, 2007). It also supported the development of the "road map" campaign promoted by the API (see note 26) (Mulvey, & Shulman, 2015).
- ²⁰ The Anti-Global Warming Petition ("Oregon petition") was launched by Art Robinson (biochemist at the Oregon Institute of Science and Medicine) and supported by the George C. Marshall Institute (<https://www.desmogblog.com/oregon-petition#s4>) in 1998, and again in 2007. It claimed that more than 30000 scientists signed a petition against the existence of man-made global warming (Lavik, 2016). The initiative was linked to ExxonMobil (McKnight, 2010; Monbiot, 2006). The Petition was also supported by a paper published by the Journal Energy and Environment (1999) in which Willy Soon and Sallie Baliunas (two astrophysicists) appear as co-authors. This paper sustains that carbon dioxide emissions do not significantly contribute to climate change. Sallie Baliunas was also member of the Global Climate Coalition. Willie Soon is affiliated with Frontiers of Freedom. Finally, both authors have connections with the Heartland Institute and the George C. Marshall Institute (Union of Concerned Scientists, 2007). Moreover, Greenpeace (2013) found that Soon received funding from ExxonMobil, the American Petroleum Institute and Koch Industries.
- ²¹ Bjørn Lomborg is a Danish political scientist/statistician author of "The Skeptical Environmentalist" (2001) and Copenhagen Consensus Center (CCC), which was found to be financed by Paul Singer's foundation in 2013, and its early funders had links to the organisations funded by the Kochs (Readfearn, 2015).
- ²² Frontiers of Freedom (<https://www.ff.org/about/>) is an US educational foundation established in 1995 to comment on environmental regulations. The foundation received consistent financial support from ExxonMobil (Union of Concerned Scientists, 2007). It was involved in the development of the "road map" campaign supported by the API (see note 26) (Mulvey, & Shulman, 2015).
- ²³ The Frontier Centre for Public Policy (<https://fcpp.org>) is a Canadian public policy research charity established in 1997. It received \$25,000 from the Heartland Institute in 2007 (<http://conservativetransparency.org/recipient/frontier-centre-for-public-policy/>). Tim Ball (geographer) was member of its Expert Advisory Panel in 2010 (<https://www.desmogblog.com/frontier-centre-public-policy>).
- ²⁴ David Bellamy is a British botanist who authored books and newspaper articles in which climate change is contested (<https://www.desmogblog.com/david-bellamy#s13>). He is affiliated with the Heartland Institute (<https://archive.is/qf9ZC>).
- ²⁵ The Australian Institute of Public Affairs is a think tank established in 1943 (<https://ipa.org.au>) with several connections with the Liberal Party. It contests environmental regulation and receive funding from oil corporations including ExxonMobil (Bodker & Neverla, 2013). Among its founders, there is also Keith Murdoch, father of Rupert Murdoch (https://ipa.org.au/wp-content/uploads/2016/11/2015_IPA_Annual_report.pdf).
- ²⁶ The American Petroleum Institute (established in 1919) is the biggest US association representing oil and natural gas industry interests (<https://www.api.org>). In 1998, the American Petroleum Institute (including BP, Chevron, ConocoPhillips, ExxonMobil, and Shell) outlined a "plan" to spread misinformation about climate change among "average citizens" supporting the claims with scientific testimonies (Mulvey & Shulman, 2015).
- ²⁷ The British Petroleum (www.bp.com) is a British multinational oil and gas company established in 1908 and associated with the API. BP withdrew (together with Shell and Texaco) its membership from the GCC in 1997, starting to invest in renewable energies and recognising the harm cause by greenhouse emissions (Union of Concerned Scientists, 2007).
- ²⁸ Chevron (Chevron.com) is an American multinational oil and gas company established in 1879. It is a member of the API and, together with ExxonMobile, contributed to the development of the "road map" in 1998 aimed at misinforming the public about climate change-related issues.

1.1. Scepticism: denial of the problem, scientific authority of scepticism, and uncertainty around effects and actions to be taken

In the first bloc of years (1988-1997), sceptical scientists are represented as a collective entity and specific figures, who have connections with oil corporations (see chapter one), are mentioned (such as e.g. in the case of Baliunas) (GCC, 1998g, 1999a) (see also Table 46). This in order to highlight

the impossibility of acting in an uncertain and complex system. As shown in chapter one, the use of scientific authority aims to "manufacture uncertainty" (Dunlap & McCright, 2010) rather than explicitly refer to scientific disputes, by echoing the strategies adopted by the Tobacco industry to deny the damaging effects of smoking (Oreskes & Conway, 2008). This is shown by a tendency to defend the unique position that there is "no need" for limiting emissions in the developed world because there is "no crisis" (GCC, 1997f). The denial of climate change is not always explicit, but it indirectly derives from the constant reference to the damage caused by climate policies to the economy. At the same time, one article explicitly denies the connections (in terms of adoption of similar strategies to diminish the authority of the science) with other similar cases, such as the tobacco industry (GCC, 1997g). Consequences are also connected to policy implementation, which will produce negative impacts on both social and economic assets.

In the second bloc (1998-2007), the unreliability of climate science is reinforced by explicitly denying the existence of the problem, casting doubts on both its connections with human activities and the necessity of tackling the problem, and questioning the effectiveness of existing agreements. Both the GCC and the GWPF tend to explicitly or implicitly diminish the validity of climate science by criticising climate policies rather than specific aspects of the science. The CATO institute more explicitly attacks the science by denying several dimensions of the problem (sometimes related to its reality, sometimes to its consequences and policies to tackle it, and some others in relation to its causes) by using expressions such as "scientific fraud" (Taylor, 2006i), "the enviro playbook" (Taylor, 2006j) and "religious cult" (Taylor, 2006h). As the GCC in the first bloc, in the second bloc the CATO institute denies its similarities with the Tobacco industry in terms of "spreading scepticism" (Taylor, 2006b), but also the potential influence that companies such as ExxonMobil might exercise on their positions on climate change (Taylor, 2007c). This happens throughout the three blocs under examination. However, in the third bloc there is an evident attempt to affirm that the instances promoted by the CATO institute are supported by "scientists who are not part of the community of skeptics" (Goklany, 2008b). In a similar way, several times the GWPF claims its independence from organisations connected to the energy sector (see e.g. GWPF, 2009a, 2010b, 2014a).

In the third bloc (2008-2016), both the CATO and the GWPF less frequently deny the existence of climate change, but they use scientific evidence to argue that the consequences (if any) will not be harmful against what the mainstream scientists claim. Sometimes scientific arguments are also used to bolster the notion that greenhouse gases emissions have a minimal contribution to climate change and that these emissions, in addition to a slight warming, can be beneficial for both the earth and crop production. In this bloc, the greenhouse emissions are either denied as causes of climate change or valorised as benefits, especially when specific projects are promoted, such as in the case of denying the climate impacts of the Keystone XL pipeline (see e.g. Knappenberger, 2013a, 2013b, 2013c, 2013d, 2013f, 2013g; Knappenberger & Michaels, 2015a), and the need for producing energy from fossil fuels (see e.g. Idso, 2015; Knappenberger, 2014c; Michaels, 2014; Michaels & Knappenberger, 2013b, 2014b, 2015, 2016a). The shift towards a denial focused on the consequences of climate change (see also chapter one) is also manifest in the frequent references to "lukewarming"

approaches by the CATO, which acknowledge both the reality of climate change and the human contribution to it, but deny that the consequences will be negative (see Appendix 8). If the CATO institute is more oriented to deny the damage caused by climate change consequences, the GWPF adopts a focus similar to that adopted by the GCC by mainly denying the positive effects of mitigation policies in the UK. In fact, adaptation is prioritised given that the consequences of climate change are uncertain, and the current restriction-oriented policy regime is damaging both the economy and the society. Accordingly, the GWPF often calls on the government to suspend action aimed at UK decarbonisation and higher costs of energy (see e.g. GWPF, 2010c, 2015c, 2015g).

Reflecting the characteristics identified in the analysis of the centre-right leaning newspapers, in addition to a scientific aura of scepticism, representatives and scientists belonging to the think tanks are invested of the authority to criticise climate change science and climate-related policies. This happens mainly by referencing specific literature produced by scientists who work for the think tanks, CEOs, and senior coalitions' members, but also specific aspects of studies that might contradict some findings of climate change science. For example, the CATO institute refers to a study carried out by the Danish National Space Center¹³⁶ (Taylor, 2006f) regarding the cooling effect produced by clouds (thus, implying that the global warming can be naturally countered). Another example is the reference to a NASA's study reporting that "Antarctica is gaining mass" (see e.g. Knappenberger, 2012a, 2012b), hence contrasting climate change predictions about melting glaciers. Therefore, from this general picture it derives that "honest scientists" (Taylor, 2006j) are those who question climate change, whereas scientists' "assertions" entirely confirming climate change are "faith-based argumentation" (Taylor, 2007b). The institutes refer to papers published by their own members also emphasising their authority in the climate debate. The GWPF, for example, often refers to its role in conversing with other institutions such as for example the Royal Society, the World Meteorological Organisation and the MET Office. In these cases, the institute describes itself as a "controller" of the inaccuracies and misleading information spread by the "official voices" speaking for the climate science. The GWPF also refers to the controversy cited in chapter one of this work related to the literature review carried out by Cook et al. (2016) on scientific consensus around the connections between global warming and human activities, and in turn criticised by Richard Tol (2016) and Andrew Montford (GWPF, 2013) (both members of the GWPF). This in order to show that the methodology adopted by the authors is not appropriate and does not reflect the climate debate in any sense.

The uncertainty resulting from this contradictory debate around climate change is too high in terms of both policy making choices (mainly discussed by both the GCC and GWPF), and scientific evidence (mainly questioned by the CATO). Accordingly, policy implementation and international agreements are described as "controversial" (GCC, 1998e) and characterised by "political and intellectual cowardice" (Taylor, 2006a), because they are based on scientific uncertainties (GCC, 1998c, 1999f, 2000b). The focus on uncertainty is maintained throughout the three blocs by

¹³⁶ Henrik Svensmark is a member of the GWPF Academic Advisory Council and head of the Sun-Climate Research unit at the Denmark's National Space Center (<https://www.thegwpf.org/who-we-are/academic-advisory-council/>),

highlighting conflictual results in terms of the effects of greenhouse gases, the severity of consequences (positive, negative or absent), and policy making. However, particularly evident in the third bloc is the idea that, since the science is not "settled" (Pilon, 2009; GWPF, 2010e) neither in establishing the human contribution to climate change (given the inaccuracy of models), nor around the consequences of it (not necessarily negative), only "no-regret actions" (Goklany, 2009c) should be implemented, meaning "no-restrictions" on emissions. The uncertainty in climate science is further increased by scandals (such as e.g. "climate-gate"), which diminish both science credibility and scientists' professionalism (see e.g. GWPF, 2010d; 2011b).

1.2. Consequences on both society and economy

From the picture outlined above, the best solutions proposed by the institutes (mainly based on "in-house" and economic studies) to tackle the uncertainty around climate change are either a "no action strategy" or the valorisation of already existing voluntary actions implemented by the "free-market economics". In fact, the think tanks' focus is on the negative consequences on both economy and society resulting from the implementation of policies mainly based on "aggressive emissions reductions" (Kuznicki, 2008) and "decarbonisation" (see e.g. GWPF, 2010c, 2011d, 2014d). The social and economic costs of international agreements and national/local implementation of them are higher than dealing with the consequences of climate change, hence confirming the tendency for sceptics, already highlighted in chapter one, to promote adaptation rather than mitigation (Hobson & Niemeyer, 2013). The main ideas that are promoted are that there is no need to "penalise" the society (Mitchell, 2007) by "risking jobs" (GCC, 1998d, 1998f), rising energy costs for households (GWPF, 2010c, 2015g), and "wasting" time and money on something "vaguely scary" (Boaz, 2007), and "hopeless" (Taylor, 2006b). Echoing the characteristics of the right-leaning newspapers' narratives, the society is often represented as the main victim of the climate policies, especially in relation to higher costs for energy and loss of jobs, but also represented as in constant opposition to government decisions. While the severe consequences on social-economic systems are especially emphasised by the GCC in the first two blocs, and by the GWPF in the third bloc (but only marginally by the CATO, more oriented to "mock" both climate science and policies), this becomes a salient aspect of the CATO in the third bloc. In fact, mitigation strategies are strongly contested by both the CATO and the GWPF, by contrast supporting "adaptation" approaches which result from free-market mechanisms.

Chapter 7 Comparing newspaper reporting and sceptical think tanks' communication strategies

Key points

Chapter seven reports the results of the qualitative analysis of three think tanks' documents mentioned by the newspapers, and identifies similarities between these narratives and those proposed by sceptical oriented news articles. This helps answer the third research question related

to how contextual factors (represented in this case by think tanks) influence newspapers' narratives. It explores the use of scientists as claim-makers (section one); the adoption of dramatization to report on climate change (section two); and the use of symbols and symptoms of climate change (section three). Finally, it compares with the narratives of the newspapers and finds that there are some common traits (section four). This also helps illuminate why newspapers tend to construct climate narratives in certain ways.

1.3. Policy evaluations: techno-market faith and inverse climate "injustice"

An additional point of overlap with the centre-right leaning newspapers is the "techno/market faith" characterising these narratives. In fact, starting from the second bloc, the GCC particularly emphasises the value of "technology-centred approaches" (GCC, 2001), and the scientific advances in technological terms that already enable the industry sector to limit its impacts on the environment. Both the GCC and the CATO think tanks defend the "free-market economics" (Edwards, 2014), which has already spontaneously implemented measures to reduce impacts on the environment.

The estimations predicted by the Stern's report¹³⁷ about the costs of climate change consequences, are considered by the CATO institute as "alarmist" (Taylor, 2006k), and based on wrong indicators (Taylor, 2006l), not considering for example the development of new technology (Goklany, 2009a), and including a too extended period of time (Goklany, 2008b). All the think tanks highlight the need for limiting top-down restrictions by underlining the importance of voluntary and market-driven actions (see Table 46). Government intervention is strongly criticised, and its intervention should be only limited to the provision of incentives for new technologies (GCC, 1998b) and establish industry-government partnerships (GCC, 1998b). This aspect is particularly reinforced by the CATO institute in the third bloc. The development of new technology resulting from market-based logics is seen as the main solution to climate change that allows society to produce "cheap, reliable, scalable reliable energy" (Michaels, 2014). On the other hand, the GWPF tends to focus on the promotion of shale gas exploration in the UK, which is evaluated as the cheapest way to produce "environmentally friendly" energy (see e.g. GWPF, 2016a, 2016d, 2016e).

Moreover, throughout the period both the CATO and the GCC tend to highlight the limited action taken by developing countries and they hold this as an example of international political failure. This tendency characterises the GCC communication for the entire period under consideration. This reinforces the idea in the second bloc that developing countries will be the only beneficiaries of new regulations, and whereas the developed ones will be the "victims" (see Table 46 and Appendix 8). Similarly, this aspect becomes particularly evident in CATO's strategy of communication in the third bloc. In fact, since the economies of these countries are increasingly growing, this represents a risk for the developed countries, economically and environmentally penalised by the increase of their greenhouse gases emissions (and their request for financial support). The same idea is also promoted

¹³⁷ The Stern Review on the Economics of Climate Change (published in 2006) recognises the reality of climate change and the need to act urgently in order to avoid its negative impacts on worldwide economy.

by the GWPF in the third bloc, although less attention is given to the developing countries compared to the other two institutes.

1.4. Folk devils

Directly connected to the topic of "inverse climate injustice" is the identification of folk devils. In fact, for the GCC those held primarily responsible for international policy failures are represented by developing countries, whereas the CATO Institute identifies a constellation of different actors who are generally labelled as the "environmental lobby" (see e.g. Taylor, 2006b; 2008a). Politicians, activists, the media (and journalists), and scientists devoted to supporting "restrictive measures" to control greenhouse gases, are identified as "folk devils". In the third bloc in particular, they are represented as interconnected in implementing their "tactics" for spreading panic around climate change in order to gain attention, increase the economic pressures on the society, and financially support new scientific research. For example, using mocking tones, Michaels and Knappenberger (2016b) refer to a "mainstream press/science consortium" that uses weather events as evidence of climate change, whereas Taylor (2008b) highlights that "climate change alarmism is heavily influenced by the lust for power, the demands of ego, and the pursuit of political agendas". The reference to specific "green tactics" (Knappenberger, 2014a) adopted by environmentalists suggest a "conspiracy" aimed at spreading "alarmism" (see e.g. Knappenberger, 2013i; Knappenberger & Michaels, 2013c; Michaels & Knappenberger, 2015; Taylor, 2007c). In a similar way, the GWPF frequently condemns mainstream scientists' attempt to cover "dissenting views" (GWPF, 2010a) and the crisis in science credibility especially in relation to the climate-gate scandal. It is claimed that policy-makers, the media, scientists and the related climate lobbies are involved in distorting reality, and scaring people to implement costly actions that will only produce negative effects on both economy and society (GWPF, 2014e). For example, a document highlights how both the Government and the MET Office did not warn people about the severe cold winter in 2011 (assuming that this was an evidence of absence of global warming), because they wanted to preserve the forthcoming UN Climate Change Conference in Cancun while ignoring the damages to people (GWPF, 2011a).

Table 46. Think tanks' use of science throughout the three blocs

Macro-theme	Sub-theme	Think tank	Typical use
		1988-1997¹³⁸	
Scepticism	Denial of the problem	GCC	"There is no crisis at hand that would force us to take rash and hasty actions that could turn out to have devastating economic and social consequences" (GCC, 1997f).
		1998-2007	
		GCC	"Most climatologists believe global warming 'is a largely natural phenomenon'" (GCC, 1999c).

¹³⁸ Only documents from the GCC were available between 1988-1997.

Table 46. Think tanks' use of science throughout the three blocs

	CATO	"The truth is that my colleagues at Cato and I are skeptical about the end-of-the-world scenarios bandied about by zealots like Greenpeace, we anchor that skepticism in the peer-reviewed scientific literature, and that skepticism naturally attracts funding from those parties who like what they hear" (Taylor, 2007c).
	2008-2016	
	CATO	"With a polarized debate among the scientific community over climate change, what about experts who admit that climate change is real, but don't think it's the end of the world?" (CATO, 2009).
	GWPF	"The key problems with current policies for wind power are simple. They require a huge commitment of investment resources to a technology that is not very green, in the sense of saving a lot of CO2, but which is certainly very expensive and inflexible" (GWPF, 2012b).
	1988-1997	
	GCC	"Economist Dr David Montgomery will release a new study [...] examining the economic impacts of proposed climate change policies on eighty countries" (GCC, 1997b).
	1998-2007	
	GCC	"Dr. Baliunas said the scientific evidence for the link between solar variability and shifts in climate only began to emerge in the last decade or so" (GCC, 1998g).
Scientific aura/authority of scepticism	CATO	"Cato's intrepid Pat Michaels also filed a brief, joined by a number of other prominent climatologists, which tackles the dubious scientific claims of the environmental petitioners" (Moller, 2006).
	2008-2016	
	CATO	"Citing new evidence in the debate over the legitimacy of global warming, Senior Fellow in Environmental Studies Patrick J. Michaels explains scientific bias in his new book, Climate of Extremes: Global Warming Science They Don't Want You to Know" (Taylor, 2009).
	GWPF	"A new briefing paper published today by the London-based Global Warming Policy Foundation (GWPF) examines environmentalists' statements about droughts and heatwaves and finds them to be highly misleading" (GWPF, 2016b).
	1988-1997	
Uncertainty around effects or actions to be taken	GCC	"This decision was made without adequate economic facts and is based on uncertain climate science" (GCC, 1996a).
	1998-2007	

Table 46. Think tanks' use of science throughout the three blocs

		GCC	"Science behind climate change is uncertain" (GCC, 1999b).
		CATO	"In climate science, what you think is obviously true can literally change overnight, like the assumption of continued exponential growth of carbon dioxide, or how the earth responds" (Michaels, 2006).
		2008-2016	
		CATO	"We recommend that unless/until the collection of climate models can be demonstrated to accurately capture observed characteristics of known climate changes, policymakers should avoid basing any decisions upon projections made from them" (Knappenberger, 2012d).
		GWPF	"actions require choices to be made - each with economic and often overlooked ethical dimensions - and the uncertainties involved are greater than [...] many of the IPCC authors publicly acknowledge" (GWPF, 2014g).
		1988-1997	
		GCC	"According to the WEFA analysis, mandatory emission goals could result in a loss of Gross Domestic Product (GDP)" (GCC, 1997b).
		1998-2007	
		GCC	"The Kyoto Protocol could cause serious economic harm" (GCC, 1998c).
		CATO	"After all, why waste time and money fighting for a hopeless cause? Why not 'get a seat at the table' and try to minimize the damage that emissions controls might inflict on your business?" (Taylor, 2006b).
	Economy	2008-2016	
Consequences		CATO	"Just to be clear, I know many strong supporters of taking action against climate change who do not believe in this kind of protectionist approach. They recognize that local content requirements are economically harmful and shouldn't be part of these policies" (Lester, 2014).
		GWPF	"The Global Warming Policy Forum is calling on the Government to scrap Britain's unilateral Carbon Floor Price which is contributing to the crisis of UK steel and other energy intensive industries" (GWPF, 2015f).
		1988-1997	
		GCC	"American families could expect dramatic increases in consumer prices and unemployment" (GCC, 1997b).
	Society	1998-2007	
		GCC	"Our children deserve the same economic opportunities that we enjoy today. This treaty puts those opportunities in harm's way" (GCC, 1998d).

Table 46. Think tanks' use of science throughout the three blocs

		<p>CATO "A poll conducted a few months ago [...] for the European Commission, for instance, found that 59 percent of those (notoriously Green) Europeans surveyed were not 'prepared to pay more for energy produced from renewable sources than for energy produced from other sources'" (Taylor, 2006g)</p>
		<p>2008-2016</p>
		<p>CATO "Put these all together and you have a system in which the government will not only know where your vehicle is at all times, but can turn off your vehicle if it decides you are driving too much or driving in a way that emits too many grams of carbon dioxide or is otherwise offensive to some bureaucratic imperative" (O'Toole, 2015).</p>
		<p>GWPF "Lord Nigel Lawson, Chairman of the Global Warming Policy Forum, added: 'The UK's unilateral Climate Change Act is forcing British industry and British households to suffer an excessively high cost of electricity to no purpose'" (GWPF, 2014f).</p>
		<p>1998-2007</p>
		<p>GCC "Industries have reduced and controlled greenhouse gas emissions while investing billions of dollars on voluntary, common sense initiatives" (GCC, 1999b).</p>
		<p>CATO "American capitalists- motivated as much by the hunt for profit as they are by the quest so save the world- are undertaking a 'distributed Manhattan project' to develop economically attractive alternatives to fossil fuels. No centralized government program is necessary, thank you very much" (Taylor, 2006c).</p>
	Techno-market faith	<p>2008-2016</p>
		<p>CATO "It is worth noting that power plant CO2 emissions already dropped by about 15% from 2005 to 2012, largely, because of market forces which favour less-CO2-emitting natural gas over coal as the fuel of choice for producing electricity" (Knappenberger & Michaels, 2014a).</p>
		<p>GWPF "This lack of clarity will inevitably lead to constant government amendments and continual intervention, which will act as additional barriers to new entrants in the UK electricity market" (GWPF, 2012d).</p>
		<p>1988-1997</p>
	Inverse climate "injustice"	<p>GCC "There is a wider recognition of the fallacy of excluding developing countries - where the bulk of future emissions will originate - from requirements to manage greenhouse and gas emissions. Nonetheless, developing countries continued to assert adamantly their opposition to requirements to restrain emissions" (GCC, 1996c).</p>
		<p>1998-2007</p>
		<p>GCC "The emissions reductions from the US and other developed nations will be dwarfed by emissions from</p>
Policy evaluations		

Table 46. Think tanks' use of science throughout the three blocs

		developing nations" (GCC, 1998c).
	CATO	"New American car emissions count for only 6% of worldwide carbon dioxide emissions. Eliminating these emissions wouldn't necessarily reverse global warming or even appreciably slow it - particularly given the dynamic nature of emissions in developing countries" (Moller, 2007).
		2008-2016
	CATO	"So, while developing countries pursue 'luxuries' like indoor lighting and clean cooking facilities (not to mention improved sanitation), developed countries are awash in the luxury of debating whether to alter the relative components of their fuel mix in hopes that it may (or may not) alter the future course of the climate" (Knappenberger, 2014b).
	GWPF	"Paris agreement: a blank cheque for CO2 emissions by China and India" (GWPF, 2016c).
		1998-2007
	GCC	"She [Dr. Baliunas] added, however, that she was "dismayed" by the incivility of the climate change debate" (GCC, 1998g).
	CATO	"The environmental lobby has a lot at stake in presenting the appearance of inevitability with regards to greenhouse gas control" (Taylor, 2006b).
Folk Devils: Environmental lobbies as folk devils (scientists, politicians, and green activists)		2008-2016
	CATO	"We've discussed how the appetite for producing 'interesting' results-which in the case of climate change means results that indicate the human impact on weather events/climate is large, unequivocal, and negative-leads to climate alarm becoming 'a self-promulgating collective belief'" (Michaels & Knappenberger, CATO, 2016e).
	GWPF	"Questions have been raised about the reliability of the surface temperature data and the extent to which apparent warming trends may be artefacts of adjustments made after the data are collected" (GWPF, 2015b).

2. Use of dramatization frames

The analysis of dramatization frames shows the emergence of two macro-areas related to "inverse drama" and "mockery of drama". In the first case, the think tanks use dramatization to highlight the severe consequences of implementing climate change policies. In the second case, as was observed with the centre-right leaning newspapers, the drama per se is "mocked" and mainstream scientists are accused of being alarmist and wilfully exaggerating the consequences (if any) of climate change.

Since both the GCC and the GWF focus on describing the economic and social consequences of implementing climate policies, throughout the entire period the drama derives from the negative

effects on people's everyday life and economy resulting from action against climate change ("inverse drama"). Severe consequences on society's well-being are expected from the implementation of "ill-informed policies", which will also aggravate the environmental crisis (GWPF, 2014g), and fuel poverty (GWPF, 2010c, 2014d). However, they also "mock" governments and experts using expressions such as the "the White House tries to sell" (GCC, 1997c), "so-called experts" (GCC, 1997d, 1999c), "climate alarmists" (GWPF, 2009a, 2010e, 2011c, 2014a), "Kyoto albatross" (GCC, 1999e), "short" or "without" "common sense" Kyoto protocol (GCC, 1998a; 2000a, 2000c), and mocking the "unrealistic" and "irrational" interventions proposed by international agreements (see Table 47 and Appendix 8) based on "rosy predictions" (GCC, 1999d) and "emotional or political reactions" (GCC, 2000b). The scientific peer-review process is described as "haphazard and byzantine" (GWPF, 2016f), and the media reportage as "one-sided" (GWPF, 2012e) and "fraudulent" (GWPF, 2011e). The CATO institute is less oriented to adopt an "inverse drama" style in the first bloc, and more prone to "mock" climate science and its "supporters". The drama is related to a general "hysteria" (Michaels, 2006; Taylor, 2007a) that does not correspond to reality (Taylor, 2006a). It aims to spread an "eco-fascism plague" (Mitchell, 2007) based on "utter garbage" (Taylor, 2006i). Starting from the second bloc, the CATO combines both mocking tones (however prevalent) with inverse drama to highlight that people's lifestyle/morality and (global/local) economies (see e.g. Lindzen, 2013) will be severely affected by "irrational", "disastrous" (Michaels, 2012) and "bizarre" climate policies (Knappenberger & Michaels, 2013b).

However, the mocking tones are inherently part of the CATO's strategy of communication, which repeatedly emphasises the exaggeration of climate change consequences. In the third bloc, the message is that "global warming/climate change alarmists" (see e.g. Knappenberger & Michaels, 2013a; Michaels, 2009b; Taylor, 2010) over-exaggerate their finding through their "gloom-and-doom climate models" (Michaels, 2009a), providing "apocalyptic visions" (see e.g. Boaz, 2009a; Michaels, 2013a; Michaels & Knappenberger, 2014a) to support "the myth" of climate change (James, 2010; Illarionov, 2009).

Table 47. Think tanks' use of dramatization throughout the three blocs

Theme	Think tank	Typical use
	1988-1997	
	GCC	"There is no crisis at hand that would force us to take rash and hasty actions that could turn out to have devastating economic and social consequences" (GCC, 1997f).
	1998-2007	
Inverse drama	GCC	"Vast majority of economic studies suggest disastrous economic impacts" (GCC, 1999g).
	2008-2016	
	CATO	"Spending money on speculative, even if plausible, catastrophes instead of problems we know exist for sure is like a starving man giving up a fat juicy bird in hand while hoping that we'll catch several other birds sometime in the next few centuries even though we know those birds don't exist today and may never exist in the future" (Goklany, 2009b).

Table 47. Think tanks' use of dramatization throughout the three blocs

	GWPF	"During this time we have witnessed a near-complete shutting down of open scientific debate, militant hostility to any questioning of the claims or assertions of the IPCC, and the zealous promulgation of costly and irrational energy policies with inadequate regard for the balancing of human costs and benefits" (GWPF, 2015a).
	1988-1997	
	GCC	"We now have further evidence that unless the White House injects some common sense into the United Nations negotiating process, the train of economic progress and prosperity will be derailed for millions of Americans" (GCC, 1997a).
	1998-2007	
Mockery of drama	GCC	"The Highway Users also vigorously opposes the Kyoto Protocol, an international treaty that attempts to address climate change by forcing developed countries to limit energy use [...]. [...] we hope to convince lawmakers to fix congestion first before embarking on more cumbersome regulatory schemes, like the Kyoto Protocol [...]. Now we must continue to find new opportunities for our message of 'common sense instead of Kyoto'" (GCC, 2000c).
	CATO	"The legislation has no teeth, it has offers no program to translate wish into reality, and has all the earmarks of any number of empty environmental pledges that have turned to dust with the passage of time" (Taylor, 2006e).
	2008-2016	
	CATO	"Rational analysis must necessarily be based on systematic analysis, and not on cherry picking one's favorite catastrophes" (Goklany, 2009b).
	GWPF	"As a result of the absence of any recorded 21st century warming trend, the formulation now favoured by climate campaigners is that the last decade has been the warmest since records began. It is rather as if the world's population had stopped rising and all the demographers could say was that global population had been the highest ever recorded', Lord Lawson, the Chairman of the Board of Trustees, said" (GWPF, 2009b).

3. Symbols: ecological, human and religious symbols

Both the GCC and GWPF do not often use symbols. However, in the GCC's case, since the analysis of the consequences of climate policies is often debated in relation to societal implications, the documents refer to human symbols more frequently than any other symbols. Children and families are used as symbols of a future that is threatened by these policies (see Table 48 and Appendix 8). In addition to human symbols, which mainly emphasise the improvement of well-being achieved thanks to fossil-fuel consumption, in the third bloc, the GWPF also uses ecological and religious symbols to both deny the link between ecological events and climate change, and mock climate science, using e.g. expressions such as "polar bear scientists" (GWPF, 2015d), "ecodogmatism" (GWPF, 2016d) and "blind faith" (GWPF, 2011c).

In common with the GWPF, but more frequently, the CATO institute adopts ecological symbols, especially in the third bloc. However, they are used as evidence of natural variations rather than climate change. In fact, extreme weather events are cited such as e.g. hurricanes, storms, snowfalls,

floods, and drought, to mock the "environmental apocalypse" (Taylor, 2007a), which erroneously and unjustifiably attributes these natural events to climatic changes. Moreover, the same symbols used by newspapers to show the dramatic effects of climate change, such as coral reefs, glaciers, sea level rise and polar bears, are used to denounce the "tactic" of the "environmental lobby" to scare the society, and by contrast to demonstrate that natural environments and their population naturally adapt to changes. In the third bloc, ecological symbols are also combined with human symbols to highlight the "false" connection between the increases in human deaths due to climate change (especially in relation to extreme weather events). Human symbols are also used to show how the "fossil fuel era" (Knappenberger & Michaels, 2013d) has improved societies' well-being, and how the environmental lobby holds humans responsible for causing global warming. This use of symbols is in line with the attempt highlighted in chapter one to portray environmentalism as the folk devil that threatens Western societies' wellbeing. Finally, especially in the third bloc, religious metaphors and icons aim to diminish the validity of science by calling it a "religion" (Pilon, 2011a), a "cult" (Michaels & Knappenberger, 2016c), an "orthodoxy" (Pilon, 2011b), a "dogma" (Michaels, 2014), a "credo" (Knappenberger & Michaels, 2015b) and a "collective belief" (Lindzen, 2014; Michaels & Knappenberger, 2016d, 2016e). Moreover, references to the Pope's statements and encyclicals are made to contest the idea that capitalism has negatively affected the environment.

Table 48. Think tanks' use of symbols throughout the three blocs

Theme	Think tank	Typical use
	1998-2007	
	GCC	"72 percent of state climatologists say weather events in their states in the past 25 years have not been more severe or frequent" (GCC, 1999c).
	CATO	"The Left says yes - only the ideologically disabled or intellectually dishonest deny that the four horsemen of the environmental apocalypse (drought, disease, sea rise, and hurricanes) will soon devastate our fair planet" (Taylor, 2007a).
	2008-2016	
Ecological symbols	CATO	"Just think of all the stories that you have heard about the loss of Arctic sea ice, and the threat to polar bears, seals, native peoples, etc. [...]. When it comes to a poster child for global warming, there is little better than some furry dewy-eyed arctic creature precariously perched upon the last bit of ice in an otherwise ice-free Arctic ocean" (Knappenberger, 2013e).
	GWPF	"Whenever an extreme weather event is widely reported by the news media, a heated debate about its possible link with global warming is set off. The latest example of this kind of speculation was triggered by the recent flooding in Kashmir" (GWPF, 2014c).
	1998-2007	
Human symbols	GCC	"The Kyoto Protocol [...] endangers our children's future" (GCC, 1998a).
	2008-2016	

Table 48. Think tanks' use of symbols throughout the three blocs

	CATO	"Notice that there is not a single study cited that links changes in heat waves to changes in heat-related mortality [...]. Despite rising heat, fewer American's die from heat-related causes (when properly adjusted, of course, for population increases and changes in age structure). But such information is nowhere to be found [...] Instead, the section on extreme heat events [...] goes on to say that extreme heat causes death" (Knappenberger & Michaels, 2014b).
	GWPF	"almost every indicator of human well-being from life-expectancy to health to standard of living has improved beyond measure largely because of our use of fossil fuels" (GWPF, 2015e).
	1998-2007	
	CATO	"The Global Warming Cult" (Taylor, 2006h).
	2008-2016	
Religious Symbols	CATO	"The Church of Global Warming" (Boaz, 2009b).
	GWPF	"In his report [...], Andrew Montford [...] shows the Society's gradual closing of critical scrutiny and scientific impartiality and the emergence of an almost dogmatic confidence that climate science is all but settled" (GWPF, 2012a).

4. Comparing newspaper reporting and sceptical think tanks' communication strategies and final considerations

To answer the third research question regarding potential influences on newspapers' narratives by conservative think tanks, some similarities were found between them. Even though both the GCC and the CATO institute focus on the USA context (the first one particularly oriented to question political and economic interventions), whereas the GWPF is more concerned with UK policy implementation, it is possible to identify some similarities between their narratives and those adopted mainly by British centre/right-leaning newspapers. Given that these institutes are embedded in a network of connections with the oil industry from which they receive support, those media narratives inspired by these conservative think tanks, voluntarily or involuntarily serve oil interests by explicitly or implicitly promoting no action against climate change. As shown in chapter two, a further structural reason for such sceptical-oriented coverage might be found in the connections between newspapers' owners and external corporations with stakes in the energy/environmental sector¹³⁹. Moreover, advertising sponsored by polluting companies (e.g. car, transport and oil industry) accounts for large revenues in newspapers, especially if their political orientation aligns with right wing values (Stop Funding Hate, 2017). Accordingly, a report published by Influence Map (2019) shows that BP, Shell, ExxonMobil, Chevron and Total are the companies with the highest annual

¹³⁹ E.g. Rupert Murdoch owns part of Genie Energy, involved in oil exploration in Syria (see chapter two) (Craig, 2013).

expenditure on promoting communication strategies and supporting advertising platforms that frame climate change as a "dual energy challenge" (McCarthy, 2019). Although this does not necessarily mean that these connections interfere with editorial lines, some studies found cases of "censorship" or "auto-censorship" in media reporting, which in turn affect the critical reading of climate change-related issues (Anderson, 2009, see also chapter two).

A first point of contact is in line with one of the characteristics identified by the Union of Concerned Scientists (2007) in exploring the similarities between communication campaigns that deny climate change and those that denied smoking-related health risks. This concerns the construction of "manufacturing uncertainty" through the use of scientific evidence to support the denial of several aspects of climate change (such as its existence, its causes, and its consequences). In common with the centre/right-leaning narratives (see chapter six), sceptical/denial arguments are reinforced by the adoption of a scientific aura, by either focusing on specific studies/reports that somehow support their cause (while "mocking" the ones that contrast them) or mentioning scientists who belong to different fields from climate science, especially economists and "independent scientists/organisations". This is consistent with the characteristics listed in chapter one regarding sceptics' strategies of communication (see e.g. Austin, 2002; Buell, 2003; Douglas, 2007; Dunlap & McCright, 2010; Herrick & Jamieson, 2001; Jacques, 2006, 2008; Jacques et al., 2008; Gelbspan, 1997; Lahsen, 1999, 2005; McCright, 2000, 2003; Mooney, 2005). In fact, conservative discourses attribute "authority" to businessmen, directors of the institutes (and "in-house" scientists, e.g. Patrick J. Michaels, Chip Knappenberger, Bjorn Lomborg, and Richard Lindzen in the case of the CATO institute, or Indur Goklany, Andrew Montford, Benny Peiser, Richard Lindzen, Nigel Lawson, and David Whitehouse in the case of GWPF) to criticise the mainstream science and the related policies.

The similarities between think tanks' narratives and centre/right-leaning reporting are illustrated by the use of the same quotations, such as for example in the case of David Whitehouse, science editor of the GWPF, who supports a "global warming pause" that is ignored by mainstream scientists. The exact same quotations are reported by both the GWPF (2012c) and the *Daily Mail* as authoritative voice in the climate debate (Webb & Smith, 2013). In a similar way, on other occasions both the *Daily Mail* (Rose, 2013) and *The Daily Telegraph* (Delingpole, 2011a) use Whitehouse's authority to support the global warming standstill. Moreover, other members of the think tanks, such as for example Philip Stott, Bjorn Lomborg, Richard Lindzen, Benny Peiser and Nigel Lawson are cited by the right-leaning newspapers as reliable and respectable scientific voices (see e.g. Boyle, 2014; Phillips, 2006; Webb & Smith, 2013)¹⁴⁰ who criticise the reduction of carbon emissions damaging for the economy (see e.g. Clark, 2005; Delingpole, 2013; Rose, 2013), and question the rise of temperatures (and are "marginalised" by the mainstream scientists, Delingpole, 2010a). By contrast, the centre/left-leaning newspapers tend to describe them as "highly-paid consultants to the fossil fuel industry" (Brown & Vidal, 1997, p.4), and their work as "nonsense" (Burke, 2004, p.24) and aimed at creating fake controversies around climate change consequences (Ward, 2015).

¹⁴⁰ In some cases, they are authors of the articles, see e.g. "Save the world, ignore global warming" published by *The Telegraph* (Lomborg, 2005).

Further supporting the line of research that identified an instrumental use of uncertainty by conservative think tanks to deny climate change and support delay in action (Union of Concerned Scientists, 2007), and likewise newspapers' narratives (see chapter six), the think tanks tend to combine denial with uncertainty. Similarities can be found in diminishing mainstream science validity by questioning (mainly in the first two blocs) the capacity to "separate man-made factors from natural phenomena" (Hawkes, 1991), and the certainty that "fossil fuels are the villains" (Stelzer, 1997). Moreover, "claims that man-made pollution is causing 'unprecedented' global warming have been seriously undermined" (Matthews, 2003, p.16), because global warming is "largely a natural phenomenon" (Bellamy, 2004, p.12), and "some scientists question the very notion that humans are even responsible for global warming" (Matthews, 2000, p.25). In a similar way, and in line with those studies that found a connection between the representation of climate change as a natural phenomenon and promotion of no intervention (Lakoff, 2010), the think tanks advance the idea that "compared to natural climate changes spurred by the sun, any global warming resulting from increased greenhouse gases in the atmosphere would be slow and insignificant" (GCC, 1998g), and that "carbon dioxide and other greenhouse gases is not a necessary condition for period of warming to arise" (Taylor, 2006d).

Starting from the second bloc, in both cases the consequences are considered, but described as uncertain. In this vein, the centre/right-leaning newspapers highlight that there is "no evidence suggesting future extreme weather events, such as severe storms or droughts, increases in infectious diseases, or changes to forests and other" (Clover, 2000, p.10), and that scientists claim opposite effects at the same time, being incapable of agreeing with one another (such as e.g. simultaneously suggesting that Cornwall will freeze and become a desert, see Nott, 2005). On the other hand, the think tanks suggest that the "warming will likely be modest and of no particular consequence" (Taylor, 2006c).

From this, the aim of the think tanks is to "unmask" the manipulation of data by those who claim that climate science is settled. In a similar way, as noted in chapter six, the "hockey-stick curve dispute" (Mann et al., 1998) is used by the centre-right to emphasise the importance of sceptics' approaches in unmasking the manipulation perpetuated by mainstream scientists (Delingpole, 2009; Delingpole, 2011a). The "lukewarming" approach, based on accepting climate change reality but refusing either the existence or the gravity of consequences, becomes especially evident in the third bloc. Accordingly, even though the scepticism around the causes never disappears completely, both newspapers and think tanks tend to emphasise that the rise of both temperatures (Delingpole, 2012) and sea level are connected to melting glaciers (see e.g. Delingpole, 2011a), and that the consensus around the severity of the consequences (see e.g. Booker, 2009; Hanlon, 2006) are exaggerated by scientists. By contrast, positive effects have been identified by science for both humans and nature in some parts of the globe (see e.g. Batchelor, 2015; Beall, 2016; Prigg, 2014). The uncertainty is instrumentally used to highlight the impossibility of formulating appropriate preventive measures. By contrast, adaptation approaches to uncertain (if any) future consequences are preferred to mitigation, thus defending the "status-quo", meaning support for liberal-market mechanisms and for energy production systems based on fossil-fuel/nuclear power/natural gas. This further supports that

the "scientific debate" tends to be overshadowed by the discussion of political, technological and economic arguments (Bourk et al., 2015; Chetty et al., 2015; Chubb & Nash, 2012; Davidsen & Graham, 2014; DiFrancesco & Young, 2011; Lee et al., 2013; Stoddart et al., 2015; Young & Dugas, 2012; Yun et al., 2012), and this is in line with those findings reported in chapter three relative to sceptics' attempts to reduce climate change to a "secondary" technical issue (Influence Map, 2019; Uldam, 2013). Accordingly, potential solutions to climate change are discussed in terms of both technological advances and economic costs (Cherry et al., 2013; Nerlich et al., 2012), while neglecting the cultural and social impacts of a broader "sustainable living" (Cherry et al., 2013). The free-market logics, in addition to technological developments, are emphasised as the main ingredients to adapt to potential climate change. The idea that climate policies cannot be based on global warming "hysteria" (see e.g. Michaels, 2010; Taylor, 2008a) and "uncertainty" (see e.g. Daily Mail, 2002, p.22; GCC, 1996b; GWPF, 2014g; Michaels & Knappenberger, 2015) is supported by both think tanks and centre/right-leaning newspapers throughout the entire period. In fact, the costs of preventive policies are higher than "no action" (Knappenberger & Michaels, 2013b), and they will also increase the costs of energy, damaging both the economy and the society (see e.g. Bellamy, 2004; GCC, 1998f; Lea, 2004; Pearce, 1990).

Another similar aspect in the narratives proposed by the two groups, relates to the representation of developing countries. In fact, as already noted in the analysis of newspapers, the reference to think tanks' representatives, such as e.g. Philip Stott, supports the idea that climate change is not a priority for developing countries, or the space given to Bjorn Lomborg as author of the article, highlights the economical drawbacks for developed countries of intervening in the developing ones (Lomborg, 2005; Searjeant, 2004). In addition to the developing countries, there is also a tendency to identify the same folk devils, mainly represented by scientists, environmentalists in general, the media and policy-makers who are in favour of climate policies. These actors are represented as all connected in their "tactics" to implement "restrictive policies" and fund climate research to support the "political/scientific/media propaganda" (see e.g. Delingpole, 2010b; GWPF, 2011e, 2012e; Illarionov, 2009). By contrast, as observed in the right-leaning narratives, there is a tendency to describe "sceptics" as victims of this circuit. For example, Michaels and Knappenberger (2013a) denounce that "David Rose of the Mail on Sunday was vilified for saying that there's been no global warming". As noted, in a similar way, *The Telegraph* refers to the marginalisation of journalists for their scepticism (Delingpole, 2010a). It is also claimed by both groups that this conspiracy is based on the tactic of blaming people for their culpability in bringing about climate change (see e.g. Daily Mail, 2002; GCC, 1999c; Goklany, 2008a; Knappenberger, 2013h; Stott, 2003), and scaring them with "doom-laden" and "catastrophe" scenarios (Clark, 2013; GWPF, 2014b; Michaels & Knappenberger, 2015) in order to implement "draconian measures" and "state-enforced population control" (see e.g. Delingpole, 2010a; Knappenberger, 2012c). These findings reinforce the idea that sceptics tend to represent themselves as "victims" and "marginalised" (Jaspal et al., 2016) by the "environmental lobby", which is the real folk devil. In this sense, sceptics self-proclaim themselves as a counter-movement that aims to "unmask" the strategies adopted by mainstream scientists to gain advantages at the expense of the society. Moreover, similarities can be found in terms of adoption of

dramatization. In fact, a similar tendency can be identified in inverting the drama caused by the implementation of "oppressive" (Delingpole, 2013) and "suffocating" (Baker, 2007, p.51) climate policies; and mocking the drama adopted by "climate alarmists" to support their "cause" (see e.g. Booker, 2016; GWPF, 2009a, 2010e; Warren, 2014) by defining climate change consequences as a "myth" (see e.g. Bellamy, 2004, p.12; Booker, 2009; Illarionov, 2009; Michaels & Knappenberger, 2016f). This peculiar use of dramatization suggests a specific tactic of the "denial machine" to further diminish science credibility. In fact, it supports the notion that sceptics frame climate-change discourses in a way (and through a specific language) that aims to reduce both public concern (see e.g. Luntz's unpublished memo partially reported in chapter one, regarding the use of specific terms to diminish the severity of the problem), and people's willingness/commitment to tackle the problem (Saunders, 2017).

These considerations are also connected to another similarity between the two groups relative to the use of symbols to diminish climate science validity. In fact, ecological symbols are used to "mock" the connection between extreme-weather events and climate change, such as for example in the case of Typhoon Haiyan in the Philippines in November 2013. *The Telegraph* (Delingpole, 2013), the Cato institute (Michaels, 2013b, 2015) and the GWPF (2013) sustain the belief that it represents an example of "speculation" aimed at attributing natural phenomena to climate change. Moreover, similarly to what was observed in think tanks' narratives, children are represented by right-leaning newspapers as "suffocated" (Ahuja, 2010, pp.54-55) by climate propaganda (Daily Mail, 2007). Even though in some cases the centre-right uses both ecological and human symbols to highlight the consequences of climate change on both nature and society, a tendency to use these symbols to show beneficial effects of climate change has been observed (see e.g. Austin, 2016; Beall, 2016; Lea, 2004). Finally, the religious symbols and metaphors are used by both groups to "mock" climate science and highlight its unjustified and unproved claims around climate change. This further supports those findings in the literature that show how religious metaphors are used by British conservative newspapers to diminish the scientific validity of climate studies, by e.g. depicting them as an irrational faith-based religion (Woods et al., 2012)

To answer the third research question, the identification of similarities between centre/right-leaning newspapers and conservative think tanks, showed that these actors (and the corporations behind them) represent sources of information and a focal point for right-leaning framing of climate change. This supports the view that newspapers (especially centre/right wing-oriented) play a role within the circle of denial of climate change. Moreover, as highlighted in chapter five, despite differences between newspapers in relation to their political orientation, the analysis of each moral panic showed an overall "success" of a "carbon-heavy status quo instance" (Moser, 2010), which promotes confusion to justify policy delay. This depends on the fact that both centre-right and centre-left leaning newspapers present affirmative or dissenting instances around climate change (with a prevalence in one direction or the other in relation to their political standpoints). However, the traits of the "dissenting" narratives (in both cases) reflect those advanced by these conservative institutions, which establish who, how and what should be criminalised. This is line with those studies that show how corporate and political interests promote climate change contrarianism by using multiple

channels and strategies (Dunlap & McCright, 2010, 2011) and that moral panics are tools to reaffirm the "powerful structure in time of crisis" (Brisman, 2012, 2013; Brisman & South, 2015). In this sense, amplifying their positions, the media attribute to these actors the authority to speak for the climate (see also Boykoff, 2011), thus suggesting that the media do not merely serve the "elite-power", but they are equally important in terms of activating moral panics. This means that neither the interpretation provided by the attributional model (Goode & Ben-Yehuda, 2009; see also Hall et al., 1978), which interprets the media as passive recipients of other claim-makers' views, nor that provided by the processual model (Cohen, 1972), which interprets the media as primary-definers, can completely capture the multidimensionality of the climate change debate. In contrast, in line with Critcher (2008), mass media, claim makers and political elites seem to be all responsible for creating a "circuit of communication", which in turn generates moral panics in relation to contrasting interests at play. In fact, newspapers provide their version of the story in relation to different factors, among which, as this thesis showed, their political orientation and connections with external sources of information, play a role in generating two contrasting moral panics.

To sum up and connect the third research question to the overall research question that guided this work, these results suggest that contextual factors, specifically represented by political orientation of newspapers, connections with conservative think tanks and in turn with business' interests (mainly represented by the oil industry), influence newspapers' discourses around climate change. Moreover, they show that the moral panic framework is useful to capture the differences between opposite narratives, and investigate the role of the media in supporting specific instances. Finally, they support those approaches to moral panics as an "ideal type" that should be adapted to the context under consideration (Critcher, 2008; Rohloff, 2012). Accordingly, this work showed similarities between the Propaganda Model (Herman & Chomsky, 1988) and Moral Panic that help both guide the research and interpret the results. In fact, both approaches highlight the necessity of investigating the role of the media in reproducing the interests of powerful groups. As suggested in the introductory paragraph of this section, the relation between the media and external forces (such as conservative think tanks, advertising and oil corporations, also through shares held by owners of newspapers in oil companies) not only influences the political content of the media (as e.g. suggested by the advertising of the PM and the power-play relations supported by some moral panic approaches, see e.g. Hall et al., 1978), but also indicates an active role of the media in co-producing discourses around climate change (see also Good, 2008). In other words, this suggests a direct and active role of the media (and their owners) in negotiating with other "powerful actors" the meaning and values to be transmitted in relation to their own interests. Moreover, as suggested by both the moral panic and PM theories the media inform their content by referring to external sources, therefore they legitimise specific claim-makers. This reinforces the active role played by the media in supporting specific orientations, further supported by the identification of specific folk devils/enemies (or "anti-factor" elements for the PM).

Finally, as noted in the analysis of newspapers' articles and their more or less marked orientation to represent sceptical voices (and conservative think tanks' positions), the use of a moral panic framework first helped identify two "conflicted moral panics" (Maneri, 2013) characterised by

specific political orientation and framing tendencies (that differ in terms of those "Who" activate the process, "How", and "Why" moral panics arise); second, it suggested the prevalence of a "stillborn moral panic". In fact, following Maneri (2013), "stillborn moral panics" emerge when the "urgency" of dealing with a "threat" is overshadowed by the prevalence and imposition of deniers' positions (that become primary definers). Accordingly, as shown by both chapter five and chapter six, and further supported by the connections observed between sceptical newspapers' narratives and conservative think tanks, despite a prevalence of affirmative or dissenting instances in relation to their political orientation, both groups of newspapers include opposite and conflictual narratives. This generates a general confusion that increases a sense of uncertainty around the problem, which in turn supports the sceptical/denial crusade (see also Rice et al., 2018). In fact, as shown by the analysis of the think tanks' documents and supported by the literature (see Dunlap & McCright, 2010), the "manufacturing uncertainty" is integral part of the "denial machine" to undermine the necessity for environmental regulation. Moral panics help guide the interpretation of the "schizophrenic" images that populate the debate supporting the idea of a "strategy" ("flak filter") to promote the status quo (meaning "no action"). The fact that sceptics (and their conservative think tanks) define themselves as a "counter-movement" to "unmask" scientific dishonesty should be read as a "flak mechanism" to re-direct the media and public attention on the need to maintain a "carbon-heavy status quo" (McCright & Dunlap, 2001, 2003; Moser, 2010).

In conclusion, this empirical evidence reinforces previous analyses in relation to the schizophrenic nature of climate change discourses, which in turn supports the interpretation of moral panic as "working in reverse" in the case of climate change (Brisman, 2012). In fact, the overall uncertainty resulting from such a confusion shows a lack of consensus in the scientific community. In turn, this undermines scientists' credibility, and by contrast increases sceptics' authority as claim-makers, while contributing towards depicting climate change accepters as "folk devils" (Brisman, 2012, 2013; Brisman & South, 2015). Moreover, the disproportionality that characterises climate change can be read in reverse since the mainstream scientists are still under-represented if compared to the reporting of a negligible number of dissenting voices. Finally, the result of such representation favours the "sceptical crusade" because it explicitly and implicitly promotes a "no intervention strategy" (or delay in action) due to the high level of uncertainty, and therefore encourages the perpetuation of the anti-environmental business-as-usual.

Summary

Answering the third research question, the analysis showed that similarities exist between those newspapers' narratives that tend to be sceptical around climate change, and those proposed by conservative think tanks. The interconnections between these institutes and the oil industry, and the influence that their narratives play in determining the sceptical "story line", show that the media "voluntarily" or "involuntarily" reflect elite positions. However, this also suggests that newspapers (especially centre/right wing-oriented) play a role within the circle of denial of climate change. Think tanks' echoes are mainly found in centre/right-leaning newspapers' narratives throughout the period, firstly questioning or denying the causes (especially first bloc), then the consequences (mainly in the third bloc). However, whether they are causes or consequences,

whether it is complete or partial denial, these narratives aim to sabotage the adoption of preventive measures, and by contrast support liberal-market mechanisms and technological advances for tackling environmental problems. Moreover, connecting the third research question to the overall question guiding this research, and given that sceptical traces can also be found in some left-leaning articles, the "nebulous aura" surrounding climate change discourses further supports the interpretation of moral panic as "working in reverse". In fact, reversing the moral panic traits, the uncertainty resulting from this "schizophrenic image" supports i) a lack of consensus within the scientific community, and by contrast sceptics' authority as claim-makers; ii) no need for concern given the high uncertainty; iii) climate change accepters as "folk devils"; iv) and disproportionality in terms of under-representation/estimation of mainstream scientists (almost the unanimity) in comparison to the reporting of a minority of sceptical voices. Finally, the uncertainty deriving from such confusion suggests that a "no/delay intervention strategy" should be preferred until the scientific consensus is reached.

Conclusions

The overall aim of this thesis was to empirically explore the application of the moral panic framework to study media narratives of climate change, drawing upon a unique dataset of news articles over three decades. To answer this overarching question, three sub-questions were formulated in relation to the application of this frame to a specific case study (British newspapers), to "how" moral panics can be used in the presence of conflicts (deriving from contrasting political forces at play), and to the reasons behind this polarisation (external influences). These questions derived from the review of the literature, in addition to the identification of a gap in the literature in terms of clarifying the nature of the conflictual character of the climate change debate. In fact, as highlighted in the introduction of this work, a limited number of studies have tried to apply the moral panic framework to climate change narratives, but they have produced contradictory results. Explanations of these contradictions can be found in the focus on single narratives while disregarding the overall picture (which, as shown by this thesis, helps dissolve these conflicts). Moreover, previous studies mainly adopted inductive approaches that led to rival conclusions because they focused on different elements relative to specific narratives. By contrast, the originality of the present thesis relies on the first attempt to operationalise the moral panic framework by adopting a media framing approach to the study of climate change messages. This also enables replication in other contexts and including other media products. Moreover, this work shows that moral panics are still useful concepts/tools not only for exploring the role of the media in constructing the meaning of social facts (e.g. climate change), but also for understanding the reasons behind apparent conflicts, and the strategies adopted by powerful actors to "defend" their interests by inflaming confusion/uncertainty. Studying the process of constructing climate change meaning by adopting a moral panic frame was appropriate for identifying the actors "who" are involved, "how" the conflict evolves towards the prevalence of one moral panic, and "how" and "why" this rivalry takes place (influenced by external factors).

The main implications of this study can be identified, firstly, in the use of a tool (moral panic framework) that can be still valuable for exploring conflicts in which powerful interests are involved (such as corporate interests in the case of climate change), secondly in further understanding how the "denial machine" works. This means that this thesis contributed towards illuminating the "missing link" between the media communication of climate change and think tanks' denial strategies. This relates, not only to the direct or indirect influence exercised by these institutions on the centre-right leaning media, but also to the centre-left role in creating the favourable conditions for their counterparts to prevail (for example by assuming defensive positions and presenting fragmented editorial lines by including both advocate and sceptical articles). This is significant in terms of understanding and explaining public opinion on climate change and understanding and explaining policy-making responses on the part of the political elite. In fact, even though it is not possible to speculate on this aspect, as highlighted throughout this thesis, the empirical evidence (e.g. public opinion polls) reveals that both public and decision-makers' opinions are still not completely convinced about climate change, despite the almost unanimous scientific consensus around its

existence, causes and consequences. This also means that the communication strategies adopted by the stakeholders (in this case mainly fossil fuel dependent corporations), and their linked think tanks, are incorporated into media reporting, which in turn affects both public and policy-makers' perception. These findings contribute towards increasing awareness on aspects that might be useful for both climate communicators and policy-makers to define their strategies of communication (especially on the media arena) in a conflictual environment.

Proceeding in an orderly manner, the first research question examined the possibility of applying the moral panic framework to British newspapers' reporting on climate change between 1988 and 2016. This work showed that moral panics are useful to identify the traits of narratives in which a specific threat (and the related folk devils) is recognised by the claim-makers as progressively causing a societal crisis with a consequent moral duty to intervene to re-establish the pre-existing order. However, moral panics also contribute towards understanding rival situations characterised by symmetrical and opposite forces, such as in the case of British newspaper reporting on climate change. In the British context, contextual factors such as the political orientation of newspapers (that reflects elite-power conflicts between conservative and progressive forces) and corporations' influences (mainly fossil fuel industry) can help explain this polarisation. The literature review highlighted that three main points are common to a number of moral panic approaches, related to the necessity to identify "Who", "How", and "Why" moral panics arise. The results of the quantitative analysis support the idea that moral panics can be applied to capture the traits of a polarisation. In turn, two moral panics emerge from such polarisation, which are characterised by specific voices "Who" speak for the climate and strategies through which ("How") they are constructed. The framework developed and adopted in this study captured the majority of the aspects that newspapers' narratives share with moral panics. The combination of existing frames, previously identified by studies on media framing of climate change, with the moral panics' constitutive elements (as identified by both the processual and attributional models) fills a gap in the literature, which so far presented media reporting on climate change as fragmented (mainly due to their inductive-oriented approaches). The implications are that this study enables replications in other contexts that can be used in a comparative perspective by future research aimed at further understanding climate change-related moral panics. In turn, this might help both policy-makers and scientists identify strategies of communication that are precise and linear in supporting action against climate change. In fact, the exploration of different contexts can contribute towards identifying those elements that can attenuate political polarisation and promote science-based approaches to tackle climate change.

The polarisation of newspapers' narratives is directly connected to the second research question that focuses on identifying the characteristics of rival climate change narratives in British newspapers. Accordingly, chapter five and chapter six both quantitatively and qualitatively identified the attributes of these two contrasting messages. Importantly, the centre/right group is a source of moral panics, suggesting that moral panics can work in reverse as is argued by Brisman (2012) and Brisman & South (2015). That is, the centre-right suggests that climate change is an "a-moral" issue that does not need to be "righted". On the other hand, messages from the centre-right can be considered as an example of "bad moral panics" as the narrative corresponds to specific "negative"

attributes of the moral panic frame. These messages from the right attempt to activate "concern" around science reliability (prevalence of sceptical items around both causes and consequences); to show "consensus" among the claim-makers (a minority of experts who are not necessarily climate scientists) around the lack of consensus within the scientific community, meaning that scientists have neither answers nor solutions; and to inflame "hostility" against specific folk devils (identified in mainstream scientists and advocates in general). The disproportionality relates to the use of either mocking tones to underestimate the problem, or intentional exaggeration of the problem to emphasise the human incapability of coping with climate change. In this case, the "moral crisis" relates to the threat (constructed and imposed by the folk devils who are scientists and environmentalists) to people's way of life. Therefore, intervention is invoked to reaffirm the pre-existing order and stop the attempt of these folk devils both to scare people and to implement restrictive regimes (on fossil-fuel exploitation).

On the opposite (centre/left) side, the findings support Rohloff's (2012) interpretation of climate narratives as attempts to activate "good moral panics" by encouraging "concern" around climate change that threatens the "planet" (and humans); supporting "consensus" among the claim-makers (mainstream scientists) and stimulating societies to self-reflect on those "wrong" values and behaviours that contribute towards causing this situation. In this case, the "hostility" is against climate change (main folk devil), but also corporations, industrialised countries, polluters in general and sceptics. The disproportionality relates to the attempt to "propagate fear" by focusing on the dramatic consequences of climate change. Sensitisation and symbolisation processes represent climate change as a "collective problem" which dramatically affects both human society and nature. Intervention is invoked to stop the exploitation of natural resources and the pollution of the environment.

However, particularly evident in the centre-right group is an evolution from questioning the climate change as a whole, towards an increasing consensus around the causes and scepticism around consequences, which despite their devastating potentiality, are uncertain or out of humans' control. The fact that the characteristics emerging from these two groups support different scholars' findings, which appear contradictory, reinforces what is highlighted in the introduction of this conclusive section. In fact, this conflictual character can be solved only by simultaneously looking at the two different contrasting moral panics separately (which are characterised by specific traits), and at the overall picture resulting from their combination. The implication is that even though the literature highlights that the scientific consensus has progressively become dominant in the climate change debate (meaning that advocate narratives prevail), this does not necessarily mean that scepticism no longer exists in media discourses. This has also implication in terms of how uncertainty and confusion can be instrumentally used to promote inaction and hostility against intervention. Indeed, this work highlights that, despite the quantitative prevalence of consensus-oriented articles, when observing both the single narratives and the overall picture deriving from their combination, the representation of scientific certainty around climate change is "schizophrenic", "unclear" and "uncertain". In turn, this confusion contributes towards creating the idea that such uncertainty makes it difficult to identify appropriate counter-measures to climate change. These findings provide insights for both policy-makers and scientists suggesting that communications based on uncertainty,

conflicting information, but also apocalyptic scenarios, favour the sceptical crusade by supporting delay in action (due to a lack of a certain line of action). However, they also suggest that the intersections between these "uncertainty-based" narrative styles and their evolution should be further explored in the light of potential connections between newspapers, editorial groups and journalists with external sources (in particular fossil-fuel corporations).

These considerations lead to the third research question regarding the influences of conservative think tanks on climate narratives, which also help explain the reasons behind the right-leaning approach and its evolution. In fact, echoes of think tanks' communication strategies were found throughout the period, firstly questioning or denying the causes (especially in the first bloc), then the consequences (mainly in the third bloc). Moreover, in addition to the adoption of a similar language to "mock" climate science, and the identification of the same folk devils, additional points of overlap were identified in the use of claim-makers (and their statements) and scientific evidence (often produced by in-house scientists who work for the think tanks). The combination of a "complete denial" with the promotion of uncertainty, firstly regarding the causes, then the consequences, is an additional common trait. Furthermore, the use of climate change symbols (such as e.g. extreme weather events, polar bears, and melting glaciers) to deny the risks associated with climate change is a peculiarity of both groups. Finally, the combination of all these traits tends to explicitly (in particular through mocking strategies) and implicitly sabotage governments' intervention against climate change. The implicit sabotage is represented by e.g. prioritising adaptation instead of mitigation by suggesting that the costs of dealing with future and uncertain consequences are lower than preventing potential damages. Another example is represented by the identification of villains in the developing countries by suggesting that their development should be contained to avoid damages to the economy of the developed countries. The main solution proposed by these narratives relies on free-market logics based on self-regulation of the market with minimal/no intervention of governments. The identification of the connections between these conservative think tanks and the media narratives contributes towards understanding how the "denial machine" works, and how the media legitimise and amplify their messages. The fact that similarities can be found mainly between right-leaning narratives and those proposed by these institutions suggests that the adoption of similar strategies of communication might not be a coincidence. This is important because the media legitimise and amplify "who", "how" and "what" has to be criminalised by trying to drive the public attention. These results might be valuable for policy-makers who intend to promote the implementation of action against climate change. In fact, they show that the media tend (in conjunction with external forces such as conservative think tanks) to drive public and policy-makers' attention towards specific free-market-based solutions in favour of fossil-fuel dependent businesses.

To answer the overall question that guided this work, relative to the possibility that climate change media communication promotes moral panics, it is necessary to reflect not only on the single narratives (advocate versus sceptical) influenced by the partisan orientation of newspapers, but also on the general picture resulting from the combination of them. In fact, this work showed that even in the context of rival forces that generate "conflicted moral panics", one direction prevails, which in this case is the conservative line of the "story". However, this can only be understood by

simultaneously observing the processes of construction of each single narrative and their constitutive elements, and their comparison. Accordingly, as highlighted firstly by the literature review, and secondly by the empirical sections of this work, the image of climate change depicted by British newspapers is "schizophrenic", indicating that climate science is "unstable" and the uncertainty behind every aspect of the phenomenon is too high to support a unique narrative line. This also means that in the climate change debate the prevailing position is that there is not a unique guiding interpretation of the climatic events. The fact that previous studies show contrasting results in terms of attributing moral panics traits to climate change narratives, further supports that the "instability" of these narratives causes the emergence of opposite folk devils as well as folk heroes. And it mainly depends on the perspective adopted, the specific narratives under consideration, the time-period, but also the geographical context (see for example the "blame game" identified in the "developing vs developed countries" dispute). For example, mainstream scientists might be primary definers and folk heroes of the left-wing narratives, but they can become folk devils for their counterparts. By contrast, this work contributes both theoretically and empirically towards exploring climate change narratives by simultaneously looking at both the specific traits of each narrative (characterised by political affiliation) and the overall picture resulting from the combination of them. From a theoretical perspective, this study showed that moral panics are still valuable tools for exploring polarisation. Moreover, this thesis operationalised moral panics to investigate newspapers' narratives of climate change, and empirically applied the developed framework to a specific case study. In fact, in the British context, the politicisation of newspapers' narratives around climate change causes a fracture between two groups characterised by specific dominant traits, which in turn correspond to moral panic attributes. Considering these opposite forces simultaneously, the resulting image is a combination of contradictory features. One might contest this approach by claiming that the readers of specific newspapers (in particular if motivated by political reasons) tend to read newspapers that support/reinforce their pre-existing values. However, considering that, alongside the main tendencies, each newspaper also includes a minority of examples that present the characteristics of the opposite part (sceptical for the left-leaning and advocate for the right-leaning), confusion and uncertainty emerge as the common trait for both narratives. Moreover, this deviance from the main tendency is frequently connected to the journalists who authored the articles. This opens new questions related to how media workers frame their narratives and potential influences on their interpretations of the news. This aspect might be further investigated, also in relation to the intentionality of journalists (and newspapers) to create specific storylines and the related moral panics in the context of climate change.

Therefore, simultaneously considering the two narratives, the overall "confusing image" resulting from both conflicted panics ("centre-left vs centre-right"), and the multidimensionality within the same politicised narrative (such as in the case of the drama dimension in which the problem is "dramatized" also by the centre-right) might evolve in "stillborn moral panics" (Maneri, 2013), because it might favour the "status quo instance", which is rooted in economic, social, and political interests. The interconnections between conservative think tanks and the oil industry, and in turn their influence on dictating the sceptical "story line", suggest that the media "wilfully" mirror elite power

conflicts. Accordingly, some similarities have been showed between the moral panic frame and the Propaganda Model. However, the moral panic frame turns out to be an appropriate tool for identifying the contrasting characteristics of opposite newspapers' narratives in a specific context, whereas, given its focus on macro-level analysis, the PM might be more pertinent in the context of exploring the overall implications resulting from a more univocal and homogeneous version of the story. The moral panic framework enables to capture the complex nuances of a debate, which, however, seems to favour the "denial cause". Nevertheless, the political economy approach helps reflect on the controversial and contrasting forces that populate the media debate around climate change. However, some approaches only admit contrasting voices if they represent elite positions (Bennett, 1990). In the case of climate change, although the opposite forces at play might reflect existing elite-conflicts, the media themselves seem to play the role of claim-makers that empower (and in turn are empowered by) specific actors to become authoritative definers of the problem. This is particularly evident when considering that the newspapers attack each other (also naming specific journalists) and other media as an integral part of the debate. This means that they simultaneously support and are supported by external powerful actors. Accordingly, the idea of a "circuit of communication" (Cricher, 2008) in which the media, other claim-makers, and political elites are all responsible for generating moral panics, is supported. The similarities and differences between the two approaches for studying climate narratives, and the possibility of operationalising the PM in the context of British newspapers might be an object of further investigation.

Finally, this thesis serves to reveal how climate change meaning, as constructed by the media, might influence public/political discourses. In fact, as highlighted throughout the work, the current political debate and the public understanding of climate change appear to be "paralysed" also due to the "confusion" promoted by media narratives. Moreover, the identification of interconnections between right-wing think tanks and media narratives can help policy-makers understand how to overcome sceptical barriers to climate understanding. This also means that this work contributes towards identifying those elements that inflame hostility and resistance to climate change acceptance. Climate change communication that aims to promote "intervention-oriented" approaches should take into account the dialectics between the forces at play.

Some limits of this work should be highlighted such as e.g. in the sample used for this study. Given the great number of articles, it was impossible for one researcher to analyse and code all of them. As a result, this thesis relied on a sample of articles that restricted the representativeness of the sample to three blocs of years, and to two wider groups of newspapers distinguished as per political orientation. This shadowed the potential evolution of the narratives over shorter periods, and the potential differences among newspapers' ownerships. This limitation might be addressed by future research that focuses on shorter periods by adopting both quantitative and qualitative approaches to analyse specific phases/attributions of moral panics.

Some additional limitations of this work relate to the impossibility of formulating in-depth reflections on both the public and political reaction to media narratives, as well as on the real effects produced by these communications amongst these two levels. Some approaches to moral panics suggest conceiving the public as a rhetorical device used by the media in their negotiation/interaction

with powerful actors. However, exploring how the public reacts to specific narratives is equally important to formulate communication (and policies) that can be effective in terms of activating "good moral panics". Moreover, the focus on newspapers limits these considerations to specific narratives. Further research might include different media products such as e.g. television programmes and documentaries. Furthermore, even though the study included both print and online news articles, online interactions through social media and blogs are integral parts of the construction of the meaning of climate change. It might be interesting to explore if and how the characteristics identified in newspapers' reporting can be found in these contexts. These might further support policy-makers and scientists in developing strategies of communication/interaction that might be effective in promoting public engagement.

Finally, as suggested throughout these conclusive remarks, it is not possible to show if moral panics are created a priori by newspapers in order to defend specific stakes. Accordingly, further research is needed by involving journalists, editors, owners and the analysis of newsroom dynamics. However, despite the limits and the multidimensionality of climate change narratives, this work showed that the moral panic framework is still an appropriate tool to investigate media interactions with the political and economic levels.

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**MORAL PANICS AND NEWSPAPER
REPORTING IN BRITAIN: BETWEEN
SCEPTICAL AND REALISTIC
DISCOURSES OF CLIMATE CHANGE**

Volume 2 of 2

M L Ruiu

PhD

2019

**MORAL PANICS AND NEWSPAPER
REPORTING IN BRITAIN: BETWEEN
SCEPTICAL AND REALISTIC
DISCOURSES OF CLIMATE CHANGE**

Volume 2 of 2

Maria Laura Ruiu

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Appendix 1. Coding examples

MEDIA INVENTORY COMPONENT: CONCERN, CONSENSUS, AND DISPROPORTIONALITY

Sources of Information, Disproportionality and General Prevailing Framework

Sources of information/Claim-makers frame:

1. Government/Politicians

"GORDON BROWN has blamed a lack of ambition by China and America for the failure of the Copenhagen climate change summit [...]. Mr. Brown, who is angry at the failure of the talks, said that never again should 'a handful of nations' hold the rest 'to ransom'" (Porter, 2009).

2. Businesses

"BP has warned that carbon dioxide emission levels from burning fossil fuels are unsustainable unless the international community unilaterally introduces tougher binding regulations on atmospheric pollution [...]. Bob Dudley, BP chief executive, said: 'The most likely path for carbon emissions, despite current government policies and intentions, does not appear sustainable'" (Critchlow, 2015).

3. Other Media

"The two-hour documentary follows Larsen and Waters on their 2014 attempt to break the record for the fastest human-powered traverse to the North Pole. But the race against the 2006 benchmark of 49 days, set by a Norwegian team, quickly becomes a struggle to ski, trudge and, eventually, swim their way across the rapidly changing Arctic" (Enders, 2015).

4. Public/Civil Society

"The poll canvassed views on climate change among the 'major religious traditions' in the US. Surprise, surprise, it shows that 'white evangelical Protestants' were the group with the lowest level [...] of acceptance that there is solid evidence that global warming is real and that it is attributable to humans" (Hickman, 2009).

5. NGOs/Activists/Associations

"Campaigners also voiced their disappointment. Catherine Pearce, international climate change campaigner at Friends of the Earth, described the latest draft as disastrous. 'There seems to be no kind of real commitment at all in some of the essential areas. [...]', she told BBC Radio" (Bennett, 2005).

6. Scientists

"Scientists say diseases including dengue fever and the West Nile virus could become common as warmer weather attracts insects from parts of Asia and Africa. The biggest threat to the UK comes from the Asian tiger mosquito, which spreads dengue fever and the Chikungunya virus" (Batchelor, 2015).

7. Celebrities

"Meanwhile, more than 50 celebrities and personalities committed to the fight against climate change [...] flocked to the conference in Le Bourget to encourage the efforts. 'Perhaps this is the most exciting time in human history', said Penn, at a special conference event" (Calderwood, 2015).

8. Justice/Law enforcement

"The justices said in a 5-4 vote along ideological lines that the Environmental Protection Agency cannot apply a permitting provision of the Clean Air Act to new and expanded power plants, refineries and factories solely because they emit greenhouse gases" (Associated Press, 2014b).

9. Religious Officers

"POPE Francis has called on America to take more action on climate change with a rousing speech during his first ever visit to the country" (Gutteridge, 2015).

General Frame:

1. **Consensus frame:** General recognition of scientific consensus around causes, entity, consequences and need for intervention

"A survey published yesterday by the association of 78 scenarios of the greenhouse effect world-wide reveals a consensus that reductions of 40 per cent in carbon dioxide emissions are technically and economically feasible within 15 years" (Fagan, 1990).

2. **Partial consensus:** General recognition of scientific consensus about causes and existence of the problem, uncertainty about some other aspects (severity of consequences or types of actions to be taken)

"The remote regions are highly sensitive to climate change [...]. But scientists warn existing climate models do not work well and failed to predict the dramatic break up of Antarctic ice shelves in recent years. They say by tagging deep-diving beluga whales and ice burrowing seals they will be able to build up a more accurate picture of future climate change" (Martin, 2006).

3. **Neutral frame:** No specific position expressed¹

"The report will form the basis for discussion when environment ministers meet in Geneva at the second World Climate Conference in November. It concludes that the heating over the past 100 years is between 0.3C and 0.6C, which is compatible with greenhouse warming models but might as easily be explained by climatic variation. To be certain that it was the result of global warming would require a further 0.5C increase. If the models are right, that will take place in ten to 15 years a second reason why it will take time to be sure whether global warming is occurring. If it is, the models predict a rise of 3C before the end of the next century if no changes are made to the emissions of greenhouse gases (Hawkes, 1990).

4. **Partial scepticism:** Partial recognition of scientific consensus around some aspects, but negation of consequences, no intervention is needed

"Climate change has been widely portrayed as a force that will leave staple food crops struggling in many areas where they are grown today. But a new study has shown that increasing levels of carbon dioxide in the atmosphere may actually lead to greater yields of key crops like wheat, rice and soybeans [...]. While the effects of a complex changing climate makes it difficult to predict exactly how crops in different parts of the world will grow, overall rising carbon dioxide levels could be beneficial" (Beall, 2016).

5. **Sceptical frame:** Presentation of the problem as controversial and uncertain in all regards, a conflict between different parties

"But the ultimate irony of providing funds for alternative energy sources is that the Meteorological Office has revealed that global warming 'is a myth'" (North, 1994).

Problem Definition Frame:

1. **Topic: Scientific:** the problem is presented as a scientific issue; reference to scientists; reference to scientific findings

"The Intergovernmental Panel on Climate Change (IPCC) said that evidence was now 'unequivocal' from direct observations of global average air and sea temperatures, the widespread melting of snow and ice and rising sea levels. The scientists said there is a more than 90 per cent probability that the rise in temperatures is man-made. The IPCC report estimates that continued emissions [...] will lead to an increase in global average temperatures of between 1.8C and 4C by 2100 - with the most likely figure around 3C" (Clover, 2007).

2. **Topic: Political:** the problem is presented as a political issue; reference to political figures; government way of tackling the problem; reference to policies

"The Kyoto protocol aimed to achieve cuts in emissions of greenhouse gases by up to three per cent, far below the 60 per cent reduction that scientists say is needed to halt man-made climate change. But without the United States, which is responsible for a quarter of greenhouse gas emissions, it may

¹ In this case longer extracts are needed to show how the climate change issue is discussed (by e.g. referring to political negotiations), but no specific position is expressed about the scientific consensus.

fail even to achieve the original target [...]. The agreement, though much watered down, establishes rules by which industrialised countries will have to cut 5.2 per cent of their 1990 emission levels by 2010" (Clover, 2001).

3. **Topic: Economic and Energy:** the problem is presented as an economic issue; reference to specific economic factors and energy-related issues

"[The report] said the effects of climate change had lowered global output by 1.6 percent of world GDP, or by about \$1.2 trillion a year, and losses could double to 3.2 percent of global GDP by 2030 if global temperatures are allowed to rise, surpassing 10 percent before 2100. It estimated the cost of moving the world to a low-carbon economy at about 0.5 percent of GDP this decade" (Daily Mail, 2012).

4. **Topic: Technological:** climate change is presented as a problem to be tackled through technological tools

"Experts could be able to 'suck' carbon dioxide out of the air by using an experimental system called BECCS -Bio-energy with Carbon Capture and Storage. It would involve growing crops that absorb CO₂ from the atmosphere then burn them in a power station to generate energy [...]. The net effect of that process would result in CO₂ being removed from the air. Britain would be an ideal place to try the technology" (Spencer, 2014).

5. **Topic: Ecological/Environmental/meteorological:** climate change is presented as an issue concerning the natural world and its damage (focus on plants, animals, biodiversity, habitat, and/or weather events such as heat waves, droughts, floods, and weather trends)

"A third of the world's land mammals and plants could become extinct through global warming in just 50 years, British scientists warned yesterday [...]. Among the one million species that could be lost is the dunnoek, a common British garden bird. Also in peril is the crested tit, seen in Highland forests, and the Scottish crossbill, the only bird found solely in Britain" (Ingham, 2004).

6. **Topic: Civil Society:** climate change is presented as a societal problem; reference to Civil society, NGOs, people engagement/affection, people habits, footprint and life style

"Some 375million people are affected every year by climate change [...]. Most of the 600,000 or so people killed as a direct consequence are in the Third World, but in 2003, 70,000 Europeans died because of diseases caused by global warming. It impacts on the quality of water, the price of food, even the future availability of smart-phones [...]" (The Sun, 2015).

MEDIA INVENTORY COMPONENT: EXAGGERATION, DISTORTION AND SYMBOLISATION

Exaggeration, Distortion and Symbolisation:

Dramatization Frame:

1. **Mockery:** the risks of climate change are "mocked"/dismissed or presented as opportunities

"Meanwhile, further evidence emerges that 'science' informing the IPCC's prognostications of Man Made Climate Doom is junk science" (Delingpole, 2011a).

2. **Slightly dramatic:** the consequences of climate change might cause negative consequences, but not exactly measurable or specified.

"The scenes might not be as dramatic as the mass migration and wars over diminishing resources that some predict, but they do show changes which are expected to be expensive to adapt to, and sometimes deadly for native wildlife and plants" (Jowitt, 2007).

3. **Neutral:** consequences are evaluated neither positive nor negative

"Overall, the world is getting warmer due to increasing greenhouse gas emissions that trap the sun's heat. But, given natural climate variability over short times scales, the likely effect of global warming over humanly relevant periods such as the length of a person's life is not so well understood" (Zolfagharifard, 2015).

4. **Dramatic:** the consequences of climate change are represented as negative, but not as beyond humans' control

"The draft of the third report says that reducing global warming to 2C, beyond which the impacts would start to become irreversible, 'will require large-scale changes of the global energy system as well as cuts in greenhouse gas emissions over the coming decades'" (Spencer, 2014).

5. **Extremely dramatic/alarmist:** the consequences of global warming are presented as catastrophic, irreversible and beyond humans' control

"The changes are out of all proportion to anything that anyone has experienced in modern times', says Dr Wad-ham, and he fears much worse" (Simons, 1997).

Balance Frame in relation to consequences:

1. **Certainty:** The article only presents arguments that consequences of global warming exist and they will affect the "status quo"

"The ten hottest years on record have all happened since 1991 and experts say the pace of climate change seems certain to accelerate. Without urgent and decisive action, it is going to have a damaging impact on every one of us - every continent, economy, society and every family" (Blair, 2007).

2. **Mostly certain:** The article presents uncertainty around the severity of consequences, but emphasises that consequences of global warming exist

"While projections show that the world will warm and climate will change, there's still a level of uncertainty about how much, and that makes the problem all about how much risk we accept, said MIT climate scientist Kerry Emanuel" (Zolfagharifard, 2014).

3. **Balanced:** The article presents a balanced account of debates surrounding the existence/severity of the consequences of global warming

"The consensus is still that global warming is on the way. Carbon dioxide levels are still expected to double. Sea levels are likely to go on rising. The scientists who triggered the alarm bells still believe what they believed six years ago - and 10 years before that, too. But all the questions turned out to be bigger, and harder to answer [...]. There, the certainty stops and the guesswork begins. Nobody actually knows what is going to happen. The best guess - now a conservative one - is that on average, the planet's temperature will rise by 1.5-4.5C in the next century and that sea levels will rise by half a metre" (Radford, 1994).

4. **Mostly uncertain:** The article presents uncertainty around the severity of consequences, but emphasises the dubious nature of the claim that consequences of global warming will be negative

"While the effects of a complex changing climate makes it difficult to predict exactly how crops in different parts of the world will grow, overall rising carbon dioxide levels could be beneficial" (Beall, 2016).

5. **Uncertainty:** The article only presents arguments that consequences of global warming are not predictable or not exist

"I am not a climate scientist but I know enough about scientific method to see that not enough is yet known about Earth's climate to sustain the level of certainty with which the climate change lobby has interpreted computer projections of rising temperatures" (Clark, 2013).

Symbolisation Frame:

1. Nature

"Polar bears are facing extinction because the ice they live on is melting, conservationists warn" (Chapman, 2002).

2. Humans

"This is Shishmaref, the Eskimo village on a tiny Alaskan island that's in the frontline of a losing battle with global warming [...]. Science teacher Ken Stenek, who lives on the island with his wife and four children, says: 'Many adults are fearful for the future. Some are having nightmares over the warming weather. Our children share that fear. They wonder what life will be like if the village moves, and what will happen to the graves of family members buried in the village cemetery'" (Arnold & Wigmore, 2007).

3. Religious symbols

"Like many primitive religions it is based around sun-worship, and the fear of natural catastrophe [...]. Its most devoted adherents have that characteristic which is a particularly irritating aspect of the self-righteously religious - that sharing in the belief is in itself a sign of virtue. But even if you are of the true faith, you cannot seriously believe in the miracle that you personally have a 'chance to change the climate'" (Lawson, 2006).

THE OPINION AND ATTITUDE THEMES COMPONENT: HOSTILITY

Orientation; Images; Causation

Orientation-Moral/Ethical Frame:

1. CC as **benefit** (e.g. for nature/health/economy/society)

"While the effects of a complex changing climate makes it difficult to predict exactly how crops in different parts of the world will grow, overall rising carbon dioxide levels could be beneficial" (Beall, 2016).

2. CC as **risk** (e.g. for nature/health/economy/society)

"Climate change is increasing the risk of severe flooding and it will never be fully possible to prevent these disasters, according to CBRE flood-risk expert Ian Joyner. Thousands of families and businesses have been left facing financial hardship after the recent floods" (Swan, 2016).

Images/Folk Devil Frame:

1. **Scientists** are depicted as villains (scientists, and their findings, are discredited, criticised, mocked, identified as responsible for undermining the current "status quo")

"If scientists can't even get the mundane activities of the plant world right, we are entitled to wonder what else they have got wrong in their prediction of environmental catastrophe for the entire planet [...]. Climate change scientists clearly make a habit of overlooking the evidence which happens to blow a hole in their entire theory. The global warming industry has been created and sustained by three sources of gross scientific fallacy" (Phillips, 2006).

2. **Contrarians** are represented as villains (contrarians, and their claims, are discredited, criticised, mocked, identified as responsible for undermining scientific certainty)

"In the run up to the UN climate change summit in Copenhagen in 2009, sceptics spread misleading accounts about the contents of emails that had been illegally hacked from the Climatic Research Unit at the University of East Anglia [...]. This is just the latest attempt by climate change sceptics to damage confidence in the global temperature record, which shows about 0.85C of warming since the start of the late 19th century, according to the latest report by the Intergovernmental Panel on Climate Change (IPCC)" (Ward, 2015).

3. **Politicians/Policy-makers** are represented as villains (policy-makers, and their actions, are discredited, criticised, and mocked)

"Donald Trump has consistently expressed his conspiratorial and misinformed beliefs that global warming is a hoax" (Nuccitelli, 2016).

4. **NGOs/Activists/Environmentalists** are represented as villains (activists, and their actions, are discredited, criticised, mocked, identified for undermining the current "status quo")

"There are many more such claims made by the green lobby which just don't stack up. The evidence of imminent apocalypse provided by such phenomena is, to put it mildly, inconclusive" (Phillips, 2006).

5. **Businesses** are represented as villains (businesses, and their actions, are discredited, criticised, mocked, identified as responsible for climate change)

"Indeed, the company [ExxonMobil] has financed about 40 organisations dedicated to debunking global warming, starting in the late 1980s. Mr. Raymond himself has twice served as chairman of the climate change denying Global Climate Coalition" (Gumbell, 2006).

6. **Industrialised countries** are represented as villains (their actions are discredited, criticised, mocked, identified as responsible for climate change)

"This travesty of global climate justice, say many developing countries, is largely the fault of the US, which, backed by Britain and others industrialised countries like Canada and Australia, has helped build up distrust in developing countries by continually trying to deregulate the international climate change regime by weakening the rules, shifting responsibility to the south and making derisory offers of financial help" (Vidal, 2014).

7. **Poor/Developing Countries** are represented as villains (their actions are discredited, criticised, mocked, identified as responsible for climate change)

"That is an incendiary idea. China, India and other developing countries will resist any deal that would hamper their economies because they argue they are still developing" (Worthington, 2009).

8. **Civil Society** is represented as villain (their actions are discredited, criticised, mocked, identified as responsible for climate change)

"Official: global warming is all our fault [...]. 'February 2, 2007 may be remembered as the day the question mark was removed from whether people are to blame for climate change'" (Clover, 2007).

9. **Climate Change** is represented as villain (the phenomenon per se and its causes are represented as a threat)

"This expert panel concluded that average temperatures are rising, polar icecaps are melting and consequent rises in sea levels could devastate both economic and human life. It said that changing weather patterns, more violent storms and the tropicalisation of temperate regions, would add to the chaos" (Mail on Sunday, 1997).

10. **Other media/Journalists:** are represented as villains (media reporting and journalists' conduct are described as manipulator of reality)

"The BBC's Editorial Compliance unit has blasted its flagship Today programme over its failure to provide balance on a debate on climate change. The show's editorial team was found to have given minority views and opinions 'equal footing' to those of the scientific consensus" (Boyle, 2014).

11. **Law Enforcement:** are represented as villains (unjustified abuse of power usually against CC activists)

"Police used pepper spray liberally and demonstrators were confronted by police dogs. Magnus Leitt, one of the protesters sprayed, said: '(The spray) went right into my eyes, I couldn't do anything to get out of the way. It burns like fire. But the worst thing is that you start to hyperventilate, you can't get your breath and then it's hard not to panic'" (Watts & van der Zee, 2009).

Causation Frame:

1. **Anthropogenic:** The article only presents arguments that anthropogenic global warming exists, clearly distinct from natural variations

"There is widespread evidence of anthropogenic warming of the climate system in temperature observations taken at the surface, in the free atmosphere and in the oceans' it [IPCC Report] says" (Connor, 2006).

2. **Mostly anthropogenic:** The article presents both sides, but emphasises that anthropogenic global warming exists, distinct from natural fluctuations

"Today, some 60 per cent of methane originates from human activity, the rest coming from wetlands and other natural sources [...]. About a third of human-generated methane is a by-product of the fossil fuel industry" (AFP & Plummer, 2016).

3. **Balanced:** The article presents a balanced account of both anthropogenic and natural global warming

"This sentiment sums up everything that has gone wrong with the green debate - whichever side you are on. Like most people, I am not a scientist. If a man in a white coat with a lot of letters after his name shows me a graph and says it proves that the planet is getting warmer because of the effects of man-made carbon emissions, I tend to believe him. The problem is that if another man with an equally dazzling coat and accumulation of letters says that no, actually, the Antarctic ice cap is 30 per cent thicker than it was 30 years ago and climate change is caused by sunspots, not CO₂, then I'm swayed by him, too" (Radford, 2009).

4. **Mostly natural:** The article presents both sides, but emphasises natural fluctuations as cause of global warming

"Since falling back after 1998, the rising trend in temperatures has for 17 years come to a halt - what even the IPCC accept as 'the Pause' [...]. Even fervent supporters of the 'consensus' have found this hard to explain, and have had to admit that natural factors, such as changes in solar radiation and ocean currents have much more influence on climate than their computer models allowed for" (Booker, 2015).

5. **Natural:** The article emphasises natural fluctuations as cause of global warming and the dubious nature of the claim that anthropogenic global warming exists

"The idea that man's carbon dioxide emissions are causing the world to heat up is just idiotic. A complete fairy story" (Clarkson, 2007).

THE RESCUE AND REMEDY COMPONENT²: CONCERN

Sensitisation, Prediction/Action

Sensitisation/Symptomatic Frame:

1. **Ecological symptoms** (e.g. weather extreme events) are related to climate change

"Rising waters have already engulfed a number of small islands in the Pacific" (Khan, 2016).

2. **Health symptoms** are related to climate change

"Crippling tropical disease spread by mosquitoes has taken a foothold in Europe and could be heading for Britain, climate change experts have warned" (Derbyshire, 2007).

3. **Social changes** (e.g. migration phenomena and war) are related to climate change

"Tens of thousands of people in Bangladesh and other low-lying areas of Asia are leaving their communities as their homes and land become inundated. But this is the first time that a senior politician from a developing country has openly proposed that those countries considered responsible for climate change should take physical responsibility for the refugees created" (Randerson, 2009).

Societal Control Culture-Solution/Action Frame:

1. **Financial/Economic solutions** proposed, implemented, rejected or debated

"A leaked draft of the report sent to governments in December suggests that [...] emissions need to fall by 40-70 percent by 2050. Investments in fossil fuels such as oil and coal would have to drop by \$30 billion a year, while spending on renewables would have to go up by \$147 billion annually, according to the draft" (Associated Press, 2014a).

2. **Technological solutions** proposed, implemented, rejected or debated

"Sucking carbon dioxide out of the air might be used as a last-ditch attempt to stop global warming, UN scientists say. The technology is proposed as a 'Plan B' if Governments fail to cut carbon dioxide emissions by up to 70 per cent before 2050" (Spencer, 2014).

3. **Policy-making solutions** proposed, implemented, rejected or debated

"An integrated transport policy will improve our quality of life. Wasting less energy will make businesses more competitive. Britain invented many of the new environment technologies. We could lead the field in exporting in one of the world's growth industries" (Prescott, 1997).

4. **Scientific solutions/research** proposed, implemented, rejected or debated

"I expect that now with the science of climate change settled [...], scientists will turn their attention to impacts research. Some of this research will involve physical sciences, and I've been fortunate to have contributed a bit to this area. Studies covering increases in drought, floods, sea level rise, for example fall into this category" (Abraham, 2016).

² The two elements of "novelty" and "exploitation" identified by Cohen are explored in relation to the emergence of specific positions of newspapers and contextual factors such as their political/economic orientation, and the emergence of new elements emerging over time (changes in narratives over time).

5. **Societal action** proposed, implemented, rejected or debated

"Unfortunately, making a difference involves eating less meat, taking fewer flights, walking instead of driving, avoiding processed foods and those long hot showers, burning less coal, insulating your home and planting trees" (The Sun, 2015).

6. **Natural predictions/evolution:** Natural processes will solve the problem /no need for action

"So the rise in global temperatures is perfectly explicable in terms of natural climatic cycles. Furthermore, you could reasonably argue that the theory of anthropogenic CO₂ as a driver of catastrophic global warming has already been 'falsified'" (Delingpole, 2011b).

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Appendix 2. Most frequent words used for scientists and drama frames

Theme	Year-bloc	Frequency	Keyword
Science/scientists	1988-1997	325	scientists
		172	Dr
		72	professor
		71	IPCC (Intergovernmental Panel on Climate Change)
		58	university
		53	institute
		51	centre
		36	scientist
		28	experts
		26	agency
		26	climatologists
		24	researchers
		24	Hadley (centre) ³
		24	(East) Anglia (university)
		23	Houghton (John) ⁴
		18	NASA
		16	Oxford (university)
		16	Hansen (James) ⁵
		13	Cambridge (university)
		12	Parry (Martin) ⁶
		12	oceanographers
		11	Lindzen (Richard) ⁷
		10	biologists
		10	Manabe (Syukuro) ⁸
		9	Odden ⁹
		8	Spiesberger (John) ¹⁰
8	nobel		
8	modellers		
8	meteorologists		
8	Beniston (Martin) ¹¹		
6	Marshall ¹²		
6	Jones (Phil) ¹³		
6	Goddard (institute) ¹⁴		

³ Met Office Hadley Centre for Climate Science.

⁴ Lead editor of the first three IPCC reports.

⁵ American climatologist.

⁶ Professor in Plant Science for Food Security at Lancaster University.

⁷ American atmospheric physics.

⁸ Meteorologist and climatologist.

⁹ "The 'Odden' is a large sea ice feature that forms in the east Greenland Sea" (see Shuchman et al., 1998).

¹⁰ Oceanographer at Pennsylvania University.

¹¹ Climatologist at the University Of Geneva.

¹² This word refers to different subjects such as The George C. Marshall Institute (a no-profit conservative think-tank established in 1984 in the USA that closed in 2015) and Marshall Islands.

¹³ Cultural geographer at the University of Birmingham.

¹⁴ NASA's Goddard Institute for Space Studies.

Theme	Year-bloc	Frequency	Keyword
Science/scientists	1998-2007	356	scientists
		127	Dr
		99	office
		96	experts
		92	university
		70	Panel (Intergovernmental)
		65	centre
		53	professor
		49	IPCC
		45	institute
		44	scientist
		43	researchers
		37	Lovelock (James) ¹⁵
		35	expert
		31	Prof
		23	NASA
		22	Rapley (Christopher) ¹⁶
		20	Hansen (James)
		15	climatologists
		15	Nobel
		15	academy
		14	centres
		13	(East) Anglia (university)
		13	Hadley (MET office)
		12	Cambridge
		11	astronomers
		10	Surrey (university)
8	Bracknell (Meteorological Office)		
8	Svensmark (Henrik) ¹⁷		
7	meteorologists		
7	Parry (Martin)		
Science/scientists	2008-2016	323	scientists
		148	IPCC
		139	Dr
		136	university
		112	Professor
		97	scientist
		88	researchers
		81	NASA
		72	experts
		68	centre
		68	Panel (Intergovernmental)
		60	Hansen (James)
		55	author

¹⁵ Environmental scientist who proposed the Gaia hypothesis.

¹⁶ Professor of Climate Science at London's Global University.

¹⁷ Henrik Svensmark is a physicist and professor at the Danish National Space Institute in Copenhagen.

Theme	Year-bloc	Frequency	Keyword
		52	institute
		51	expert
		42	Prof
		33	authors
		28	Laxon (Seymour) ¹⁸
		25	Mann (Michael) ¹⁹
		25	(East) Anglia (University)
		24	Stott (Philip) ²⁰
		23	nobel
		19	Oxford (university)
		15	Pachauri (Rajendra Kumar) ²¹
		14	Marshall
		14	Allen (Myles) ²²
		14	NOAA (National Oceanic and Atmospheric Administration) ²³
		11	Gerlach (Justin) ²⁴
		11	Muller (Richard) ²⁵
		10	Lovelock (James)
		10	Christy (john) ²⁶
		10	Rudkin (Angharad) ²⁷
		9	climatologists
		9	PhD
		9	Grantham (Institute) ²⁸
		8	Columbia (university)
		8	Hadley (MET office)
		7	WMO (World Meteorological Organisation)
Drama/Risk	1988-1997	126	increase
		102	problem
		71	threat
		63	issue
		57	increased
		53	damage
		53	huge
		48	serious
		45	significant
		40	increases
		39	risk
		37	warned
		36	warning

¹⁸ He was a climate change scientist at the University College (London).

¹⁹ American climatologist and geophysicist at Pennsylvania State University.

²⁰ Professor of biogeography at the University of London.

²¹ Chairman of the Intergovernmental Panel on Climate Change from 2002 to 2015.

²² Professor of Geosystem Science at Oxford University.

²³ Scientific agency within the United States Department of Commerce.

²⁴ Lecturer at Peterhouse Cambridge.

²⁵ Professor of physics at the University of California, Berkeley.

²⁶ Climate scientist at the University of Alabama.

²⁷ Child Clinical Psychologist at the University of Southampton.

²⁸ Centre for research and education on climate change. It is part of the Imperial College London.

Theme	Year-bloc	Frequency	Keyword
		33	disaster
		33	biggest
		32	issues
		30	worst
		29	dangerous
		27	destruction
		26	massive
		23	faster
		23	crucial
		18	significantly
		17	diseases
		17	depletion
		17	catastrophic
		16	threaten
		16	disasters
		16	disappear
		15	harmful
		14	threatens
		14	catastrophe
		13	dramatically
		12	warns
		12	warnings
		12	risks
		12	disruption
		11	famine
		11	extinction
		11	devastating
		11	damaging
		8	alarming
		7	doomsday
Drama/Risk	1998-2007	140	problem
		139	increase
		101	issue
		100	threat
		97	serious
		96	increased
		94	risk
		92	huge
		83	save
		74	biggest
		67	extreme
		62	damage
		60	challenge
		53	warned
		51	worst
		48	warning
		46	issues
		41	dramatic

Theme	Year-bloc	Frequency	Keyword
		40	disaster
		39	worse
		38	threatened
		38	severe
		37	faster
		36	seriously
		36	massive
		35	fears
		30	survive
		30	vulnerable
		27	extinction
		26	urgent
		25	damaging
		25	catastrophic
		25	devastating
		25	unprecedented
		25	threats
		24	worrying
		22	dangers
		22	disasters
		22	warn
		20	significantly
		19	disappear
		19	warns
		19	catastrophe
		17	disappearing
		17	extremes
		17	warnings
		16	challenges
		15	disappearance
		15	terrorism
		15	risks
		15	threatens
		13	doom
11	alarming		
11	unpredictable		
10	extinct		
9	dire		
8	plagues		
Drama/Risk	2008-2016	141	help
		119	extreme
		106	issue
		101	risk
		80	warned
		76	threat
		75	biggest
		73	serious
		66	significant

Theme	Year-bloc	Frequency	Keyword
		63	huge
		63	damage
		58	issues
		52	largest
		50	save
		47	dangerous
		47	worse
		46	risks
		44	severe
		44	security
		39	challenge
		36	concerns
		32	vulnerable
		30	warn
		29	catastrophic
		28	crucial
		25	dramatically
		24	extinction
		23	challenges
		23	unprecedented
		23	threats
		20	alarmist
		18	significantly
		18	devastating
		17	harmful
		16	warns
		16	disasters
		16	deaths
		15	damaging
		13	threatens
		12	alarming
		11	extinct
		10	uninhabitable

Appendix 3. Additional examples of newspapers' representation of scientists

Bloc 1988-1997 - Centre-left

Scientific consensus

Scientific consensus: general consensus

"Climatologists predict that, by midway through the next century, temperatures may have risen by as much as 4C. Happening so quickly, that could catastrophically reduce mankind's ability to grow food, destroy or severely damage what wildlife and wildernesses remain and raise sea levels, flooding coastal cities and farmland [...]. Both groups of researchers agree [...]. Scientists find evidence of global warming" (Schoon, 1990a, p.1).

"Scientists say that they now have little doubt that some of these at least are early signs of global climatic change [...]. The evidence so far shows that Antarctica has been warming up faster than anywhere else on Earth - which is precisely what the scientists who have been predicting global warming said would happen" (Lean, 1995a, p.13).

"The scientists are more united in their views than ever before. Action is needed quickly, they say: according to the Intergovernmental Panel on Climate Change, a 60 per cent reduction on current carbon dioxide emissions is urgently required to save the world from dangerous climate change [...]. The solution is clear: carbon dioxide emissions need to be cut, with urgency and on a global level" (Brown, 1997b, p.17).

Scientific consensus: consequences on both humans and nature:

"Dr Michael Rycroft, a distinguished atmospheric scientist with the British Antarctic Survey (the team which discovered the Antarctic Ozone Hole), puts the order of magnitude in this way: 'The troposphere goes up to 10-15 kilometres, but that contains 90 per cent of the world's atmosphere. So 99 per cent of the world's atmosphere is below 30 kilometres. Ninety-nine point nine per cent is below 45 kilometres, and 99.99 is below 60 kilometres' [...]. Rich countries are spending billions to reduce the obvious local, and some far distant, effects. But carbon dioxide is much harder to eliminate, unless people stop burning fossil fuels" (North & Schoon, 1989).

"GLOBAL warming is blocking a vital 'plughole' in the world's oceans with vast and incalculable long-term effects on the world's weather, scientists have found [...]. The result of the blocking could be that Britain becomes colder, rather than hotter, as the planet's climate warms up" (Lean, 1995b, p.18).

"Now imagine a Britain where great swathes of East Anglia and Lincolnshire are submerged under the sea. Where our summers are plagued with baking drought but our winters are Icelandic. Where we live in constant fear of floods, hurricanes and tornadoes. This is what might happen, top scientists tell us, unless we stop pumping out so much greenhouse gas from our cars, power stations and factories" (Prescott, 1997, p.14).

Scientific consensus: adaptation capacity

"A NEW generation of genetically engineered plants is being created with government funds to prepare Britain for the possible effects of global warming [...]. Professor William Stewart, secretary of the Agriculture and Food Research Council, said the plants, which the researchers hope to produce within 10-15 years, would be better able to withstand extremes of temperature, drought, and resist pests and diseases that could become rampant as climatic conditions changed" (Brown, 1990a).

"Scientists at the John Innes Centre for Plant Science Research at Norwich are seeking alternative genes from wheat varieties grown in southern Europe [...]. Through these techniques, the scientists expect to be able to avert the disaster that might otherwise overtake the British wheat crop" (Tudge, 1991, p.17).

Scientific consensus: climate change as a risk/benefit issue

"All previous forecasts have been worldwide, but the Department of the Environment has looked at how unchecked increases in carbon dioxide emissions may affect Britain by 2030 [...]. The worst damage is likely to happen to species of animals and plants which cannot adapt fast enough to the hotter, drier climate [...]. The malaria mosquito would probably be able to live in poorly drained areas of southern England. Global warming is expected to melt part of the polar ice caps and raise sea temperatures and levels. Drier soil will affect agriculture and forestry, and fish farming would also suffer [...]. But the transport, construction and mining industries would benefit greatly from less snow and ice in the winter and tourism could enjoy a boom" (Erlichman, 1991).

"While global warming may be good for birds, it is bad news for humans [...]. It wants the industrialised world to do something serious about its emissions first" (Brown, 1995, p.4).

"The Environment Secretary, John Gummer²⁹ [...] said that while the predictions brought some good news - for example a boost to tourism - on balance it was bad, particularly for counties in southern England [...]. Rain and windstorms will become more frequent in Britain and do more damage than at present. A rise in the sea level of up to one foot (35cm) on the east coast will threaten to low-lying areas [...]. Some plant and animal species will die out, others will have to migrate northwards. Insects like the malaria-carrying mosquito will be able to thrive in southern Britain" (Brown, 1996a, p.1).

Scientists as political advisors

"Scientists are telling both leaders that very large reductions in carbon dioxide emissions and other gases are vital if the warming of the earth's atmosphere is to be kept within manageable bounds" (Brown, 1990b).

"THE independent World Resources Institute based in Washington has published a report for the United Nations which sets out what amounts to the first full league table of greenhouse gas emitting nations [...]. Sponsored by the UN Environment and the UN Development programmes, the report's figures [...] show that greenhouse warming gases are emitted in almost equal part by the first and third worlds. Adding carbon dioxide, methane and chlorofluorocarbon (CFC) emissions, it lists countries by their volume of emissions based on 1987 figures" (Vidal, 1990).

"The EU promises 15 per cent reductions by 2010 - still far less a cut than scientists say is necessary - and the 35 small island states that will disappear beneath the rising sea level are demanding" (Brown, 1997c, p.17).

Need for further research: unknown aspects

"Although scientists can measure the rise in atmospheric carbon dioxide, there is uncertainty over how our planet will adapt. It is feared that if the oceans cannot continue to moderate Earth's climate there will be a catastrophic increase in mean global temperature [...]. With experts predicting a rise in sea level and consequent coastal flooding as ice-caps melt, such monitoring will provide an early warning of global warming" (Bond, 1991, p.16).

"Given the importance of establishing how much of the changes are due to natural fluctuations and how much to man-made effects, answers are needed as quickly as possible. In this respect, weather satellites may hold the key to taking the planet's temperature more precisely" (Burroughs, 1993, p.15).

"Whatever the accuracy of the science, it gives an additional urgency to the deliberations in Kyoto this week [...]. 'To hold this up as an inevitable threat would be irresponsible, but to ignore this in thinking about the future would be equally naive', says Professor Fairbanks. 'What we are doing here is making a risk assessment'" (Parry, 1997, p.14).

Scepticism confutation

Scepticism confutation: political-economic interests behind uncertainty

"Without intervention, scientists believe, carbon dioxide emissions will rise by 0.5 to 2 per cent a year. Calculations made by the Climatic Research Unit suggest that, by the early 2020s, greenhouse gases will have doubled since the eighteenth century [...]. So the view of the IPCC's expert working groups, to be delivered in Washington this week, is that the Marshall Institute study is 'not credible'

²⁹ With regard to his speech to the United Nations conference in Geneva on climate change in 1996.

[...]. Some even suspect the US of wanting to use its complexities as a stalling tactic, to delay an agreement" (Nicholson-Lord, 1990, p.6).

"GLOBAL warming has become political [...]. Most of these dissenting noises have come from the United States, by far the most prolific (per capita) burner of fossil fuels and producer of greenhouse gases [...]. The real argument, which is becoming messy and bitter and is polluting the presentation of the science, is about whether we need to reduce our profligate energy use now" (Schoon, 1990b, p.15).

"The industrial lobby has successfully restrained progress since Rio [...]. The scientists want at least a 50 per cent reduction in carbon emissions - but industry will resist further restrictions" (The Guardian, 1996, p.10).

Scepticism confutation: corporation funding and sceptics

"The debunking process began late last year with a report from the George C Marshall Institute, a Washington-based science think tank. It suggests investing \$ 100m (pounds 61m) to improve the forecasting of global warming. 'The investment would be cost-effective when viewed in the perspective of the large and potentially negative impact on the five-trillion-dollar US economy that could result from a premature decision to tackle greenhouse gas emissions', it says. Some 60 US corporations and interest groups have founded the Global Climate Coalition 'to provide the business perspective' and study the impact of anti-global warming policies on the US economy" (Schoon, 1990c, p.8).

"But more powerful voices still deny global warming exists, or that it is a problem. Millions of pounds are still being spent to convince politicians that there is nothing to worry about. The Global Climate Coalition, as this group styles itself, represents the fossil fuel lobby. It fears climate change is bad for business [...]. The Climate Coalition, which includes Shell, BP, Exxon and Ford, claims the scientists are going over the top and says there is as yet no proven need to do anything" (Brown, 1996b, p.4).

"The Climate Change Coalition - set up by the oil, coal and motor industries - has spent pounds 10 million on television advertising in the past six weeks alone. It has financed dubious science showing that global warming is caused by sunspots, and has claimed that action to cut carbon dioxide emissions will cost jobs, increase taxes and make America less competitive [...]. It is a grave error to believe that we can continue to procrastinate" (Brown, 1997a, p.15).

Advocates vs sceptics

"On one side there is an impressively broad consensus reached by researchers from around the world who have contributed to the reports of the Intergovernmental Panel on Climate Change (IPCC) [...]. On the other side are a few noisy mavericks. The most quoted of these is Richard Lindzen, professor of atmospheric science at the Massachusetts Institute of Technology in the US [...]. If Lindzen is right, we could ignore the greenhouse effect, for a while at least. If the IPCC is right, global warming will be one of the most disruptive changes of the coming century" (Pearce, 1993, p.42).

"Climate experts around the world generally agree that the emission of greenhouse gases since the start of the industrial revolution has trapped extra energy from sunlight in the surface of the earth and the lower atmosphere. However, scientists do not agree on how this trapped energy relates to world temperature increases, commonly called 'global warming' [...]. Many aspects of global warming are still not fully understood but, like it or not, governments are now legally committed to reducing energy use. Whether the precautions they are taking will be enough to avoid what most scientists still believe could be the most fundamental change to the way we live, is hotly debated" (Perkins, 1993, p.16).

"ONE school argues that there have always been natural atmospheric fluctuations [...]. Another argues that climate is really controlled by the sun [...]. And a third - and very vocal - school has simply pointed out that if the greenhouse effect was real, then something ought to be happening already [...]. Confused? You're not alone. Nobody knows the answer to these questions. The doubters are not wrong to raise them, but it doesn't mean climate scientists are wrong when they can't answer them. The climate scientists - and the environmental campaigners who believe what they say - have one very strong card to play, and keep on playing. If there is a way of alleviating the greenhouse effect, it will require humanity to either burn less of its dwindling fossil fuel supplies or to use the energy from them more efficiently, or both [...]. And since sharing wealth, limiting pollution and

using energy efficiency are all things that everybody agrees we should be doing anyway, how can that hurt?" (Radford, 1994, p.2).

Bloc 1988-1997 - Centre-right

Scepticism

Scepticism: scientific disagreement

"Although most climatologists believe warming is taking place, proving it is difficult. The natural variation from year to year is much greater than the estimated warming, making it tricky to separate man-made factors from natural phenomena. A more sinister possibility is that the sulphur gases will catalyse the ozone erosion" (Hawkes, 1991).

"The project's science manager, Alex Pyne, of Victoria University in New Zealand, says: '[...] some scientists think that the Earth's average temperature may warm by two or three degrees. [...] People don't know the answers. One way of predicting is to go to rock history to find out what happened in a previous warm time'" (Andrews, 1996).

"Scientists are divided about whether or not and, if so, how much and why 'global warming' is taking place [...]. As for solar power, to suggest that it might replace oil is foolish. One expert has pointed out that the BP field west of the Shetlands, against which Greenpeace was protesting last week, will yield about half of 1 pc of Britain's annual production. And yet, he points out, it would take 30 million solar panels 100 years to produce the same quantity of energy. So Greenpeace has got it wrong again. By now, we should have come to expect it" (Oddie, 1997, p.8).

Scepticism: scientific aura of scepticism

"Sceptics of the greenhouse effect have produced several arguments. One is that the scientific data used to support the cries of alarm have been misinterpreted or are simply wrong [...]. One committee of a United Nations panel on global warming predicted that if the earth does warm up, the benefits in improved farming and increased forest growth would outweigh the loss of coastal areas to flooding" (Hosenball, 1990).

"It was enormously good fun, then, to watch the dismay in virtuous circles when the George C Marshall Institute, an independent think-tank in Washington, launched its assault on the view that the greenhouse effect [...] was potentially catastrophic [...]. But I know, simply from having read the summary of what the scientists say, that the predictions do not [...] remotely depend on, nor were they extrapolated from, any present, observed raising of global average temperatures [...]. The models are fragile" (North, 1990).

Scepticism: uncertainty around effects and actions to be taken

"Scientists at the Climate Analysis Centre in Washington DC say that global temperatures this year are again hotter than normal, although India and Africa have been cooler. But like their colleagues in Britain they cannot agree on whether the greenhouse effect a layer of pollution trapping the sun's heat inside the atmosphere has caused the 0.5 deg rise in world temperatures over the past five years" (Palmer, 1989).

"Scientists stress that they need to know much more about complex ocean behaviour before they can make more accurate predictions" (Roy, 1989).

"Until now, one of the greatest uncertainties about global warming has been that computer models have been able to give only a general, average prediction of the warming of the atmosphere for the world as a whole. The guess is that, at present rates of carbon dioxide emission from industry, motor vehicles and power stations, world temperatures will increase by between 1.5C and 4.5C by about 2030 [...]. The centre [UK Centre for Climate Change Prediction] is being set up at the Meteorological Office at Bracknell, Berkshire [...]. Funding for the study will rise from Pounds 600,000 this year to Pounds 5.7 million in 1990-91, with most of the money going on the establishment of the centre" (McCarthy, 1990a).

Consequences

Consequences: far away problem

"There is no consensus between weather experts on the effects, if any, of global warming [...]. Dr Mike Tooley, reader in geography at Durham University, said: 'I live at 300 feet and I wouldn't buy a house in a low lying coastal area. My parents used to have a house in an area below five metres

and I was glad when they sold it [...]. Dr Andrew Dlugolecki [...] said: 'The weather now is more extreme than it was and we have more problems with droughts and storms than we used to'. He added: '[...] at the moment it is not seen as a major problem because the average life of a mortgage is only six years"' (Dibben, 1990).

"British scientists are to launch an expedition to the Greenland Sea to study a vast, tongue-shaped sheet of ice called the Odden feature [...]. Greenland, is believed to be crucial in ordering the climate and could be one of the most important natural events helping to prevent global warming" (Nuttall, 1992).

"The researchers, members of the United Nations Intergovernmental Panel on Climate Change, have concluded that global warming is under way and is now fact rather than speculation [...]. While the forecasts show that some years may have cooler periods with rainfall, the overall trend is for the region to become drier and hotter [...]. Adam Markham, the director of the WWF climate programme, said species facing the greatest threat were those living in the upland grasslands near the Cape of Good Hope. They include mountain zebra, grey reebok, grysbok, mountain reedbeek, black wildebeest, bontebok and blesbok. Larger species, such as elephant and hippopotamus, are also expected to suffer" (Nuttall, 1995).

Consequences: effects on nature

"The average date for the redstart, for example, has advanced from the last week of May in 1978 to the beginning of the second week of May in 1990. The stock dove, however, is an exception, showing a trend towards a later laying date. Other species regularly monitored, however, show no obvious trend. 'As an overall pattern, it's certainly consistent with climate change'" (McCarthy, 1992a).

"Recently, however, it [British orchid] has started a remarkable spread. 'It does look like climate might be responsible for the increase in numbers' said Peter Carey, from the Institute of Terrestrial Ecology, at Monks Wood, Cambridgeshire [...]. Although its range has not increased, several populations have shown dramatic expansions in the past three years: one, at Holme next the Sea, has increased a hundredfold, to more than 10,000 plants. 'It is possible this can be related to climate change', Dr Carey said (McCarthy, 1992b).

"GLOBAL warming is destroying the world's most beautiful coral reefs and causing chaotic changes in the weather, Greenpeace claimed yesterday" (Daily Mail, 1994, p.28).

Scientific evaluations

Scientific evaluations: climate change as a risk/benefit issue

"A TEAM of six plant chemists, led by Dr Linda Fellows, are analysing hundreds of plants and herbs from all over the world to try and isolate ingredients that could in future be used to treat cancer, AIDS, and diabetes. 'Plants have always played an important role in treating illness', points out Dr Fellows" (Daily Mail, 1992, p.99).

"[Greenpeace] has amassed evidence from 500 reports by scientists and media organisations on changes in weather, ecology and oceans which it says prove that a 'climatic timebomb' [...]. Every major reef region in the world has suffered from coral bleaching, due to rising sea temperatures, and Tahiti's vital reef system is dying" (Daily Mail, 1994, p.28).

"THE South of England would enjoy the weather of the Paris Basin as global warming pushed the climate of Europe northwards, scientists forecast yesterday. But the benefits of average summer temperatures 1.6C hotter by 2050 could be overwhelmed by a sharp rise in gales, storms and the loss of wildlife [...]. The tourist industry and winemakers would benefit and continental butterflies become commonplace. But Martin Parry of University College London, one of the scientists behind the report, believed that overall there would be more negative impacts [...]. There will be positive and negative impacts on the British Isles from climate change by 2030 to 2050, scientists said" (Nuttall, 1996).

Scientific evaluations: evaluations from other fields

"The Government has come under increasing attack [...] over its lukewarm attitude to energy-efficiency programmes, which are widely felt to offer a low-cost and low-risk solution. That view is shared by the scientists who have signed the declaration, led by Professor Dorothy Hodgkin, OM, FRS, emeritus professor of chemistry at Oxford and winner of the Nobel Prize for chemistry in 1964,

and Professor Maurice Wilkins, CBE, FRS, emeritus professor of biophysics at King's College London and winner of the Nobel Prize for medicine in 1962" (McCarthy, 1989).

"Worries about costs have been buttressed by several studies suggesting that the more modest estimates of the benefits of global warming control that is, the measurable damage that can be avoided if global warming is stopped are not very high. Ranges of 0.25 per cent of GNP through to 2 per cent are quoted [...]. If the benefits are 2 per cent of GNP, action is clearly warranted without venturing into the hazardous area of measuring non-GNP gains, such as the effects on biodiversity" (Pearce, 1990)³⁰.

"Research group Cambridge Econometrics notes: 'It has been difficult to find schemes that provide proper incentives [...]. But this [carbon tax] might damage the economy, so some observers believe that to keep long-term costs down and hit emission targets, such taxes should be redistributed as subsidies to 'clean' power stations powered by nuclear and wind sources. The price of electricity would still rise, but not by so much because nuclear power would become more cost-efficient" (Mail on Sunday, 1997, p.8).

Scientific evaluations: reaching consensus

"The 60 meteorologists are members of the Intergovernmental Panel on Climate Change which will report to the World Climate Conference in Geneva in November. They are also compiling an official science report, which will be published in the summer. Their working group is chaired by Dr John Houghton, Director-General of the Meteorological Office. The scientists' principal conclusion was disclosed last night by Dr David Fiske, Chief Scientist at the Department of the Environment, and Mr Philip Ward, head of the department's Global Atmospheres Division. They said the report was only in draft form, but added that it was likely to remain unchanged in its main thrust" (McCarthy, 1990b).

"Scientists advising the 160 nations that make up the Conference of the Parties to the UN Framework Convention on Climate Change [in Kyoto] estimate that the 60 per cent cut is needed to keep global warming within levels that biological systems can tolerate" (Nuttall, 1997, p.22).

³⁰ In this case, it is emphasised that action is needed in case global warming occurs, but the focus is on economic benefits rather than environmental improvements.

Scientific consensus

Scientific consensus: the climate is changing

"These days, serious evidence backs the conclusion that the Earth's climate is changing due to fossil fuel usage. Average global temperatures have risen by 0.6C over the past century and the concentration of CO₂ has reached a level not seen on Earth for more than 740,000 years" (King, 2005).

"The Gaia system, founded on the interaction of life-forms with their environment, is made up of feedback mechanisms that have previously acted in a benign way for humans. But because of the way the environment has been damaged by us, Professor Lovelock says, it may start to act in a way harmful to humanity and amplify global warming to such an extent that it is impossible to control" (McCarthy, 2006).

"Professor Hawking said that we stand on the precipice of a second nuclear age and a period of exceptional climate change, both of which could destroy the planet as we know it [...]. 'As in past deliberations, we have examined other human-made threats to civilisation. We have concluded the dangers posed by climate change are nearly as dire as those posed by nuclear weapons. The effects may be less dramatic in the short term than the destruction that could be wrought by nuclear explosions, but over the next three to four decades climate change could cause drastic harm'" (Connor, 2007a).

Scientific consensus: climate change can be tackled

"The report, published jointly by the Defence Council and the Rocky Mountain Climate Organisation, lists 12 parks considered to be in greatest jeopardy from rising temperatures [...]. 'This is an across-the-board alarm that some of our most special places really are at risk', said Mr Spencer. 'We need federal efforts to limit global warming pollution across the board. It's as simple as that' (Usborne, 2006).

"Jim Hansen of NASA, George Bush's top climate modeller, predicts that sea level rise will be 10 times faster within a few years, as Greenland destabilises [...]. Alarmist? No. It has happened before, he says [...]. But there is a growing fear among scientists that, thanks to man-made climate change, we are about to return to a world of climatic turbulence, where tipping points are constantly crossed [...]. For one thing, there is no single point of no return. We have probably passed some, but not others. The water may be lapping at our ankles, but I am not ready to head for the hills yet. I'm an optimist" (Pearce, 2006, p.8).

Scientific consensus: environmental understanding

"In a study published today in the journal Nature, the international team of scientists from 10 European countries warns that the Earth's climate would now be in a highly stable period if it were not for the extra carbon dioxide being pumped into the atmosphere from human activities. 'Given the similarities between this earlier warm period and today, our results may imply that without human intervention, a climate similar to the present one would extend well into the future', the scientists say" (Connor, 2004).

"For more than 30 years, scientists have been arguing about how rainforests like the Amazon might have responded to the cold, dry climates of the ice ages, but until now, no one has come up with a convincing answer [...]. But how will the Amazon respond to future climate change? If it gets drier will it still survive and continue to draw down carbon dioxide? Scientists hope that by understanding how rainforests reacted to climate change in the past they will be able to predict how the rainforest will manage in the future" (Ravilious, 2004).

Scientific consensus: climate change as a risk/benefit issue

"The world is facing a string of 'full-scale environmental emergencies' which threaten to cause misery for billions of people in the 21st century, the United Nations said yesterday [...]. The report [Global Environment Outlook 2000] [...] is based on a survey of 200 scientists in 50 countries. They cite global warming as the biggest threat to the planet followed by the scarcity of fresh water, deforestation and desertification" (Nuttall, 1999).

"[...] millions living in Britain and other northern climes would gain from milder winters and a longer growing season but, further south, people would suffer the consequences of intense heat waves that would kill many unused to extreme temperatures" (Brown, 2001).

"The Himalayas have warmed by almost 1C since the 70s [...] according to the UN environmental programme. More than two-thirds (67%) of the glaciers in the mountain range are in retreat, and the melting snow and ice has created huge lakes, raising fears among scientists that they could overflow into each other in a cascade effect. If this happened, thousands of people could be killed, while Nepal's agricultural industry - on which 80% of the population relies - would be devastated" (Batty, 2007).

Scientific consensus: climate "(in)justice"

"THE EFFECTS of relentlessly rising global temperatures in the coming century are likely to be catastrophic for the world, the second volume of the new IPCC report spells out with more chilling confidence than ever before [...]. Billions of people will to be affected directly. Societies may be able to bring about some limited adaptation, but the least able to adapt will be the poor developing countries in Africa, Asia, Latin America and the Pacific, who will be hit hardest. Their future is grim" (McCarthy, 2001b, p.7).

"The delegation to Washington will be led by Sheila Watt-Cloutier, who chairs the Inuit Circumpolar Conference and who was last week nominated for the Nobel Peace Prize. Speaking yesterday from Iqaluit in Nunavut, Canada, she said: 'For us in the Arctic our entire culture depends on the cold. The problem of climate change is what this is all about. At the same time we will be bringing in lawyers to talk about the link between climate change and human rights' [...]. In the Arctic, scientists have estimated that summer sea ice could completely disappear by 2040" (Buncombe, 2007).

Scientific consensus: signs of climate change

"The rejection this week by the American President, George Bush, of the argument that climate change is happening not only flies in the face of a growing consensus among scientists - it ignores what is taking place before our eyes [...]. The melting of the ice-caps in the Polar Regions is perhaps the most spectacular [...]. Wildlife is already becoming affected: body weights of polar bears in Hudson Bay are declining as their hunting season shortens with the longer periods of open water; they feed on ringed seals, which they can catch only on ice" (McCarthy, 2001a, p.11).

"Extreme weather is here to stay unless global warming can be reversed. America was stunned by the devastation wreaked by Hurricane Katrina in the Gulf States. But if the experts are right there is more to come all over the globe. Britain is no New Orleans, but it would be complacent to think that we are safe from the weather's onslaughts" (Husband, 2005, p.1-2).

"Climate change is reshaping the landscape of Britain as rising temperatures allow orchids and ferns to flourish in the north, while other species retreat to cooler conditions on high land and mountainsides [...], a trend researchers say will be exacerbated by future warming [...]. Other species, such as the lesser butterfly orchid and mountain pansy, which flourish in cooler climates, suffered declines" (Sample, 2006, p.9).

"Last week the Met Office predicted another summer of above-average temperatures, after a spate of record-breaking years, while earlier this month the UN's Intergovernmental Panel on Climate Change issued an apocalyptic warning of future mass migrations fuelled by loss of fertile land, droughts, rising seas and more intense storms" (Jowit, 2007).

Scientists as political/economic advisors

Scientists as political/economic advisors: political support

"A study has found that the soil of Britain is emitting more carbon dioxide into the air than a quarter of a century ago because increasing temperatures are speeding up the natural rate of organic decay [...]. Scientists believe the findings have major scientific and political implications for the Kyoto treaty on climate change which is aimed at limiting the amount of man-made carbon dioxide 'the major greenhouse gas' into the atmosphere" (Connor, 2005, p.6).

"The evidence is mounting all round [...]. In the face of this, the silence on global warming from the leaders of the rich world gathered in St Petersburg was deafening. They were led in their foot-dragging by George Bush, who insists that the cost of mitigating global warming is too high to be

justified in the light of what he calls the scientific uncertainty about the pace of climate change. The rest of the world sees no such uncertainty, and the heat of today will only underline that" (The Independent, 2006).

"The battleground for negotiators is a five-page text, which, if agreed tomorrow, would act as a detailed agenda leading to an international deal at a summit in Copenhagen in two years' time. As of last night, that text included scientists' calls for a 25-40 per cent reduction in emissions of greenhouse gases from industrialised nations by 2020" (Howden, 2007, p.32).

Scientists as political/economic advisors: economic/energy support

"Could the solution to the problem of global warming lie in the soil? [...]. The idea of using soils to soak up carbon is widely attributed to Rattan Lal, professor of soil science at Ohio State University. He says: 'Soils have the potential to prevent a large proportion of the annual increase in atmospheric concentration of CO₂'. It could, in other words, choke off global warming [...]. Controversial or not, it now seems likely to form part of a deal with the European Union to break the deadlock that scuppered the talks. If, as negotiators hope, ministers meet to sign a deal in Oslo next week, soils may be the factor that encourages the US to sign" (Pearce, 2000, p.8).

"SCIENTISTS [...] believe millions of tonnes of carbon dioxide could be dumped under the bed of the North Sea to reduce atmospheric warming. And they have selected a key candidate to test the technology: BP's Miller oilfield [...]. Under the scheme, carbon dioxide from power stations - instead of being vented into the atmosphere - would be liquefied, pumped back out to the North Sea via a disused gas pipeline and into the Miller field [...]. BP would gain because the carbon dioxide pumped into the depleted field would help to flush out its last reserves of oil, while Britain would be provided with a sink for its fossil fuel emissions [...]. Alternative generating schemes - wind or nuclear - have been proposed but are controversial and have technological drawbacks" (McKie, 2005a).

"Preventing 2C of warming means stripping carbon dioxide from the air. The necessary technology already exists: the challenge is making it efficient and cheap [...]. The real issues in Bali are not technical or economic. The crisis we face demands a profound philosophical discussion, a reappraisal of who we are and what progress means. Debating these matters makes us neither saints nor communists; it shows only that we have understood the science" (Monbiot, 2007b).

Uncertainty as a driver for further research

"Serious disagreement has broken out among scientists over a United Nations climate report [...]. However, many researchers [...] say it fails to stress that climate change is already having a severe impact on the continent [Antarctica] and will continue to do so for the rest of century [...]. The fate of that continent crucially affects the fate of the planet, and according to scientists at the British Antarctic Survey it is already being affected by global warming [...]. 'Current global studies project the Antarctic ice sheet will remain too cold for widespread surface melting and is expected to gain in mass due to increased snowfall', states the draft version of the report. But this vision is disputed. Last year, Dr Turner and colleagues [...] discovered that temperatures in the lowest level of the atmosphere over the continent have already risen by about 0.7C. Their paper, in Science, was published in March, too late for inclusion in the IPCC's deliberation" (McKie, 2007).

"With all these possible options for coping with nuclear waste it is disappointing that what little public debate there has been in the UK seems to have been aimed at answering the question of 'should we' rather than the technological question of 'could we'. The answer to the latter question is only likely to be found in a multidisciplinary effort involving scientists from a wide range of fields. Then the philosopher's stone will be within our grasp once more" (Al-Khalili, 2007)³¹.

Scepticism confutation

Scepticism confutation: political-economic interests behind uncertainty

"Many say that the discovery by scientists that there is an unequivocal link between man-made greenhouse gases and a dramatic heating of the Earth's oceans, as reported to the American Association for the Advancement of Science, is unlikely to change that. 'There's a denial of the

³¹ Jim Al-Khalili is professor of physics and public engagement in science at the University of Surrey.

science by the upper levels of the administration', a spokesman for the Sierra Club said. For 'upper levels' read the President and vice-president. Their links with energy companies are well known and oil, coal and other natural resources companies have been prime contributors to campaign coffers" (Cornwell, 2005).

"For the past four years, the Bush administration has mounted an all-out war against the country's climatologists and continually interfered with research that provides any corroboration between human activity and climate change [...]. The Union of Concerned Scientists recently gathered more than 60 eminent scientists, including 12 Nobel prize winners, to condemn the Bush administration for distorting findings that run counter to its political beliefs" (McKie, 2005b, p. 16).

"The demand that money and research be diverted into these quixotic solutions is another indication that Bush's avowed conversion to the cause of cutting emissions is illusory. He is simply drumming up new business for his chums [...]. Now the oil and coal companies that support such people [denials] have changed their target. Instead of trying to persuade us that man-made global warming is a myth, they are seeking to divert us into doing everything except the one thing that has to happen: reducing our consumption of fuel. It is another species of denial" (Monbiot, 2007a).

Scepticism confutation: corporation funding

"The UN Panel on Climate Change, comprising the world's top climate scientists, recently said that the burning of fossil fuels is raising world temperatures far faster than previously predicted [...]. More than 160 governments have now acknowledged the links between fossil fuels and global warming, but in a recent statement Exxon condemned the promotion of 'scientifically unfounded scare scenarios'. As well as making direct political donations, Exxon has backed multi-million dollar campaigns organised by lobbying groups such as the American Petroleum Institute" (Browne, Summerskill, & Morgan, 2001, p.3).

"George Bush's strategy on global warming suffered a setback yesterday when a panel of scientists convened at the request of the White House condemned it as lacking vision, and wasting time and money on research questions that were resolved years ago [...]. Environmental groups accuse the oil company Exxon Mobil of leading a campaign in the US to discredit scientific findings suggesting that the dangers of global warming are grave. 'There's no question that if you claim that not much is known, even if it is, then you delay the time at which you can say, OK, the research is unequivocal and we need to do something about the problem', Dr Schlesinger said. 'It's not very far beneath the surface that there's an element of not taking any action here'" (Burkeman, 2003).

Scepticism confutation: dissemination of misleading information

"A company called Wag TV is currently completing a 90-minute documentary for Channel 4 called The Great Global Warming Swindle [...]. The programme's thesis revolves around the deniers' favourite canard: that the 'hockey-stick graph' showing rising global temperatures is based on a statistical mistake [...]. What it will not be showing is that [...] the paper claiming to have exposed the mistake has been comprehensively debunked; and that the lines of evidence used by Mann, Bradley and Hughes are just a few among hundreds demonstrating that 20th-century temperatures were anomalous [...]. How often must scientists remind the media that a handful of cherry-picked studies does not amount to the refutation of an entire discipline?" (Monbiot, 2007a).

"A Channel 4 documentary that claimed global warming is a swindle was itself flawed with major errors which seriously undermine the programme's credibility [...]. The programme-makers labelled the source of the world temperature data as 'NASA' but when we inquired about where we could find this information, we received an email through Wag TV's PR consultant saying that the graph was drawn from a 1998 diagram published in an obscure journal called Medical Sentinel. The authors of the paper are well-known climate sceptics who were funded by the Oregon Institute of Science and Medicine and the George C Marshall Institute, a right-wing Washington think-tank³²" (Connor, 2007b).

"The solar hypothesis was championed publicly in March by the controversial Channel 4 documentary The Great Global Warming Swindle. The programme has been heavily criticised for distorting scientific data to fit the sceptic argument [...]. James Hansen, a NASA climate scientist

³² The Anti-Global Warming Petition ("Oregon petition") was linked to the ExxonMobil (McKnight, 2010; Monbiot, 2006).

who was once gagged by the Bush administration for speaking out on global warming, said the issue of whether the sun's activity is causing global warming had been dispensed with by most scientists long ago" (Randerson, 2007).

Advocates vs sceptics

"Svensmark's argument is more complicated than the simple claim that 'sunspots cause global warming'. It relies on the observation that the space around planet Earth is a battleground between competing fields of radiation [...]. But it is only theory, says Giles Harrison, an atmospheric electrician at the University of Reading, who is devising his own experiments in the field. There is as yet no hard evidence that it happens. Climatologists admit that Svensmark's work has refocused attention on the influence of the Sun on climate. This is often forgotten, but is hardly scientifically controversial" (Pearce, 1998, p.12).

"I couldn't give a solitary methane fart how much Al Gore cares about the planet. What matters is whether he is right in his claim that the planet is heating to an unsustainable level and that the cause is human activity. Last night Channel 4 broadcast Martin Durkin's *The Great Global Warming Swindle*, in which an impressive line-up of scientists disputed every facet of this fashionable assumption. As I pointed out when previewing the film, the moral force of Durkin's argument is that while the likes of Al Gore claim to be acting principally in the interests of the Third World, it is the countries of Africa and Asia who have most to gain through global economic growth and rapid industrialisation - and most to lose through policies which seek to limit that growth [...]. It is with some trepidation, therefore, that I now pass on information gleaned from NASA's Mars orbiter, *Odyssey*. According to a NASA press release, '*Odyssey* is giving us indications of recent global climate change in Mars'. Yes, you've guessed it: Mars is getting warmer, and its polar ice is retreating. Blame it on little green men in Martian 4x4s if you want to, but I for one am relieved. It gives me even more reason to believe that we are not, after all, to blame for the premature life and death of that poor little hedgehog" (Lawson, 2007, p.48).

Scepticism

Scepticism: scientific dishonesty

"Since the late 1980s, they have been claiming that everything from melting glaciers in Iceland to vanishing coral in the Caribbean and Indian Ocean points to the same awful conclusion: that the Earth is over-heating - and it's all our fault [...]. Many scientists also insist that the chief cause of this warming is the rising level of carbon dioxide (CO₂) in the atmosphere, generated by burning fossil fuels such as coal and petrol [...]. The science behind the proposed cuts is, however, far from finalised" (Matthews, 2000, p.25).

"The human race might be heaping unfair blame on itself for global warming, scientists have claimed. A report says evidence to support the theory that mankind is mainly to blame is 'slim at best' [...]. But the latest report, compiled by the European Science and Environment Forum (ESEF)³³ after consultation with 11 leading experts, says most global warming predictions fail to take into account other factors, such as water vapour, airborne particles and ocean currents [...]. Professor Stott³⁴, who has written the preface to the new report, added: 'We are developing energy policies on the basis of complete uncertainty' [...]. The report concludes that hysteria over global warming should not be allowed to dictate important policy decisions" (Daily Mail, 2002, p.22).

"CHILDREN are being brainwashed by propaganda from the Government on climate change, a court heard yesterday. The 'New Labour Thought Police' were accused of indoctrinating youngsters by handing out thousands of Climate Change Packs to schools" (Daily Mail, 2007, p.11).

Scepticism: scientific aura of scepticism

"Prof Fred Singer, a meteorologist at the University of Virginia, used temperature data assembled by James Hanson of NASA, who first highlighted the problem of climate change, to challenge the findings of the Inter-governmental Panel on the subject which underpin the Kyoto climate treaty. He said: '[...] We don't know the cause of the warming but we don't think it was human activity'. Mr Singer says he has found no evidence suggesting future extreme weather events, such as severe storms or droughts, increases in infectious diseases, or changes to forests and other ecosystems [...]. Mr Singer is one of several scientists to challenge the broad conclusions of the IPCC, a distillation of the work of 3,000 scientists from most of the leading meteorological institutes (Clover, 2000, p.10).

Scepticism: climate jokes

"Global warming - at least the modern nightmare version - is a myth. I am sure of it and so are a growing number of scientists. But what is really worrying is that the world's politicians and policy makers are not. Instead, they have an unshakeable faith in what has, unfortunately, become one of the central credos of the environmental movement. Humans burn fossil fuels, which release increased levels of carbon dioxide - the principal so-called greenhouse gas - into the atmosphere, causing the atmosphere to heat up. They say this is global warming: I say this is poppycock [...]. The link between the burning of fossil fuels and global warming is a myth. It is time the world's leaders, their scientific advisers and many environmental pressure groups woke up to the fact" (Bellamy, 2004, p.12).

"All panics are equal. But some are more equal than others. Present-day government warns us to be very, very afraid, successively of Aids, Saddam Hussein, BSE, terrorists, Sars, bird flu and now global warming. Rulers were once elected to free us from fear, not to increase it. Now they cry wolf every day and use it to demand more power and money into the bargain [...]. Scientists imply that Armageddon is a matter of may or might or could well be, before telling us to use less petrol and flying off to another conference" (Jenkins, 2006, p.16).

³³ ESEF was an educational charity founded in 1994 with connections with tobacco and oil companies. The institute tried to undermine science credibility about the danger of passive smoking (Miller et al., 2018).

³⁴ Professor Philip Stott is a bio-geographer who is part of the Global Warming Policy Foundation Academic Advisory Council, which is a UK think tank launched by Lord Lawson and Dr Benny Peiser on 23 November 2009, "open-minded on the contested science of global warming, [and] deeply concerned about the costs and other implications of many of the policies currently being advocated (The Global Warming Policy Foundation, 2014).

"The idea that man's carbon dioxide emissions are causing the world to heat up is just idiotic [...]. And last week, Channel 4's excellent documentary The Great Global Warming Swindle proved it [...]. They even interviewed the co-founder of Greenpeace, who dismissed the notion of man-made global warming as rubbish. The only inconvenient truth in Al Gore's film is that he's talking b*****s [...]. Global warming had become an industry [...]. And anyone who stands up and says 'This is all stupid' is dismissed as a lunatic by the global warming industry. The politicians. The media. And the scientists on the climate change payola" (Clarkson, 2007).

Scepticism: conflicts amongst scientists

"[...] scientists warn existing climate models do not work well and failed to predict the dramatic break up of Antarctic ice shelves in recent years" (Martin, 2006, p.36).

"What is clear is that the so-called 'carbon footprint' left by a product is a good deal more complicated than simply looking at the distance it has travelled [...]. But even the method of transport is generating controversy [...]. The disagreement over exactly how to measure the carbon footprint of food has led to the Government stepping in. Last week, the Department for Environment, Food and Rural Affairs announced it was developing a standard carbon calculator that all manufacturers and retailers could use to label their products. But a study by Bangor University, due to be completed this year, is set to complicate matters further. Researchers have found that the number of times a patch of soil is ploughed, and even the type of soil a vegetable is grown in, radically alters the amount of greenhouse gases released into the atmosphere (Gray, 2007).

Consequences

Consequences: far away problem

"The warning was delivered in the journal Nature by 19 international scientists. It studied six wildlife-rich regions between Mexico and Australia, covering 20 per cent of the planet's land area, and predicted 15 to 37 per cent of all species could be made extinct from moderate climate change likely to occur between now and 2050" (Ingham, 2004, p.25).

"The Christian Aid report highlights the situation in Kenya, where climate change is fuelling violence in areas hit by drought [...]. It also explores problems in Bangladesh where a predicted rise in sea levels would leave millions displaced and dispossessed" (Daily Mail, 2006, p.36).

"The report says the world's poor will be in the front line against climate change, facing death and injury due to heat waves, floods, storms and droughts. It predicts that the worst affected regions of the world will be the Arctic, sub-Saharan Africa, small low-lying islands, and the deltas of the major Asian rivers" (Clover, 2007c, p.10).

Consequences: effects on nature

"POLAR bears are facing extinction because the ice they live on is melting, conservationists warn. A report from the environmental group WWF blames global warming for the threat to the world's largest land predator [...]. Scientists now predict a 60 per cent loss of summer sea ice on the continent by around 2050. This will mean many polar bears spending much of the summer trapped on land, and also leave cubs vulnerable to being crushed in ice dens that melt and collapse" (Chapman, 2002a, p.39).

"Late-flowering plants are the most susceptible to climate change. 'They require a good quantity of water to produce the flower heads', said Mr Barter. Those that flower early, such as tulips and lupins, will still flourish because of winter rain. But others, such as phlox, rudbeckia, and late-flowering daisies, will not have enough moisture to flourish. Succulents such as sedum and the more drought-resistant salvia may still be planted" (Payne, 2005, p.3).

"NEARLY a third of the world's species of animals and plants will be at risk of extinction by climate change within 50 years, United Nations scientists and governments are expected to say in a report published today" (Clover, 2007c, p.10).

Scientific evaluations

Scientific evaluations: climate change as a risk/benefit issue

"Now, a traditional trip to the seaside offers the chance to glimpse some of the most exotic examples of marine life. The reason, say scientists, is that global warming is raising the temperature in the

waters around the British Isles, making them increasingly attractive to aquatic invaders. This year, more exotic fish species have been recorded off the UK coast than ever before. Five species usually in Mediterranean or African waters have been landed by fishermen" (Chapman, 2000, p.23).

"As temperatures rise inexorably, our lush green lawns will give way to a Mediterranean- style landscape of olive groves and palm trees [...]. But its author, Richard Bisgrove, director of the landscape management course at Reading University, says it will also offer gardeners new opportunities. 'Southern England will become like Bordeaux, and Scotland will be similar to central England now, so in domestic gardens we will see more exotic plants things like palms, olives and peaches', he said. 'I think we'll have olives on Teesside in 100 years or less'" (Chapman, 2002b, p.15).

"GUESS what? We have just enjoyed the warmest winter in 18 years [...]. Yet the experts at Met ireann have recorded spectacular temperatures for our dark months [...]. An international study predicted last year that climate change will make our sunny south east the new 'Mediterranean' for tourists. University of East Anglia, research editor Dr David Viner predicted that Mediterranean summers will become too hot for tourists after 2020. As a result Spanish, Italian and French tourists will flock to areas such as our southern coast" (Vousden, 2007, p.5).

Scientific evaluations: evaluations from other fields

"The attempts by the global warming industry to use the hot weather in Europe to hype up the dangers of extreme climate change are a moral disgrace [...]. Facts are not always the strong point of true believers, and global warming has morphed into an ancient-style religion, demanding sacrifice to the Earth, especially, it would seem, by the poor of the developing world [...]. Thus, if it is an especially hot summer, it is dire global warming, and you are unquestionably to blame, you selfish, greedy, rich Northerners, particularly if you are unfortunate enough to be American. Likewise, if it floods, it is global warming; if the land is parched and fires rage, it is global warming; if the monsoon is too wet or too weak, it is global warming; and, if winter freezes poor old robin redbreast, it is still global warming. Come rain or shine, hot or cold, it is always global warming. So there's an end of it, Brian [...]. Please can we grow up over the weather?" 'Climate always changes'" (Stott, 2003, p.20).

"And if the protesters stopped to listen, they might be surprised at what they heard: airport operators, airlines and aircraft manufacturers say they are acutely aware that reducing emissions not only makes good commercial sense, but is in everyone's best interests [...]. 'It's concern for the environment that's really driving advances in aviation now', observes Prof Dame Ann Dowling of Cambridge University [...]. 'Aviation pollutes, clearly', says Toby Nicol, easyJet's director of corporate communications, 'but the Stern Review, published before Christmas, said that aviation's CO2 accounts for about 1.6 per cent of global greenhouse gases, which is very small'" (Malam, 2007, p.17).

Scientific evaluations: market/techno optimism

"Global warming has become the obsession of our time [...]. Global warming will mainly harm the developing countries, because they are poorer and therefore less able to handle climate changes. However, even the most pessimistic forecasts from the UN expect the average person in the developing countries to be richer in 2100 than we are now. So action on global warming is basically a very costly way of doing very little for much richer people far into the future. We need to ask ourselves if this indeed should be our first priority" (Lomborg, 2005).

"Man-made global warming is, if the critics are correct, the biggest example of market failure in the history of the planet [...]. The costs of taking measures to limit the effects of global warming - improving sea defences, for example - could well be substantially lower and could, with the proper incentives, be achieved through market-based solutions [...]. Those who believe firmly in free markets with their unique capacity to channel individual creativity to public benefit would be unwise to lose faith now" (Baker, 2007, p.51).

"Temperatures are likely to rise by around 30 C by 2100, with a possible range of 20 to 4.50, says the IPCC. A change of 4.5 degrees would be close to the difference between the last ice age and today [...]. That's why there is now an absolutely pressing need to set up a global carbon market, which trades efficiently and generates a carbon price that sparks the necessary boom in investment and innovation in this crucial area [...]. Economic progress has caused - and will continue to cause - climate change. But economics also has the solution. We just need the courage to use it" (Hallighan, 2007, p.4).

Instrumental consensus

Instrumental consensus: balance

"POWERFUL evidence for global warming has been discovered by scientists funded by the US Government, demolishing the chief argument of sceptics who deny that the phenomenon is real [...]. Sceptics have often argued that if temperatures are rising at all, this is down to natural variation in the climate as the world emerges from a 'little Ice Age'. The tropospheric trend, however, is precisely what scientists would expect to see if man-made emissions of greenhouse gases were causing it to heat up. 'I think this could convince not just scientists but the public as well', Dr Fu said. Mike Hulme, director of the Tyndall Centre for Climate Change Research in Norwich, said: 'It will become that much harder for people to claim that the world isn't warming and that the warming isn't caused by greenhouse-gas emissions'. The Intergovernmental Panel on Climate Change estimates that global temperatures will rise by an average of between 1.4C and 5.8C by the end of the century. Dr Hulme said that while the results further confirm the overwhelming scientific consensus that man-made global warming is a proven phenomenon, he would be surprised if it were accepted by critics" (Henderson, 2004b, p.4).

"The scientific evidence for climate change will be debated at next week's conference, which is being hosted by the Met Office in Exeter. This week Nature, the scientific journal, will anticipate that debate with a research paper based on one of the biggest computer modelling exercises to date [...]. The experiment found that unless the world cuts its output of carbon dioxide and other greenhouse gases, global temperatures could rise by up to 6C by the end of the century. Researchers will warn that this would make many parts of the tropics uninhabitable and destroy ecosystems worldwide" (Leake, 2005, p.10).

"Volcanic eruptions 55 million years ago were responsible for the worst global warming the planet has known, but pale beside what mankind could do, a study shows. Eruptions along a 1,200-mile ridge pumped an estimated 4,000 to 5,000 gigatonnes of carbon into the atmosphere in about 10,000 years, warming the oceans by about 5 to 6C (9 to 10.8F). But with humans pumping out eight gigatonnes every year, a figure that is rising, it will take mankind only 600 years to match the quantity emitted by the volcanoes that tore apart the European and North American continents. The eruptions took place along the eastern side of what is now Greenland, and the volcanic activity split the two continents and pushed them apart, creating the North Atlantic Ocean. So much greenhouse gas, mainly carbon dioxide and methane, was emitted that it created what scientists call 'a planetary emergency'. Michael Storey, a British scientist based at Roskilde University in Denmark, led the research, which established the link between the increase in volcanic activity 55 million years ago and the rise in temperatures. The period of global warming is called the Paleocene-Eocene thermal maximum (PETM) and the mechanisms which caused it have long puzzled scientists" (Smith, 2007, p.40).

Instrumental consensus: extremely dramatic tones

"Despite a sunny start to last week, three teenagers were still killed and a number of others injured in incidents caused by the freak conditions. On Monday, the body of John Storrie, 18, was found [...]. A day later, Alix-Anne MacKay, 16 [...], while 14-year-old James Cairns drowned [...]. Experts are predicting more bad weather and further disruption and say it may signal the beginning of serious climate change [...]. Officials at the Met Office yesterday predicted further misery for Scotland" (Lambie, 2002, p.21).

"SCIENTISTS are racing against time to save blackcurrants in Britain amid fears that they are under threat from climate change. The blackcurrant could disappear within 15 years because of increasingly mild winters, the Met Office warns [...]. Farmers are adamant that warmer weather conditions have been disastrous for crops - worth about pounds 10 million a year to the economy. But it will take 15 to 20 years to develop new 'environment-adaptable' varieties [...]. The industry is not really responding quickly enough to the changes that are occurring" (Clover, 2007d, p.9).

"In the last few weeks, more than 200 people in northern Italy have been infected with chikungunya - a disease that causes crippling muscle pain and fever. One died [...]. A report from the Intergovernmental Panel on Climate Change, launched yesterday in London, forecast more deaths from heatwaves, an increase in skin cancer and higher pollen counts. More freak weather, including floods and droughts, is also on the way, the report said. Its authors said the impacts of global warming

are already being felt, and that it was too late to prevent a rise in droughts, floods and the extinction of species" (Derbyshire, 2007, p.32).

Instrumental consensus: blaming people

"SCIENTISTS are now overwhelmingly confident that mankind is to blame for the warming of the global climate observed since the industrial revolution, a UN report will conclude today" (Clover, 2007a, p.16).

"IT IS now beyond doubt that Earth's climate is warming and 'very likely' that most of the increase since the mid-20th century is the result of mankind's activities, a panel of UN scientists said yesterday" (Clover, 2007b, p.14).

"Conscientious consumers are being urged to buy locally sourced food in the battle against climate change. But, as Richard Gray discovers, produce from the other side of the world can actually have a smaller carbon footprint" (Gray, 2007).

Instrumental consensus: blaming external actors

"BRITAIN'S most senior government scientist has made an outspoken attack on the United States' refusal to confront global warming, which he describes today as a greater threat to the world than international terrorism. The Bush Administration is [...] refusing to sign up to the Kyoto Protocol on greenhouse gases" (Henderson, 2004a, p.19).

"President George Bush's reluctance to sign up to the Kyoto Protocol on reducing carbon emissions has made the USA an international pariah. But the President cannot ignore what is happening at home. Hurricanes Katrina and Rita savaged America's underbelly, killing hundreds and leaving a multi-billion dollar trail of devastation while a July heatwave along the eastern seaboard killed 40" (Winter, 2004, p.41).

"PERHAPS those two deadly sisters, Hurricanes Katrina and Rita, will have finally persuaded President Bush to take a fresh look at climate change [...]. There is political stand-off here which might appear to give companies a little breathing space. The Kyoto protocol of 1997, weak though it was, has hardly produced a great surge in activity around the developed world to reduce the production of greenhouse gases. Yet if CO₂ emissions are not cut by 60pc in the next 30 years, scientists estimate that climate change will become irreversible, and produce devastating outcomes" (Stern, 2005, p.3).

Genuine consensus: climate change is real

"The discovery has alarmed scientists because ancient climate records show that northern air temperatures can drop by up to 10C within decades of the circulation slowing, or even stopping, because of the vast amounts of heat energy transported by ocean currents [...]. The changes already occurring have been found as a result of efforts to follow up computer predictions of global warming. They have confirmed a predicted slowing of ocean circulation, a team from the National Oceanography Centre, Southampton, reports today in the journal Nature" (Highfield, 2005, p.15).

"The world's best climate scientists are telling us it is time to do something about it [...] What the Fourth Assessment Report is also telling us is that there is still a job for the scientists to do in developing an understanding of what's happening on the regional and local scale, and to advise politicians more specifically on what levels of emissions we should be aiming to reduce towards, and what the associated risks are" (Hardaker³⁵, 2007, p.16).

"IT'S official: 2006 was the warmest year ever recorded in Ireland, according to meteorologists, who say it is the most damning evidence yet of the effects of global warming [...]. 'It's not just a one-off', said Peter Lennon, from the climate division of Met ireann. 'It follows computer models of what is expected in terms of the greenhouse effect. It is in line with the models and the implications of those are quite serious'. Figures logged at Met ireann weather stations round the country reveal a rise in the average temperature" (McCullagh, 2006, p.5).

³⁵ Paul Hardaker was Chief Executive of the Royal Meteorological Society from 2006 to 2012.

Scientific consensus

Scientific consensus: signs of climate change and need to invest in research

"The scientific evidence for man-made climate change is now virtually beyond dispute. An overwhelming majority of scientists believe that greenhouse gas emissions are heating the earth's climate resulting in more extreme weather and climate events. A report published last week found that the polar ice sheets are melting three times faster than they were two decades ago" (Ashdown, 2012).

"This year is set to be the hottest on record both globally and for Britain, with climate scientists pointing to rising levels of atmospheric carbon dioxide as the most likely cause of the continued warming seen around the world. The global figures suggest that 2014 is set to beat previous records for heat set in 2010, 2005 and 1998. Climate researchers will use the latest data to puncture the myth that global warming has stalled and will urge negotiators at the climate change negotiations in the Peruvian capital of Lima to take note of what they see as incontrovertible evidence that the world is on path towards dangerous global warming" (Connor, 2014b, p.11).

"A dramatic surge in the Earth's surface temperatures took place in February which saw the biggest month-on-month rise in global warming on record, latest figures released by NASA show [...]. While some of the temperature rise has been put down to the large El Nino event currently coming to an end in the Pacific Ocean, scientists repeated their warnings that the global climate system is now being strongly influenced by human emissions of greenhouse gases, especially by the rising concentrations of carbon dioxide from fossil fuels" (Connor, 2016).

Scientific consensus: investing in adaption can be beneficial

"Participants at our recent roundtable concluded that [...] 'The way out of the recession will be through frugality and clever spending. Those businesses that are either developing products and services that tackle climate change or have adopted them early will do well' [...]. There was a widespread recognition that the Stern report had closed off resistance in the public sector to dealing with climate change. But not every public manager has grasped the fact that reducing emissions will save money and is therefore even more important in the present economic climate" (The Guardian, 2009).

"Fish from the Lake District will be moved to cooler waters in Scotland under radical plans - which will be unveiled this week - aimed at coping with climate change [...]. Scientists warn higher temperatures and lower rainfall in summer will lead to lower river flows and rising water temperatures [...]. Other climate change adaptation reports will be released this week by National Grid, covering gas and electricity, the Environment Agency, the Trinity Lighthouse Authority, the Highways Agency, Network Rail and Natural England [...]. An economic analysis will put a price tag on the cost of adaptation in summer 2012" (Chorley, 2011, p.32).

"Studying Caribbean coral reefs, Peter Mumby and colleagues from the University of Queensland found that enforcing a rule limiting the fishing of a single type of herbivorous fish - parrotfish - would allow coral reefs there to continue to grow, despite bleaching and other impacts associated with climate change [...]. Banning the taking of parrotfish under 30cm, and limiting total catch to 10% of the mass of the total population, would allow the reefs to cope with climate change until at least 2030, the researchers found" (Slezak, 2016).

Scientific consensus: geo-engineering debate

"A controversial proposal to cool the planet artificially by injecting tiny reflective particles into the upper atmosphere would cause droughts and climate chaos in the poorest countries of the world, a study has found. One of the more serious plans to 'geo-engineer' the global climate would in effect create another climate catastrophe that would result in misery for millions of people, according to a computer model of the plan [...]. 'However, since such cuts are far from certain to materialise, proponents of geo-engineering research argue that whatever the world decides on its carbon emissions, it would be prudent to explore alternatives that might help us in the decades ahead', Professor Highwood said" (Connor, 2014a, p.10).

"Lord Ridley, whose family has mined coal on its Northumberland estate for centuries, is a self-styled 'climate lukewarmer', believing that global warming is only happening slowly and poses no significant threat to the planet. By contrast, Baroness Worthington is a renewable electricity campaigner and Labour's shadow energy and climate change minister in the House of Lords. But they strongly agree that advancing fledgling CCS technology so that it can be employed efficiently on an industrial scale is essential if the UK is to have any chance of meeting its legally-binding targets to reduce carbon emissions [...]. The amendment, which is based on research from Professor Myles Allen of Oxford University and Professor Stuart Haszeldine from Edinburgh University, will not require power companies to dispose of their emissions, although they could indirectly pay for them since the fossil fuel companies are likely to pass some of the cost on to their customers" (Bawden, 2015a).

Scientific consensus: climate change as a risk for both environment and humans

"Up to 20 million Bangladeshis may be forced to leave the country in the next 40 years because of climate change, one of the country's most senior politicians has said" (Randerson, 2009).

"Two analyses of the Copenhagen Accord and its pledges, by Dr Sivan Kartha of the Stockholm Environment Institute, and by the Climate Action Tracker website, suggest that, with the cuts that are currently promised under Copenhagen, the world will still warm by 3.5C by 2100. Such a rise would be likely to have disastrous effects on agricultural production, water availability, natural ecosystems and sea-level rise across the world, producing tens of millions of refugees" (McCarthy, 2010, p.4).

"A 2015 study found that heat stress cost the Australian economy \$6.2bn in lost productivity and suggested that temperature increases due to climate change would cause productivity to decrease by up to 20% globally during summer months by 2050" (Wahlquist, 2016).

Scientific consensus: climate change as a moral issue and global "(in)justice"

"It is estimated that every year for the next decade, 175 million children will be affected by sudden climate related disasters, which will challenge much of the progress made towards meeting the Millennium Development Goals. Children are therefore bearing the brunt of the impact of climate change, despite being the least responsible for it" (Ashdown, 2012).

"We merely need to reinstate the strategy that was espoused both by the Tories and Labour in the pre-Thatcher years - treat each individual farm as a business (a million miles from Stalin's state-owned collectives) but ensure that all businesses of all kinds conform to principles of common sense and common morality" (Tudge, 2013).

"In the most extreme cases of disasters in patriarchal societies, women may be unable to leave the house without a male companion or their movement can even be hampered by long clothing, experts said. 'Climate change makes all of the very big and complex problems that exist in the world today a whole lot worse', said Professor Hilary Bambrick, of Western Sydney University, who points out that 90 per cent of the 150,000 people killed in the 1991 Bangladesh cyclone were women" (Bawden, 2015b).

Scientists as political/economic advisors

Scientists as political/economic advisors: political support

"The world is heading for the next major climate change conference in Cancun later this year on course for global warming of up to 3.5C in the coming century, a series of scientific analyses suggest. The failure of last December's UN climate summit in Copenhagen means that cuts in carbon emissions pledged by the international community will not be enough to keep the anticipated warming within safe limits" (McCarthy, 2010, p.4).

"It seemed like a simple idea at first: ask Republicans what they would do about climate change [...]. Whitehouse argued Republicans were now caught between, on one side, powerful corporate interests and the conservative Tea Party wing - which continues to deny the existence of climate change - and on the other, public opinion, which breaks in favour of action on climate change. A number of the Republicans who broke ranks on climate change are from states Obama won in 2012 and are facing tight re-election contests in 2016 [...]. Two-thirds of American voters would reject a candidate who denies the existence of human-caused climate change, according to a Stanford University poll released last week" (Mathiesen, 2015).

"One of the world's leading climatologists has warned that US presidential candidate Donald Trump is a 'threat to the planet' because of his denial of global warming. Professor Michael Mann, whose work showing how humans had caused the Earth's temperature to rise at an unprecedented rate helped the International Panel on Climate Change win the Nobel Peace Prize, said he and other scientists are speaking out because of 'the irreparable harm that would be done by a climate change-denying, anti-science-driven Trump presidency'" (Johnston, 2016, p.23).

Scientists as political/economic advisors: economic/energy support

"In the week that leading scientists and economists launched a global research initiative to make green energy cheaper than coal within a decade, and a day after a report from the US National Oceanic and Atmospheric Administration that global warming may be speeding up, Oxfam challenged leading economies such as the UK to phase out coal-powered plants during the 2020s" (Bawden, 2015a).

"Another financial risk related to global warming [...] is that the United Nations Intergovernmental Panel on Climate Change has estimated that there is a global 'carbon budget' if temperature rises this century are to be limited to two degrees above pre-industrial levels - widely seen as the safe limit [...]. The risk is that if this 'carbon bubble' were to burst suddenly, it could cause a wider financial crisis. Earlier this year, G20 finance ministers asked the FSB to consider how the financial sector could take account of the risks to stability presented by climate change. The United Nations will convene a climate change conference in Paris on 30 November, with a goal of sealing a new binding and universal inter-governmental agreement on curbing emissions" (Chu, 2015).

"Australia's chief scientist, Alan Finkel, has said investment in the electricity sector has stalled because of 'policy instability and uncertainty' - and he's warned that current federal climate policy settings will not allow Australia to meet its emissions reduction targets under the Paris agreement. In a 58-page report that has been circulated before Friday's Council of Australian Governments meeting between the prime minister and the premiers, Finkel has also given implicit endorsement to an emissions intensity trading scheme for the electricity industry to help manage the transition to lower-emissions energy sources" (Murphy, 2016).

Scientists as political/economic advisors: critiques to market mechanisms

"Yesterday afternoon in Copenhagen – where the UN climate talks are entering their second week – Professor Chu [a Nobel physicist] [...] thrilled us with another US innovation, a technology called pumped storage: water can be pumped up a hill when electricity is cheap and released when it's expensive. The UK started building its first pumped storage plant, Dinorwig, in 1974 [...]. What has happened to the great pioneering nation, the economic superpower which once drove innovation everywhere? The real problem is the terror of all modern US governments of being seen to interfere in the free market. It's ironic that the lack of effective regulation in the US has not ensured - as the free market fundamentalists prophesied - that the US came out in front, but that it has been left far behind. Just ask the car manufacturers. The truth, too uncomfortable to be discussed by US officials, is that government regulations are among the main drivers of technological innovation" (Monbiot, 2009).

"The logic of free-market capitalism has always meant that whatever lawfully makes the most money in the shortest time is a good thing, which is why oilmen pump crude from the ground and the gas companies invest in hydraulic fracture techniques: it makes money for the shareholders [...]. And here is where the disconnect between politics and climate science has become most obvious. In the years of inaction, or insufficient action, or outright denial, scientists have repeatedly underlined the reality of climate change, and its potentially catastrophic consequences. A recent communique from 24 of Britain's learned societies, all innately conservative and business-friendly, spelled it out again: 'Climate change poses risks to people and ecosystems by exacerbating existing economic, environmental, geopolitical, health and societal threats, and generating new ones. These risks increase disproportionately as the temperature increases'" (Adam, 2015).

Climate mobilization/dissemination

"In the end, the day of protest came down to a battle for a narrow bridge outside the climate summit's conference centre. After being promised they would be allowed to cross, protesters were driven back by police who beat those in the front repeatedly with small batons [...]. Author Naomi Klein, who was among those who joined the walkout, said the Danish police's handling of the protests had been

very poor [...]. Mary Robinson, former Irish president and honorary chair of Oxfam International, said: 'With the negotiations here in crisis we desperately need the engagement and witness of people's organisations to keep the pressure on political leaders to deliver a fair, ambitious and binding climate deal' (Watts & van der Zee, 2009, p.6).

"Neighbouring households are being encouraged to group together to apply for the funding, which could pay for solar panels, wind turbines or hydro-electric generators that could save families hundreds of pounds a year in fuel bills [...]. Ministers hope communities will be inspired by the success of projects like Brixton Energy Solar in south London, where local residents built solar panels on the roof of blocks of council housing and made a profit from electricity generation, with the money going back into the community" (Merrick, 2014).

"So many people don't understand what we're up against [...]. For most of us, none of that is real or vivid or visceral or even visible. For a great many scientists whose fields have something to do with climate, it is. In many cases they're scared, as well as sad and unnerved, and they're clear about the urgency of taking action to limit how disastrously climate change impacts our species and the systems we depend upon [...]. Dismantling the fossil-fuel economy would undoubtedly have the side effect of breaking some of the warping power that oil has had in global and national politics. Of course, those wielding that power will not yield it without a ferocious battle – the very battle the climate movement is already engaged in on many fronts, from the divestment movement to the fight against fracking to the endeavour to stop the Keystone XL pipeline and others like it from delivering the products of the Alberta tar sands to the successful movement to shut down coal-fired power plants in the US and prevent others from being built" (Solnit, 2014).

Scepticism confutation

Scepticism confutation: political-economic interests behind uncertainty

"This week saw the launch in the oil capital of Houston of a series of 'energy citizen' rallies against climate change reform. More than 3,000 people attended the lunchtime rally – many employees bussed in by Chevron and other oil companies. Greenpeace, which obtained a memo last week from the American Petroleum Institute laying out a plan for the supposed grassroots uprising against climate change legislation, has called such rallies 'astroturf' events. The inquiry has yet to establish the full extent of involvement of major coal firms in the scandal. Bonner had been hired by a PR firm, the Hawthorn Group, to lobby against the bill by the American Coalition for Clean Coal Electricity" (Goldemberg, 2009).

"There's a first class article in Nature this week on the reasons Americans reject the science of climate change [...]. One explanation is that we have a problem of propaganda: the lobbyist's rule that for every PhD there is an equal and opposite PhD makes it easy for malevolent forces to blind the world with bullshit. [Dan] Kahan [Professor of Psychology at Yale Law School], however, sees a rather more powerful explanation. Both voters and governments, in ignoring the very painful adjustments that would be needed to diminish climate change, are definitely working to a utility function. They want to minimise their own unpopularity and will see the world in ways that make their actions seem rational [...]. Underlying all this confusion is the problem that we don't have a way of ranking rationalities, so that the word means something more to a moral agent than it does to an economist. There may be ways of fixing that and averting catastrophic global warming that don't make use of religious resources, but I can't think of any" (Brown, 2012).

"The biggest oil company in the world, ExxonMobil, suspected fossil fuels might be involved in climate change as early as 1981 - seven years before the issue hit the headlines, the firm's former climate expert has revealed [...]. Climate change became a mainstream issue in 1988, when NASA climate scientist James Hansen warned that it was being caused by the use of fossil fuels. Ms [Alyssa Bernstein, director of the Institute for Applied and Professional Ethics at Ohio University] told The Guardian: 'What it shows is that Exxon knew years earlier than James Hansen's testimony to Congress that climate change was a reality; that it accepted the reality, instead of denying the reality as they have done publicly, and to such an extent that it took it into account in their decision making, in making their economic calculation. 'One thing that occurs to me is the behaviour of the tobacco companies denying the connection between smoking and lung cancer for the sake of profits, but this is an order of magnitude greater moral offence, in my opinion, because what is at stake is the fate of the planet, humanity, and the future of civilisation, not to be melodramatic'. Richard Keil, a

spokesman for Exxon, said climate change science in 1981 was 'in the very, very early days and there was considerable division of opinion'" (Johnston, 2015).

Scepticism confutation: delay in action

"There are, of course, still those who deny that any warming is taking place [...]. But few of them are climatologists, fewer still are climatologists who do not receive funding from the fossil fuel industry. Their credibility among professionals is now little higher than that of the people who claim that there is no link between smoking and cancer [...]. The consensus among climatologists is that temperatures will rise in the 21st century by between 1.4 and 5.8C" (Monbiot, 2003).

"A study suggesting that the 'pause' in global warming is not real has managed to unify climate scientists and their arch-sceptics over the need for further research to clarify whether global average temperatures really have flat-lined over the past 15 years [...]. The slowdown in temperatures has been used by climate sceptics, such as the former Chancellor Lord Lawson of Blaby, to undermine the science of climate change, claiming that global warming has stopped despite a continuing rise in industrial emissions of greenhouse gases - set to reach a record 36 billion tons in 2013" (Connor, 2013).

"Many people have spent a lot of time trying to show that much of our recent climate change is just natural. So far, these studies have died as fast as they've been born. A recent attempt was made to liken our climate to fans in a stadium, you know those annoying 'waves' that fans make? [...]. In the study, authors Michael Mann, Byron Steinman, and Sonya Miller [...] show that past analyses which have been used to estimate internal variability have failed to find appropriate variability when it was known ahead of time. These methods errantly show natural variability which is too high and which has a biased phase. As a result, the claims of stadium waves are made based on an incorrectly methodology [...]. I think we would all like to conclude that the current climate change is just natural [...]. Unfortunately, [these claims] have not borne scientific scrutiny well. Distinguished Professor of meteorology Michael E. Mann told me" (Abraham, 2014).

Scepticism confutation: dissemination of misleading information/"climate scandals"

"Anyone with a knowledge of the total surface area of Himalayan glaciers would have known that Kotlyakov was not referring to the shrinking of Himalayan glaciers, but to the shrinking of all mountain glaciers, outside the Polar Regions. More importantly his report, seriously misquoted by Down to Earth, said this shrinkage will occur by 2350 - not 2035 [...]. One of the Himalayan glaciers is listed as retreating by 2,840 metres between 1845 and 1966, which is 23 metres per year. Yet the IPCC's report lists it as retreating by 135 metres per year. Whoever did the calculation within the IPCC had divided the total glacier retreat by 21 years, not 121. It would be easy to condemn the IPCC for these lapses but it must be remembered that the organisation is essentially composed of working scientists and it was the science community that identified and exposed the errors [...]. The 2035 timeframe may be discredited, but that doesn't mean that there is not a problem. Increasingly, this century, the gradual loss of the Himalayan glaciers are likely to impinge on the reliability of the water supply of people living in the lower alpine valleys of the mountains" (Connor, 2010).

"One of the world's leading climate scientists has launched a libel lawsuit against a Canadian newspaper for publishing articles that he says 'poison' the debate on global warming [...]. Weaver says the articles, published at the height of several recent controversies over the reliability of climate science, contain 'grossly irresponsible falsehoods'. He said he filed the suit after the newspaper refused to retract the articles [...]. The articles, published from December to February, claimed that Weaver cherry-picked data to support his climate research, and that he tried to blame the 'evil fossil fuel' industry for break-ins at his office in 2008 to divert attention from reported mistakes in the 2007 report of the Intergovernmental Panel on Climate Change, on which he was lead author" (Adam, 2010).

"In the run up to the UN climate change summit in Copenhagen in 2009, sceptics spread misleading accounts about the contents of emails that had been illegally hacked from the Climatic Research Unit at the University of East Anglia. Lawson officially launched his foundation just a few days after sceptics started to disseminate the hacked emails, and cited concerns about the global temperature record in an article published in the Times to publicise his new organisation. Among the false accusations made against the University of East Anglia was a claim scientists had distorted the record of global average temperature [...]. This is just the latest attempt by climate change sceptics to damage confidence in the global temperature record, which shows about 0.85C of warming since the

start of the late 19th century, according to the latest report by the Intergovernmental Panel on Climate Change (IPCC)" (Ward, 2015).

Advocates vs sceptics

"The advocates of this policy can only justify it - or at least attempt to do so - by falling back on the mantra that the planet is imminently at risk as a result of man-made climate change. But is it, really? You don't have to be a so-called 'climate change denier' to find this claim preposterous. Listen, for example, to Professor Mike Hulme, the immensely respected founder of the Tyndall Centre for Climate Change Research and a linchpin of the Intergovernmental Panel on Climate Change. In a debate on BBC radio earlier this week he said: 'There are many people - including some scientists - who present climate change as an existential threat to the planet and to human civilisation. That is not what the science itself is telling us'. Yet it is precisely the claim that man-made climate change is 'an existential threat to the planet' which is used to justify such vastly expensive - and possibly murderous - policies as a world-wide switch to 'renewable' crop-based fuels" (Lawson, 2008, p.34).

"The US used backstage diplomatic manoeuvres to help block the appointment of a scientist from Iran to a key position on the (IPCC), a leaked diplomatic cable reveals. The US privately lobbied IPCC chair Dr Rajendra Pachauri, as well as the UK, EU, Argentina and Mali representatives, and had put its embassies to work from Brazil to Uzbekistan. It wanted to prevent the election of Dr Mostafa Jafari as one of two co-chairmen of a key working group. The other co-chair was to be an American scientist. The US state department noted that sharing the IPCC position with an Iranian would be 'problematic' and 'potentially at odds with overall US policy towards Iran' [...]. Pachauri today rejected any suggestion he had colluded with the US private approaches, which apparently ended in another candidate, an Argentinean, being appointed to the position to which Jafari had been nominated" (Carrington, 2010).

Scepticism

Scepticism: scientific dishonesty

"The 'science' is already paying dearly for its abuse of freedom of information, for unacceptable cronyism, for unwonted arrogance, and for the disgraceful misuse of data at every level [...]. What is worse, the usurping of the scientific method, and of justified scientific scepticism, by political policies and political propaganda could well damage science sensu lato" (Delingpole, 2010).

"The Mail on Sunday today presents irrefutable evidence that official predictions of global climate warming have been catastrophically flawed [...]. The eco-debate was, in effect, hijacked by false data. The forecasts have also forced jobs abroad as manufacturers relocate to places with no emissions targets" (Rose, 2013).

"A climate change researcher believes scientists are confusing their role with activism and are being influenced by politics after his paper challenging predictions about the speed of global warming was rejected because it was seen as 'less than helpful' [...]. The paper, co-authored with four other scientists, challenged the findings of the UN's Intergovernmental Panel on Climate Change (IPCC) but was rejected by Environmental Research Letters, one of the most highly regarded journals" (Carter, 2014).

Scepticism: scientific "aura" of scepticism

"A new study in the journal Nature Climate Change looked at 117 climate predictions made in the 1990's to the actual amount of warming. Out of 117 predictions, only three were accurate. The other 114 overestimated the amount by which the Earth's temperature rose [...]. 'It's a real problem... it shows that there really is something that needs to be fixed in the climate models', climate scientist John Christy, a professor at the University of Alabama in Huntsville, told FoxNews.com" (Daily Mail, 2013).

"The second man on the moon has revealed his thoughts on climate change, one-way missions to Mars and the state of space exploration. He says he is 'sceptical about the claims that human produced carbon dioxide is the direct contributor to global warming' [...]. He has a Bachelor of Science degree from the US Military Academy at West Point, New York and a doctorate of science from the Massachusetts Institute of Technology" (O'Callaghan, 2014).

"Climate change is a hoax developed as part of a secret plot by the United Nations to undermine democracies and take over the world, a top adviser to Tony Abbott, Australia's prime minister, has warned. Maurice Newman, the chief business adviser to the prime minister, said the science showing links between human activity and the warming climate was wrong but was being used as a 'hook' by the UN to expand its global control" (Pearlman, 2015).

Scepticism: economic interests behind climate science

"Professor [Myles Allen, Professor of Geosystem Science at Oxford University] had taken objection to a piece by Matt Ridley which noted that even alarmist scientists were now beginning to concede that their claims about climate sensitivity were overdone and that 'global warming' wasn't going to be as nearly extreme as they had predicted [...]. Not so Myles Allen who used it as an excuse to misrepresent and caricature Ridley's position and, more bizarrely, to deny that his own paper meant what it clearly did mean [...]. On the one hand, he is cannily finessing his position in order to appear slightly less wrong and ridiculous when the whole Catastrophic Anthropogenic Global Warming industry finally collapses. On the other, he is desperate not to lose face with his Alarmist homies, and so has to go out of his way to dissaknown sceptic in the alarmist house journal - the Guardian - even if it means coming up with an argument so convoluted it involves rejecting the significance of a paper he himself co-wrote" (Delingpole, 2013).

Scepticism: climate science as a religious cult

"[...] last year James Lovelock, a pioneer of the environmental movement and author of The Gaia Hypothesis, which raised questions about the dangers of global warming, unexpectedly revised his own views. He said: 'The problem is we don't know what the climate is doing'. 'We thought we knew 20 years ago'. 'That led to some alarmist books - mine included - because it looked clear-cut, but it

hasn't happened'. 'The climate is doing its usual tricks'. 'There's nothing much really happening yet'. 'We were supposed to be halfway toward a frying world now' (Webb & Smith, 2013).

"The reality is that man-made global warming is a myth [...]. Perhaps this will be the moment that this fact becomes the new scientific orthodoxy" (Rose, 2013).

"There recently arrived on the desk of the editor of The Times an extraordinary three-page letter, signed by 13 members of the House of Lords. They informed him in no uncertain terms that, if he wished to save his paper's reputation, he must stop printing articles which don't accord with the official orthodoxy on climate change. Headed by Lord Krebs, its signatories read like a check-list of our 'climate establishment' [...]. What made this even more bizarre was that the offending article had merely reported on a very measured, technical paper written for the Global Warming Policy Foundation by an eminent professor of statistics, an expert on computer models, questioning the reliability of the models officially used to predict future global temperatures, which have so consistently been proved wrong. The response from the signatories of the letter was a perfect case-study in what Irving Janis, the former Yale professor of psychology, analysed as 'groupthink'. Those, caught up in a bubble, he showed, first succumb to a collective mind-set which is in some way at odds with reality. They then elevate this into an illusory orthodoxy which cannot be challenged. Finally, because their groupthink is based on such shaky ground, they intolerantly lash out at anyone who dares question it" (Booker, 2016).

Scepticism: conflicts among scientists and politicisation of science

"THE world stopped getting warmer almost 16 years ago, according to new data released last week [...]. Some climate scientists, such as Professor Phil Jones, director of the Climatic Research Unit at the University of East Anglia, last week dismissed the significance of the plateau, saying that 15 or 16 years is too short a period from which to draw conclusions. Others disagreed. Professor Judith Curry, who is the head of the climate science department at America's prestigious Georgia Tech university, told The Mail on Sunday that it was clear that the computer models used to predict future warming were deeply flawed" (Rose, 2012).

"For years polar bears have been the poster boys of global warming - routinely reported to be threatened with extinction due to melting ice-packs and rising sea temperatures [...]. One prominent scientist said their numbers would be reduced by 70 per cent by 2050 while global warming proponents - including Al Gore and Sir David Attenborough - used emotive imagery to highlight their 'demise'. Yet there is one small problem: many polar bear populations worldwide are now stable, if not increasing. According to a report compiled this year on Canadian polar bear populations by academics at Lakehead University, Ontario, only one out of 13 areas showed declining numbers. In fact, in some areas numbers have steadily increased" (Graham, 2013).

"The former Cabinet minister Peter Lilley, recalled the Met Office's prediction from 2004 that, over the next decade, global temperatures would rise by some 0.3 degrees C. And what had happened when 2014 arrived, asked Letts? 'Nothing', Lilley replied [...]. This prompted the trust to quote yards of material from such learned authorities as the Commons Select Committee on Energy and Climate Change to show that it was almost universally agreed by scientists that 'human activity is the dominant cause of the warming witnessed in the latter half of the 20th century' [...]. But here is the central irony of this wondrously po-faced document. Although it repeatedly found the programme guilty of such a 'serious breach' of the BBC's statutory commitment to 'accuracy', Mr Lilley's playful comment on that 0.3 degree temperature rise predicted by the Met Office computer in 2004 was not wrong. According to the satellite record, the temperature trend line in those 10 years did not rise at all. Lilley's real offence in the BBC's eyes was that what he said was entirely accurate" (Booker, 2015).

Scepticism: apparent neutrality

"[...] latest figures from Met Office show slower rise than previously warned [...]. Dr David Whitehouse science editor of the Global Warming Policy Foundation (GWPF), which was set up by climate change skeptic Lord Lawson, was scathing about the Met Office u-turn. He said: [...] 'It is time that the scientific community in general and the IPCC in particular acknowledged the reality of the global temperature standstill [...]. Bob Ward, of the London School of Economics' Grantham Research Institute, hit back saying he was wrong to interpret the new data as indicating warming had stopped [...]. Professor Myles Allen, of the University Of Oxford, said skeptics were wrong to suggest the data proves temperatures have stalled: 'While every new year brings in welcome new data to help

us rule out the more extreme (good and bad) scenarios for the future, it would be equally silly to interpret what has happened since the early-2000s as evidence that the warming has stopped'. Prof Chris Rapley, Professor of Climate Science at University College London, added: 'I despair of the way data such as this is translated as 'global warming has stopped!'" (Webb & Smith, 2013).

"A new species of prehistoric bird has been dug up in the icy depths of the Canadian Arctic [...]. These fossils allow us to flesh out the community and add to our understanding of the community's composition and how it differed from other places in the world', says Dr Donald Brinkman, vertebrate paleontologist and director of preservation and research at the Royal Tyrrell Museum in Alberta, Canada. Building climate change records using findings such as these allows scientists to better understand how changing temperatures can affect our planet's ecosystems. It could help to predict the consequences of future extreme climatic events [...]. The ancient bird fossils were found above basalt lava fields, created from a series of volcanic eruptions. Experts believe that these volcanoes pumped carbon dioxide into the atmosphere, causing a greenhouse effect that warmed the areas around the Earth's poles. This warming created an ecosystem allowing large birds, including the team's *Tingmiatornis Arctica*, to thrive" (Pettit, 2016).

Consequences

Consequences: far away problem

"More than 100 million people will die and global economic growth will be cut by 3.2 percent of gross domestic product (GDP) by 2030 if the world fails to tackle climate change, a report commissioned by 20 governments has claimed [...]. More than 90 percent of those deaths will occur in developing countries, said the report that calculated the human and economic impact of climate change on 184 countries in 2010 and 2030 [...]. The world's poorest nations are the most vulnerable as they face increased risk of drought, water shortages, crop failure, poverty and disease" (Chestney, 2012).

"Speaking Monday via satellite to climate experts gathered for this week's Pacific Islands Forum (PIF) in the Marshall Islands, US Secretary of State John Kerry asserted that climate change needs to be taken more seriously and that action can be taken to stem the tide of consequence. The Marshall Islands, at no more than three feet above sea level, are especially at risk of rising seas, one of the many effects of global warming" (Gorman, 2013).

"In 2005, the North Pole began to move suddenly in an easterly direction. Using NASA satellite data, University of Texas researchers found that climate change, and in particular melting ice sheets, was to blame [...]. According to previous research, this shift is also caused by changes in the Earth's mass that have been occurring since the last ice age, affected by what's called the Chandler wobble. The Chandler wobble is a wobbling motion that happens as the Earth rotates on its axis [...]. The wobble was discovered by American astronomer Seth Carlo Chandler in 1891 and the poles can 'wander' up to approximately 20ft to 30ft off course over a period of 433 days, before settling" (Woollaston, 2013).

Consequences: effects on nature

"Garden birds are being protected from the effects of climate change by an alien tree, researchers have found. Turkey oaks were introduced to Britain in the 18th century and have spread across the country, but unlike many invasive species they are thought to be benefiting the native wildlife" (Smith, 2008, p.23).

"Despite our long and close association with bluebells, the nation's favourite wild flower faces an uncertain future - and we may be responsible [...]. The UK Phenology Network (also known as Nature's Calendar) collects, collates and analyses data from across the UK. It needs records from across the country to better understand the influence of climate change and climate extremes" (Rushby-Smith, 2011, p.9).

"Scientists have long known about the cannibalistic behaviours of polar bears. Polar bears are thought to eat cubs in the late summer and autumn, when seals move out to sea. Now, researchers say this may be worsening because of climate change. Warming Arctic temperatures are causing ice sheets to melt, making it difficult for polar bears to hunt for seals" (MacDonald, 2016).

Scientific evaluations

Scientific evaluations: climate change as a risk/benefit issue

"Huge amounts of dissolved iron currently being released into the oceans from melting ice sheets might cancel out some of the negative effects of global warming, it has been claimed [...]. The researchers say this could effectively 'buffer' the effect of global warming [...]. Despite the catastrophic effects of climate change of some parts of the world, researchers say there are some positive effects. They include: Increased land for agriculture [...]. Longer growing seasons [...]. Less energy needed for heating. Arctic resources become available. Boost in alternative energy research" (Prigg, 2014a).

"The frightening predictions, calling an end to the traditional exodus to the Mediterranean, were made by the European Commission investigating the savage effects of climate change [...]. High temperatures could wreak havoc for some Mediterranean countries in the summer months [...]. The report said: 'One could expect tourists would distribute their holiday pattern more evenly during the year and take shorter holidays in order to benefit, for instance, from more clement weather conditions during the other seasons' (Batchelor, 2015).

"[...] a new study has shown that increasing levels of carbon dioxide in the atmosphere may actually lead to greater yields of key crops like wheat, rice and soybeans" (Beall, 2016).

Scientific evaluations: market-techno optimism

"Britain is facing both an energy and a climate-change crisis. If we are to solve either, environmentalists on the left must take the energy crunch - and the potential of 'fracking' - seriously. And the fossil fuel brigade on the right must stop pretending that climate change isn't happening [...]. Without new energy sources, the result will be higher bills at best and blackouts at worst [...]. Yet despite that, the Government is now investing in two, rather than four, CCS projects - missing out on (EURO) 600 million of EU funding in the process. Fourth, we mustn't exaggerate how much fracking can cut energy bills. Shale has lowered the cost of US energy but exports are currently banned, restricting demand to the domestic market [...]. Exploiting a range of different technologies - shale, wind and nuclear - is the only way to deal with Britain's twin crises. That requires the camps on either side to stop talking past each other" (Straw, 2013, p.18).

Climategate

Climategate: pro-climategate

"At the climate-change conference in Copenhagen in December 2009, McAleer dressed up as a polar bear. United Nations security officials disconnected his microphone after he asked Gore a question about a controversy involving emails from the University of East Anglia, which climate sceptics claimed showed scientists had conspired to manipulate climate data. McAleer was in Copenhagen to shoot a short film entitled *Phil and Me*, about his effort to track down Phil Jones, the head of East Anglia's climate research unit" (Monaghan, 2011).

"Four are members of the supposedly 'independent' Committee on Climate Change, including its chairman Lord Deben (aka John Gummer). Others included Lord (Nicholas) Stein and Lord Oxburgh, chair of the inquiry set up by East Anglia University which cleared its Climatic Research Unit of any impression of scientific wrongdoing given by the Climategate emails. Although these signatories are all fully committed 'climate alarmists', none is in any way a climate scientist, and several have declared financial interests in 'renewables' and 'low-carbon' energy" (Booker, 2016).

Climategate: neutral

"Meanwhile efforts to destabilise the Durban talks by the release of more emails for the university at the heart of the climategate scandal appeared to have failed. The emails, hacked from the University of East Anglia, show private conversations between scientists about the release of information on climate change and how to present the argument to the public. Extracts circulating on the blogosphere include references to 'deleting emails', hiding 'dirty laundry' and not being 'too optimistic' about climate change. However Phil Jones, the head of the Climatic Research Unit (CRU) and the scientist at the centre of the row, said none of the emails appeared to cast doubt on the science. He said the issue of Freedom of Information and the presentation of uncertainty around climate change, raised by the new emails, was already dealt with in three separate inquiries prompted by the first scandal" (Gray, 2011).

Climategate: against-climategate

"I wonder how many of the harry_read_me cheerleaders have really gone through it, rather than just reading a few cherry-picked quotes from sceptical blogs [...]. Harry_read_me.txt has been presented as the proof that the climate change consensus was built on sand. Quite the contrary. It shows that the results achieved by the scientists in East Anglia, NASA, the NIES and others come from hard work, intelligence and application, rather than appearing fully-formed in laboratory computers as some naive commentators seem to insist that they should" (Douglas, 2009).

Instrumental consensus

Instrumental consensus: extremely dramatic tones

"No one will be untouched by climate change with storm surges, flooding and heatwaves among the key risks of global warming in the coming decades, claim scientists [...]. The report [...] informs policy decisions of governments around the world. But one of its contributors has accused the IPCC of being too 'alarmist' – and demanded his name be withdrawn. Professor Richard Tol, an economist at the University of Sussex, said the drafts had been changed to make the findings more 'apocalyptic'. He said colleagues 'drifted too far to the alarmist side' and were likening climate change to the 'Four Horsemen of the Apocalypse'" (Zolfagharifard, 2014a).

"Climate change will foster terrorism and will fuel immigration to the UK as millions of people are displaced by rising sea levels [...]. Scientists say the effects of climate change are already being felt and warming will continue due to existing emissions. Bangladesh is widely acknowledged to be one of the most vulnerable countries to the impacts of climate change" (Gosden Lima, 2014).

"Scientists say diseases including dengue fever and the West Nile virus could become common as warmer weather attracts insects from parts of Asia and Africa. The biggest threat to the UK comes from the Asian tiger mosquito, which spreads dengue fever and the chikungunya virus. Both cause serious illnesses, which especially in the case of dengue fever can be fatal [...]. That virus can cause infections including meningitis and encephalitis and in some cases is fatal. The UK climate is already said to be suitable for insects that carry the West Nile disease, but scientists now say factors including climate change will make the UK - and particularly southern England - the perfect habitat for the mosquitoes to thrive [...]. However the report's authors add that climate change is not the only factor in bringing tropical diseases to Britain" (Batchelor, 2015).

Instrumental consensus: uncertainty of consequences and actions to be taken

"Planting trees will make very little difference to global warming even if done on a vast scale, and in some places it could worsen the problem, a study has found [...]. The study by scientists in Canada, published in the journal Nature Geoscience, casts doubt on schemes under which governments, businesses and individuals seek to offset their emissions by paying for trees to be planted to absorb an equivalent amount of carbon dioxide [...]. Simon Lewis, Royal Society research fellow at the Earth & Biosphere Institute, University of Leeds, said: 'There is not enough land on Earth to plant enough trees to mop up sufficient carbon dioxide to substantially reduce future global warming'" (Webster, 2011, p.1).

"The unprecedented drought currently afflicting California is 'very likely' linked to human-caused climate change, researchers have found [...]. A recent report estimated that the water shortage would result in direct and indirect agricultural losses of at least \$2.2 billion and lead to the loss of more than 17,000 seasonal and part-time jobs in 2014 alone [...]. Using climate model simulations, the researchers found that 'Triple-R' events are three times more likely to occur today than in preindustrial climates. Scientists also determined that as long as high levels of greenhouse gases remain, severe droughts could become more frequent [...]. Despite the findings, Thomas Peterson, principal scientist at NOAA's National Climatic Data Center and one of the report's editors, said it is still hard to definitively link rainfall to climate change" (Prigg, 2014b).

"US researchers claim that the fast onset of global warming is set to alter the way people live, even over short time scales [...]. Overall, the world is getting warmer due to increasing greenhouse gas emissions that trap the sun's heat. But, given natural climate variability over short times scales, the likely effect of global warming over humanly relevant periods such as the length of a person's life is not so well understood" (Zolfagharifard, 2015).

Instrumental consensus: conflictual character

"For the past two years, ever since the disappointing Copenhagen climate summit, the 194 negotiating nations have stood indecisively at just such a junction. In one direction leads a steep and rugged pathway to a global agreement - legally binding on developed and developing countries alike - to cut emissions of the greenhouse gases that cause global warming. In the other lies a gentler and more beguiling roadway, paved with voluntary measures and good intentions, which looks like leading to an ultimately hellish climate [...]. [...] global emissions will have to start to decline well before 2020 if the world is to have a decent chance of keeping the rise in temperatures below the two degrees Centigrade that scientists say is the threshold for dangerous climate change. And as a giant United Nations Environment Programme study has shown, the mainly voluntary commitments due to take effect before that date are simply not enough to do the job" (Lean, 2011).

"In reality, of course, that's not how science works, or climate apocalypses, or even basic human debate [...]. Our climate is clearly changing [...]. The big question - indeed, the only real question - is what we are going to do about it. Here we find villains on both sides. By now, 17 years after the Kyoto climate summit didn't change the world, and with climate summits every year since then that haven't either, we really ought to have got the message. Yes, long-term logic, sense and compassion might have dictated that humanity should drastically change its lifestyle. But, um, we haven't, have we? And we're not going to" (Rifkind, 2014, p.25).

"After four years of talks, negotiators from 195 nations have produced a blueprint for a pact to stop climate change - but it is still riddled with conflicting proposals on most key points [...]. The UN talks, which aimed at a post-2012 deal, broke down after recriminations between rich and poor nations grew out of control. But any deal emerging from Paris is likely to fall far short of what is needed to cap global warming at the planned 2C or below [...]. Most scientists say failure to agree on strong measures would cause ever-increasing temperatures and lead to storms, droughts and rising sea levels as ice caps melt" (Calderwood, 2015).

Instrumental consensus: blaming external actors

"The devastating droughts that are plaguing southern Australia are caused by greenhouse gases and ozone depletion - and they will only get worse [...]. While the latest study suggests global warming is damaging Australia, separate research last month claims the solution might lie down under. Dry land ecosystems such as deserts play a more important role in the global carbon cycle than previously thought, the study revealed. And one of the biggest contributors, responsible for a huge spike in the amount of CO₂ absorbed in 2011, is located in Australia. The findings suggest that the Australian Outback, when exposed to increased rainfall and in turn grows more vegetation, could become a giant 'carbon sink' and might even be a major driver for global carbon absorption" (Zolfagharifard, 2014a).

"Thousands of protesters have gathered in capital cities across Australia as part of a worldwide push urging leaders to take greater action on climate change [...]. Climate scientist Tim Flannery and Lord Mayor of Sydney Clover Moore spoke at the event, as well as Labor deputy leader Tanya Plibersek. Ms Plibersek said Australia should be aiming for net zero emissions by 2050, and accused the current government of 'going backwards' on the issue of renewable energy" (Quinn, 2015).

"According to scientists it's not a case of if, but when - with sea levels set to rise by more than six feet in the next 80 years. Yet that doesn't seem to faze local Republican Senator Marco Rubio, who insists everything is hunky dory and that the climate experts are over-egging it a bit [...]. Debunkers say climate change is a myth, but I'm going to go with the experts on this one [...]. Global sea levels have shot up by eight inches since 1870, while average temperatures have risen by around 1°C since the 1960s, and will have climbed by nearly 7°C by 2100 if we keep going as we are. Some 375million people are affected every year by climate change - think hurricanes, flooding, droughts, wild fires, and the spread of diseases such as malaria. Most of the 600,000 or so people killed as a direct consequence are in the Third World, but in 2003, 70,000 Europeans died because of diseases caused by global warming" (The Sun, 2015, p.15).

Genuine consensus: climate change is real

"It's not just polar bears years from now that will be affected by climate change, the dangers of a warming Earth are immediate and very human. This is according the Intergovernmental Panel on Climate Change (IPCC) which said this year that the impact of climate change is 'widespread and consequential'. Yet the impact seen in the future still largely depends on the actions countries take to reduce their emissions today, the report said [...]. It argues that rising temperatures will exacerbate

poverty and damage land and marine species. It also claims that the world is in 'an era of man-made climate change' and has already seen impacts of global warming on every continent and across the oceans" (Zolfagharifard, 2014b).

"Europe is warmer now than it has been at any time over the past 2,000 years, according to new research. Scientists claim their findings reinforce claims global warming is man-made and not part of the normal climatic cycle. And they warn we may have underestimated the full extent of possible extreme events in the future, such as heatwaves. Most of Europe has experienced strong summer warming over the course of the past several decades, accompanied by severe heatwaves in 2003, 2010 and 2015" (Swan, 2016).

"A decade-long surge in methane threatens to make the fight against global warming even harder, top researchers have warned [...]. Methane is very efficient at trapping heat in the atmosphere. Like carbon dioxide, it contributes to global warming [...]. 'Trends in methane emissions should be taken seriously,' said Stefan Schwietzke, an expert at the US National Oceanic and Atmospheric Administration whose own estimates of CH₄ output, recently published in Nature, are even higher. 'But we should not forget that we also need to reduce CO₂ emissions, no matter what' (AFP & Plummer, 2016).

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Appendix 4. Additional examples of newspapers' use of dramatic tones

Bloc 1988-1997 - Centre-left

Headings and subtitles

"How the world received an ultimatum from on high - The billions of tons of gases pumped into the atmosphere since the industrial revolution may be inexorably altering the climate of the globe" (Radford, 1989).

"Rising sea levels, drought and the spread of disease are just some of the threats from global warming" (Brown, 1995, p.10).

"Global Warming Disaster 'on Way'" (Vidal, 1996, p.5).

Global drama

"While in European mountain resorts this will lead to economic disaster for some, in Africa the effects of global warming will destroy the way of life of millions" (Brown, 1995).

"We may think first of the near-desert regions, but disaster is more likely to come in the US grain belt [...]. The global conditions are already far from stable" (The Guardian, 1995b, p.26).

"Expansion of the oceans could raise sea-levels by 1.2 metres, flooding large areas of southern China, Bangladesh, Egypt, the Netherlands and Florida, drowning many Pacific islands and radically altering the shape of eastern England's coastline. This, combined with the possible speed and scale of disruption to agriculture, and consequently to economies, could spell the end to life as we know it" (Nicholson-Lord, 1997).

Drama of inaction

"They agree also that if we do nothing to reduce our emissions of greenhouse gases, then by the time we know the scale and the speed of change it will be too late to do anything about it - even if the consequence is disaster" (Wilkie, 1990).

"Since scientists at the Toronto convention in 1988 suggested a 60 per cent cut in the world's emissions of greenhouse gases - mainly carbon dioxide - little has occurred to upset forecasts of a potentially catastrophic rise of up to 3C in global temperature by the second half of the next century" (Nicholson-Lord, 1995).

"[...] the politicians' action is so far behind the scientists' demands that a series of climatic disasters seems almost inevitable" (Brown, 1997, p.17).

Signs of drama

"Global warming is almost certainly on the way. Global temperatures will rise, and more importantly sea levels, costing the rich nations money, and the poor ones land, livelihoods and even lives" (Radford, 1992).

"[...] for the second time in less than a decade Antarctica appears to be providing an early warning of impending environmental disaster" (Lean, 1995, p.13).

"Wildlife as well as people will be endangered by man-made changes in climate [...]. Birds, frogs, butterflies and alpine plants are all telling humans about our species' potentially disastrous intervention in the workings of the earth's climate" (Schoon, 1997b).

Drama of uncertainty

"There remain enormous uncertainties about when, and how much, and even greater uncertainties about how harmful it will be for humanity" (Schoon, 1990).

"The only question - and it is the critical one - is whether it can be stopped and how" (The Guardian, 1995b, p.26).

"Were this to happen a century from now, at a time when we struggle to produce enough food to nourish the projected population of 11 to 16 billion people, the consequences could be devastating"

(Radford, 1997).

Health, people and society

"[...] a rise in sea level of a metre will cause suffering, loss of life and severe economic damage in the deltas of the Nile, the Ganges, the Mekong, the Yangtse and the Mississippi. The Maldives will disappear. So will a lot of other coral islands" (Radford, 1988a).

"The best predictions are that mean temperatures and sea levels will rise by 3.5C and 1 ft 5 ins respectively by 2070, threatening flooding, storms, agricultural disruption and population upheaval on a scale unseen in recorded history [...]. Probably more than any other environmental threat, global warming has the capacity to kick back at the human race" (Nicholson-Lord, 1990).

"Climate change will bring 'widespread risks' to human health, according to the World Health Organisation, with big rises in malaria, heat stroke, asthma, parasitic, food and water-related infections, heart and lung disorders, skin cancer and eye disease" (Nicholson-Lord, 1997).

Climate "(in)justice"

"What will grow on farmers' land will change; many poor people's land and homes will be subject to flood or permanent inundation" (North & Schoon, 1989).

"GLOBAL WARMING could add hundreds of millions of people to the already vast number likely to go hungry in the next century, scientists warned yesterday" (Schoon, 1992).

"They point out that the rich North carries most responsibility for the threat [...]. The fact is, however, that the Third World is the most at risk from global warming [...]. [...] developing countries lack the resources to adapt their agriculture to climate change" (Schoon, 1995, p.8).

"But poor, populous ones, such as Bangladesh, will find the shifts in temperature and rainfall, and the rising sea levels, much harder to cope with and possibly catastrophic" (Schoon, 1997a, p.1).

Ecological drama

"Increased warmth and rainfall in the winter mean that some pests could get out of control. An example is greenfly, which appeared in huge numbers last spring after the exceptionally mild winter" (Brown, 1990).

"The worst damage is likely to happen to species of animals and plants which cannot adapt fast enough to the hotter, drier climate. These include trout and other freshwater fish, the mountain hare, snow bunting, midges, Jacob's ladder and bluebell" (Erlichman, 1991).

"There are already warning signs that great swathes of forestry are heading for disaster" (The Guardian, 1995a, p.2).

Economic/energy drama

"The nuclear industry has an abysmal record of achievement. They are the very last people one would choose to save the world from disaster" (Radford, 1988b).

"Given the ruinous costs [...], the whole issue of global warming stands to become, for the insurance business, a matter of life and death [...]. Yet Munich Re's analysts conclude that the insurance industry - if it does nothing - must anticipate dramatic increase in catastrophe losses, currently running at \$ 20 billion a year, to \$ 100 billion a year, rising rapidly" (Leggett, 1992).

"Insurance companies [...] are worried that dramatic climate change will lead to massive storm-damage claims in the future" (Barnett, 1997).

Bloc 1988-1997 - Centre-right

Drama vs they might be wrong

"Evidence from the ice ages is convincing a growing number of scientists that the estimated time-scale for the greenhouse effect, the potentially disastrous warming of the Earth's atmosphere, may have to be greatly reduced [...]. The time-scales that Dr Woods believes may have to be greatly foreshortened are envisaged in the Met Office's current 'best guess' for temperature rise" (McCarthy, 1989b).

"Global warming is a mass of scientific and economic uncertainty. But it would be irrational to do nothing in the face of uncertainty [...]. If nothing is done and global warming occurs, some of the impact may be irreversible: for instance, sea-level rise and some damage to the ecosystem" (Pearce, 1990).

"Some scientists are now considering whether these [changes in the behaviour of British wildlife] are the early warning signs of the long-term climate change [...]. Whether these represent the beginning of the long-term warming trend that we expect, of up to two or three degrees, one can't yet say [said Bernard Tinker, director of terrestrial and freshwater sciences for the Natural Environment Research Council]" (McCarthy, 1992).

Mockery of drama/accusation of exaggeration

"I am, frankly, not sorry about Dagenham. Lincolnshire will be a loss but we shall bear it. Scunthorpe will scarcely be missed, Kings Lynn quickly forgotten, and parts of Swansea will look better under water" (Parris, 1989).

"Probably the biggest rock on which the movement was founded was the scare about 'global warming'" (North, 1994, p.8).

"The purported catastrophic consequences of such a climate change range from floods and droughts, to dengue fever, malaria and starvation [...]. But others [scientists], equally reputable, disagree" (Stelzer, 1997).

Political drama

"More than 100 British scientists, including two Nobel laureates and 15 Fellows of the Royal Society, have signed a declaration that nuclear power is not the answer to the 'greenhouse effect', the potentially disastrous warming of the atmosphere by industrial gases [...]. [...] the Prime Minister's [...] gave strong indications that the preferred policy option was a significant expansion of nuclear power. Nuclear power, in contrast to coal-fired power stations, does not produce large amounts of carbon dioxide (CO₂), the main 'greenhouse gas'" (McCarthy, 1989a).

"The political will [...] was not there. It did not exist because public opinion was not aware of the scale of change that government would have to ask. Governments did not have the political support to implement the necessary change. Mr. David Heathcoat-Amory, Under Secretary of State for the Environment, said that the unchecked build-up of greenhouse gases would lead to consequences difficult to predict, but likely to be serious and possibly catastrophic" (The Times, 1989).

"John Prescott, the Deputy Prime Minister [...], said the targets agreed by the rich countries were robust and showed they were serious about tackling global warming [...]. Sally Cavanagh, of the Climate Action Network UK in London, said: 'This agreement is a tiny step in a long march to get emissions down to a level that is no longer a threat to the world's people, wildlife and survival'" (Nuttall, 1997, p.22).

Headings and subtitles

"Global warming threatens to push up the cost of home" (Dibben, 1990).

"Gummer sounds alarm bells on global warming" (Capella, 1996).

Drama in faraway places or on natural environment

"Southern Africa is facing a catastrophe of unprecedented proportions, according to scientists who predict a drought lasting for 100 years" (Nuttall, 1995).

"The scientists, drawn from universities and institutes across Britain, believe that diseases [...] such

as malaria, would increase. Some species of plant, such as damp-loving ferns and mosses might disappear unless they were relocated northwards. But even these measures might not be enough to save some mountain plants and animals" (Nuttall, 1996).

"Even small rises in average temperatures worldwide would increase drought, storms, and flooding, it said. Low-lying tropical islands and coastal zones would be submerged as sea levels rose" (Capella, 1996).

Bloc 1998-2007 - Centre-left

Headings and subtitles

"Climate change to kill thousands" (Laurance, 2001, p.2).

"Global warming is killing us too, say Inuit" (Brown, 2003).

"Climate wars threaten billions: More than 100 countries face political chaos and mass migration in global warming catastrophe" (McKie, 2007).

Global drama

"The world is facing a string of 'full-scale environmental emergencies' which threaten to cause misery for billions of people in the 21st century, the United Nations said yesterday [...]. They cite global warming as the biggest threat to the planet" (Nuttall, 1999).

"Greenland's icy mountains and the island's entire ice cap could disappear in the next 1,000 years because of global warming [...]. If that occurs sea levels will rise by seven metres, drowning low-level coastlines around the world" (Radford, 2004, p.12).

"We have reached a point where civilisation itself is threatened" (Connor, 2006).

Drama of inaction

"Only if we take control of our economic lives, and demand and create the means by which we may cut our energy use to 10% or 20% of current levels will we prevent the catastrophe that our rational selves can comprehend. This requires draconian regulation, rationing and prohibition [...]. Are we capable of this, or are we destined to sleepwalk to extinction?" (Monbiot, 2003).

"Tony Juniper, of Friends of the Earth [...] said: 'Unless the world reduces its emissions of greenhouse gases, the impact on the environment and people across the planet will be severe' (Roberts, 2005, p.7).

"In his letter to the Prime Minister, Dr Hansen warns that we have passed, or are on the verge of passing, several tipping points, when large-scale changes of the climate are inevitable. But if the world abandons coal burning, there is still a chance" (Connor, 2007b, p.2).

Signs of drama

"Global warming has been linked to the growing trend of climatic extremes in the Mediterranean [...]. The climatic change now threatens to make much of the country unproductive and uninhabitable" (Goncalves, 2000).

"Climate change has already begun to unleash subtle changes on the British countryside" (Brown, 2005, pp. 12-13).

"Dr Mieszkowska said that changes to shoreline species act as a warning for the effects of climate change on biodiversity" (Jha, 2006).

Health, people and society

"The UN Panel on Climate Change [...] recently said that [...] millions of lives are at risk from increasingly extreme weather, with a sharp increase in storms, floods and heatwaves" (Browne, Summerskill, & Morgan, 2001, p.3).

"Consider the really hot summer we had in 2003, one of the worst single natural disasters seen in Europe for hundreds of years. There were 30,000 fatalities. Half the severity of that heatwave has since been shown to be due to man-made climate change" (McKie, 2005b, p. 16).

"[...] earlier this month the UN's Intergovernmental Panel on Climate Change issued an apocalyptic warning of future mass migrations fuelled by loss of fertile land, droughts, rising seas and more intense storms" (Jowit, 2007).

Moral drama: moral duty drama

"The problem is that, as with any morality tale, this is a very partial truth [...], climate change is not just a matter of political negotiation but a profound challenge to every notion we have about how to live our lives. No wonder we prefer the simplicity of morality tales with comforting villains"

(Bunting, 2001, p.15).

"While there is hope that catastrophe can be averted, we have a moral duty to keep trying" (McCarthy, 2006).

"As citizens of the world [...] we have a duty, as well, to alert the public to the unnecessary risks that we live with every day, and to the perils we foresee if governments and societies do not take action now to [...] to prevent further climate change" (Connor, 2007a).

Moral drama: climate "(in)justice"

"The Inuit people of Canada and Alaska are launching a human rights case against the Bush administration claiming they face extinction because of global warming" (Brown, 2003).

"The rich nations pollute, and the poor nations suffer consequences [...]. More than 70 million Africans and an even greater number of farmers in the Indian subcontinent will suffer catastrophic floods, disease and famine if the rich countries of the world fail to change their habits and radically cut their carbon emissions [...]. 97 per cent of deaths from natural disasters, occur in the developing countries [...]" (McSmith, 2006, p.2).

"Communities such as those in the highlands are near-destitute and on the borderline of survival. 'We have fewer options than a developed country, we're more vulnerable', said Valentin Bartra Abensur, a climate change expert in the capital, Lima" (Carroll, 2007).

Ecological drama

"[...] it would spell disaster for creatures such as the polar bear; it would mean the end of one of the world's last true wildernesses" (Meek, 2000).

"Andrew Wetzler of the Natural Resources Defence Council added: 'Global warming is the single biggest threat to polar bears' survival, and this will require the government to address the impacts on the polar bear'" (Buncombe, 2006).

"Mr Hilary, who has twice reached Everest's summit, likened the effect of glacial lakes bursting their banks to the impact of an atomic bomb, saying it was 'just catastrophic'" (Batty, 2007).

Economic/energy drama

"[Scientists] believe millions of tonnes of carbon dioxide could be dumped under the bed of the North Sea to reduce atmospheric warming [...]. Global temperatures are now rising at an unprecedented rate. Last week climatologists warned that Antarctic ice fields were collapsing alarmingly while biologists have reported that spring is arriving several days earlier than it did 10 years ago" (McKie, 2005a).

"Insurers who face a £22billion bill for Hurricane Katrina have logged a huge increase in the frequency and severity of extreme weather claims over the years" (Husband, 2005, pp.1-2).

"[...] here we are trying to figure out how to avert the disaster of climate change now [...]. Human civilisation started less than 10,000 years ago, so to worry whether we'll be technologically advanced enough to deal with this buried waste thousands of years in the future, assuming we survive climate change, is utterly irrational" (Al-Khalili, 2007).

Reflection on dramatization

"Governments fear discussing the impact of climate change for fear of upsetting the economy. But campaigns of the kind used in the UK to tackle health issues like smoking are needed to shock the public out of a naivety that ranks climate change as less important than terrorism, Third World debt and Aids" (The Independent, 2005).

"The British press routinely carries The Day After Tomorrow-style articles [...] which journalists might think are raising awareness of climate change. The reality, a new report has found, is that this coverage is so hopelessly doom-laden in tone that readers have become apathetic about the threat [...]. 'If we keep telling people that Armageddon is inevitable, we risk creating an epidemic of apathy', says Solitaire Townsend, managing director of Futerra' [...]. The Independent was second, with 60 articles and a more pessimistic outlook (2.2). The Sun was one of the worst offenders, publishing just four (hugely negative) articles" (Duff, 2006).

"We should be frightened. Perhaps we are. But fear finds odd expression [...]. Elsewhere, there is

what Leo Hickman warned against in the Guardian this week: 'eco-fatigue'. He quoted Professor Mike Hulme, formerly director of the Tyndall Centre for Climate Change Research, who told scientists and the media to steer clear of hyperbole - words such as 'disaster', 'apocalypse', 'catastrophe' - when they were describing climate change predictions because it led to apathy and fatalism [...]. But a catastrophe is what it is, and our behaviour may be a reaction to that knowledge rather an avoidance of it; we may, in fact, be full and overflowing with acknowledgment" (Jack, 2007, p.36).

Drama vs they might be wrong

"The scientific consensus - as expressed recently by the UN Intergovernmental Panel on Climate Change (IPCC) - is that the world's weather has not become significantly more extreme during the past 100 years [...]. Some scientists argue that global warming will lead to more extreme weather - worse floods and stronger winds [...]. The biggest problem facing climate researchers is that they still lack computer models sophisticated enough to predict the Earth's climate with any certainty" (Matthews, 2000, p.25).

"The long-term consequences of global warming are familiar: sea levels rising by 20ft or more, leading to the inundation of much of the world's existing coastline and the towns and cities built on it; large portions of the world reduced to desert; more disease and famine [...]. Michael O'Leary, the chief executive of the budget airline Ryanair, has famously advocated the 'don't worry, be happy' response to global warming [...]. He suggests that 'if you're worried about the environment - walk' [...]. The movie and pop star crowd [...] joined forces with scientists to insist that we need to minimise the CO2 we pump into the atmosphere. But they haven't stopped flying. They may not embrace the 'don't worry, be happy' view of global warming, but they don't walk everywhere either" (Palmer, 2006, p.19).

"A crippling tropical disease spread by mosquitoes has taken a foothold in Europe and could be heading for Britain, climate change experts have warned [...]. In the last few weeks, more than 200 people in northern Italy have been infected with chikungunya - a disease that causes crippling muscle pain and fever. One died [...]. Dr Bettina Menne, of the World Health Organisation, said: 'We cannot say that the disease was caused by climate change [...]'. Global warming is improving the quality of wine and making it more alcoholic, the UN scientists say" (Derbyshire, 2007, p.32).

Mockery of drama

"The Earth's atmosphere is so polluted that the planet is dying. But scientists around the world hatch a plan, one that offers a tantalising last-ditch hope: they ask for vast amounts of funding so that they can enlist some of the smallest creatures to renew the atmosphere and save all of humanity. The proposal for a Hollywood sci-fi movie? No. This idea is under serious discussion" (Highfield, 2004, p.18).

"It has an urgent message and a wry, likeable messenger but don't expect An Inconvenient Truth to be much more than a souped-up PowerPoint presentation. Davis Guggenheim's film captures the lecture about the environmental catastrophe posed by global warming that Al Gore [...] has been touring the world since 1989. As entertaining as a lecture can be, it adds nothing to the BBC's recent Climate Change season" (Johns, 2006, p.17).

"Guess what? We have just enjoyed the warmest winter in 18 years. But judging from our pictures, these windswept shoppers certainly don't look as if they are planning on taking out the barbecues just yet [...]. Yet the experts at Met ireann have recorded spectacular temperatures for our dark months. As temperatures hot up around the world under the global warming phenomenon, Ireland infamous for its four-seasons-inoneday weather experienced one of the warmest winters in nine years. Better still, it was the warmest in 18 years in some parts of the country, including Rosslare and Valentia" (Vousden, 2007, p.5).

Accusation of exaggeration

"Global warming has become the obsession of our time [...]. The trouble is that the climate models show we can do very little about the warming. Even if everyone (including the United States) did Kyoto and stuck to it throughout the century, the change would be almost immeasurable, postponing warming by just six years in 2100" (Lomborg, 2005).

"Because if what we are being told with increasingly shrill frequency is true, the future for you, me, and everyone on poor planet Earth is so apocalyptically grim that even the nuclear threat that scared the heebiejeebies out of us 20 years ago sounds like a picnic in the park in comparison. It's our old friend global warming, of course, which is an old scare story [...]. Actually, the doom-mongers of climate change are always coming up with contradictions" (Hanlon, 2006, p.12).

"Children are being brainwashed by propaganda from the Government on climate change, a court

heard yesterday. The 'New Labour Thought Police' were accused of indoctrinating youngsters by handing out thousands of Climate Change Packs to schools [...]. Of the half of the film that is scientific, the majority is either false or vastly exaggerated', Mr Downes said" (Daily Mail, 2007, p.11).

Political drama

"Britain's most senior government scientist has made an outspoken attack on the United States' refusal to confront global warming [...]. The Bush Administration is ducking its responsibility as the world's only superpower by refusing to sign up to the Kyoto Protocol on greenhouse gases, according to Sir David King, the Prime Minister's chief scientific adviser" (Henderson, 2004, p.19).

"PERHAPS those two deadly sisters, Hurricanes Katrina and Rita, will have finally persuaded President Bush to take a fresh look at climate change [...]. Yet if CO2 emissions are not cut by 60pc in the next 30 years, scientists estimate that climate change will become irreversible, and produce devastating outcomes" (Stern, 2005, p.3).

"Mr. de Boer had been warning delegates that failure to reach an agreement on global warming could 'plunge the world into conflict'. Officials from China, which feels Western countries should do more to reduce their greenhouse gas emissions, accused UN negotiators of ignoring conference protocol" (Delgado, 2007, p.11).

Headings and subtitles

"A Year Ago, Global Warming Threatened Us. Now It Won't Stop Raining" (Simons, 1998, p.9).

"Are we to blame for this? Large parts of the country are under water and worse is threatened for the coming week. Politicians and pundits are blaming global warming and claiming that Man is responsible" (Matthews, 2000, p.25).

"We're all dead against global warming. But when it comes to the crunch..." (Aaronovitch, 2006, p.19).

Drama in faraway places or on natural environment

"According to the IPCC's latest report, global temperatures can be expected to increase by between 1.4C and 5.8C by 2100 if nothing is done to curb greenhouse emissions. This is likely to lead to sea level rises, more rainfall and crop failures in the developing world" (Henderson, 2001).

"POLAR bears are facing extinction because the ice they live on is melting, conservationists warn. A report from the environmental group WWF blames global warming for the threat to the world's largest land predator" (Chapman, 2002, p.39).

"NEARLY a third of the world's species of animals and plants will be at risk of extinction by climate change within 50 years" (Clover, 2007, p.10).

Bloc 2008-2016 - Centre-left

Headings and subtitles

"Welcome to the age of extremes. Recent weather disasters are consistent with a warming planet" (Connor, 2009).

"Devastating rise of 4-5C if we carry on as we are" (Morrison, 2014).

"Trump is a 'threat to the planet', warns leading climate change expert" (Johnston, 2016b, p.23).

Global drama

"Sea levels around Britain have risen by about 10cm since 1900 and are expected to rise further by between 11cm and 76cm by the end of the century. This, combined with the threat of storm surges and swollen rivers, increases the flooding threat to coastal towns and estuaries. But the situation is far more serious in those countries that are even more vulnerable to sea-level rise, such as Bangladesh, the Maldives and other low-lying island states where there is literally nowhere to retreat from the rising salt water" (Connor, 2009).

"The second report, from World Bank, warned in a release that the 'world is barrelling down a path to heat up by 4 degrees Celsius at the end of the century if the global community fails to act on climate change, triggering a cascade of cataclysmic changes that include extreme heat-waves, declining global food stocks and sea-level rise affecting hundreds of millions of people'" (Ashdown, 2012).

"Climate change is threatening to force millions of people to become refugees and spark major wars that could 'completely destabilise' the world, a leading general has warned [...]. Wars and mass migration had the potential to 'completely destabilise' not just countries and regions, but the entire world, the general said" (Johnston, 2016c).

Drama of inaction

"A global deal to tackle climate change is all but impossible in 2010, leaving the scale and pace of action to slow global warming in coming decades uncertain, according to senior figures across the world involved in the negotiations" (The Guardian, 2010, p.12).

"Countries now have little time to resolve fundamental issues, and success in Paris is not at all certain. All countries will be asked to submit their plans for curbing greenhouse gas emissions, known as intended nationally determined contributions, to the UN by 31 March [...]. As it stands, we may be on track for 4C of warming" (Vidal, 2014).

"[...] if extreme action is not taken quickly, this century could see an increase of between 50cm and 130cm, according to a report led by the Potsdam Institute for Climate Impact Research" (Bawden, 2016).

Signs of drama

"The signs of climate change are all around us, such as the melting of mountain glaciers and Arctic sea ice [...]. The heatwave in Western Europe in 2003, which killed more than 35,000 people, is widely considered to have been too extreme to have been part of the natural variability of the climate [...]. There are already signs in sub-Saharan Africa that semi-arid regions are becoming uninhabitable" (Connor, 2009).

"What is particularly unusual and alarming this year are the high temperatures of vast areas of the ocean surface, including the northern hemisphere. Record-high greenhouse gas emissions and associated atmospheric concentrations are committing the planet to a much more uncertain and inhospitable future [the Met Office said]" (Connor, 2014, p.11).

"Record-shattering temperatures this summer have scorched countries from Morocco to Saudi Arabia and beyond, as climate experts warn that the severe weather could be a harbinger of worse to come [...]. Analysts point to inadequate government handling of an unprecedented drought in Syria as a trigger for the country's devastating civil war, which has produced extraordinary refugee flows that have spilled into Europe" (Naylor, 2016).

Health, people and society

"A recent communiqué from 24 of Britain's learned societies, all innately conservative and business-friendly, spelled it out again: 'Climate change poses risks to people and ecosystems by exacerbating existing economic, environmental, geopolitical, health and societal threats, and generating new ones. These risks increase disproportionately as the temperature increases'" (The Guardian, 2015).

"One of the biggest transformative signals that 195 governments sent to energy markets via the Paris agreement at the weekend was a goal for the global warming ceiling to be set well below 2C, and as low as 1.5C if possible. The scientific advice given to governments explains why. At 2C, coastal plains and island nations are submerged, food and clean water supplies shrivel, and social cohesion comes under threat as a consequence" (Leggett, 2015).

"Hundreds of people have died as crops have withered in the fields in more than 13 states, forcing tens of thousands of small farmers to abandon their land and move into the cities. Others have killed themselves rather than go to live in urban shanty towns" (Johnston, 2016a).

Moral drama: moral duty drama

"Denial is most people's first response to something they don't want to hear, whether it is a diagnosis of terminal illness or the threat presented by the rise of the Axis Powers. The moral, intellectual and practical challenge of climate change is unprecedented" (Monbiot, 2009).

"It will take the kind of conformism and sense of moral obligation offered by religious thought and ritual if we are to save the planet [...]. What religious thought - and ritual - can supply is the two things absent from normative consumer liberalism. The first is a belief that the choice between ends is not arbitrary or wholly personal: that there are moral facts of the matter; that saving as much of humanity as possible is an obligation on all of us, and that this is actually true, and not just a matter of preference" (Brown, 2012).

"But it is also an ethical position, based on a particular world-view; a view that we humans need to stop living as if there is no tomorrow, or there will be no tomorrow; a view that we can and should live as though all of us on this planet, human and non-human, now and in the future, matter. Support for nuclear power is based on a world-view, but it doesn't have the benefit of also being backed by rational arguments. It is simply a fantasy of the right, a convenient prop they occasionally produce to pretend we can address climate change while changing nothing, and a weapon in their culture war" (Hollo, 2014).

Moral drama: climate "(in)justice"

"Throughout the 1,000 pages of predictions one theme is constant: it will be the poor of the world who will be hardest hit. Not only will climate disruption be greatest in the countries with lowest incomes - in water and food shortages, disease and natural disasters - the people who live there are those who can least afford adaptation and mitigation measures. Will the rich countries be able to sit back and watch it all happen? Or is this coming collection of stresses on a battered planet be something with the power to overwhelm us all?" (McCarthy, 2001, p.7).

"It is estimated that every year for the next decade, 175 million children will be affected by sudden climate related disasters, which will challenge much of the progress made towards meeting the Millennium Development Goals. Children are therefore bearing the brunt of the impact of climate change, despite being the least responsible for it. While it is the world's poor who are feeling the greatest impact of climate change - over 95 percent of deaths from natural disasters between 1970 and 2008 occurred in developing countries - climate change is no respecter of national borders and ultimately affects us all" (Ashdown, 2012).

"We have long known that Africa, which causes the least environmental damage, suffers the most from the harm others cause. The World Meteorological Organisation recorded more than 1,300 climate-related natural disasters in Africa from 1970 to 2012, which claimed 700,000 lives and caused economic damage worth \$26.6bn" (Adesina, 2015).

Ecological drama

"Watching modern explorers attempt to get to the North Pole while an ice cap melts around them might be enough to get even the staunchest of global warming apologists thinking. That's the set-up for *Melting: Last Race to the Pole*, a reality show/expedition that details what its creators are claiming could be the final trip to the North Pole before the impact of climate change makes the journey impossible" (Enders, 2015).

"Mark Avery [director of conservation at the RSPB, said:] 'All the evidence suggests that climate change will be very harmful to birds'" (Mathiesen, 2015).

"Climate change is increasing the regularity with which damaging events hit coral reefs around the world: the number of severe cyclones is increasing, and with increased water temperatures, corals are much more prone to bleaching when there are bursts of even warmer water" (Slezak, 2016).

Economic/Energy/techno drama

"In their annual letter in January, Bill and Melinda Gates³⁶ wrote: 'The long-term threat [of climate change] is so serious that the world needs to move much more aggressively - right now - to develop energy sources that are cheaper, can deliver on demand, and emit zero carbon dioxide'" (Rusbridger, 2015).

"The risk is that if this 'carbon bubble' were to burst suddenly, it could cause a wider financial crisis. Earlier this year, G20 finance ministers asked the FSB to consider how the financial sector could take account of the risks to stability presented by climate change" (Chu, 2015).

"'We need to phase out CO2 emissions and we need to change our pattern of using fossil fuels if we want to save the Earth' [said Jan Vos, a member of the country's Labour Party]. He added that electric cars needed to be affordable" (Staufenberg, 2016).

Reflection on dramatization

"While some environmental concerns are well founded and serious, others are without foundation or greatly exaggerated" (Hickman, 2009).

"In the CBC interview, [Bob] Walker also claimed: 'the models that the scientists have used on global warming have been extremely flawed'. In reality, [...] climate models have been incredibly accurate at predicting global warming [...]. We can't simply bury our heads in the sand and hope the problem goes away. If our political leaders try to kneecap our climate monitoring, citizens must make them aware that this is an unacceptably irresponsible action that will not be tolerated" (Nuccitelli, 2016).

"Mr Brown [said:] 'Big Tobacco was pretty powerful, but they lied and they came a cropper, not just with scientists but with lawyers. And, in California, we got plenty of lawyers. 'So we've got the scientists, we've got the lawyers and we're ready to fight, we're ready to defend' [...]. 'Some people need a heart attack to stop smoking. Maybe we just got our heart attack and we better start doing the work that it takes to really do what it takes to reduce our climate emissions', he said [...]. Climate change: It's 'game over' for planet earth" (Johnston, 2016d).

³⁶ Bill and Melinda Gates Foundation is an organisation committed to the eradication of diseases such as malaria, polio, tuberculosis and HIV (<https://www.gatesfoundation.org/>).

Drama vs they might be wrong

"While recently every kind of extreme weather event has been blamed on warming, in the Seventies the culprit was cooling. One article predicted 'the most devastating outbreak of tornadoes ever recorded', along with 'droughts, floods, extended dry spells and long freezes'" (Rose, 2013).

"No one will be untouched by climate change with storm surges, flooding and heatwaves among the key risks of global warming in the coming decades, claim scientists [...]. The report, by more than 300 authors, informs policy decisions of governments around the world. But one of its contributors has accused the IPCC of being too 'alarmist' - and demanded his name be withdrawn [...]. Professor Richard Tol, an economist at the University of Sussex, said fellow UN academics were exaggerating climate change and comparing it to the 'apocalypse'" (Zolfagharifard, 2014a).

"Many studies indicate that as temperatures rise, crops across the world will suffer as average temperatures become unsuitable for traditionally grown crops, and droughts, heat waves or extreme bouts of precipitation become more common. But a large team of researchers have tried to predict the combined effect of a variety of changing factors caused by climate change to take into account the increase in carbon dioxide [...]. Although the results are complicated, their research suggests some crops might grow better in 2080" (Beall, 2016).

Mockery of drama

"Climate change has become the new orthodoxy for our times. It is the moral fable that justifies new limits and restrictions for our shiny 21st century [...]. The new moral edicts of the climate change brigade - Don't go on holidays abroad! End cheap flights! Ban SUVs! Recycle! Switch off that light! are all the more pervasive (certainly more than the nostrums of organised religion) because society is suffused with the anti-humanist sentiments that lie behind them." (Waterfield, 2008).

"IT WAS another bad week for the 'warmists', now more desperate than ever to whip up alarm over an overheating planet [...]. 'Coal-fired power plants are factories of death', 'wrote Hansen, 'the trains carrying coal to power plants are death trains". This deliberate echo of the trains carrying Jews to Nazi death camps recalled how the more extreme warmists like to equate sceptics on climate change with 'Holocaust deniers'" (Booker, 2009a).

"For some on the Left and in the green movement climate change is a morality tale: they want it to happen because they see it as the comeuppance for evil global capitalism. For others climate change is a source of riches: huge fortunes have been made from green energy" (Clark, 2013).

"For years polar bears have been the poster boys of global warming - routinely reported to be threatened with extinction due to melting ice-packs and rising sea temperatures [...]. Yet there is one small problem: many polar bear populations worldwide are now stable, if not increasing" (Graham, 2013).

Accusation of exaggeration

"Top of the agenda at a meeting of the Polar Bear Specialist Group [in Copenhagen] will be the need to produce a suitably scary report on how polar bears are being threatened with extinction by man-made global warming" (Booker, 2009b).

"Politicians who dismiss the need for urgent action on climate change are like the South African leaders who contributed to thousands of unnecessary deaths by claiming that HIV did not cause Aids, a scientist has said [...]. Benny Peiser, the director of the Global Warming Policy Foundation, which argues that the threat from climate change has been overstated, dismissed the study" (Webster, 2013, p.7).

"Global warming lobby has got it completely wrong. The story [THE fifth assessment report of the Intergovernmental Panel on Climate Change] wants to tell us is that the IPCC is now more sure than ever humans are causing climate change [...]. It is a game of semantics: there is no scientific definition of the words 'very' and 'extremely'. But nothing will hide the inescapable evidence that global temperatures have failed to follow anything like the doom-laden path they were supposed to follow" (Clark, 2013).

Political drama

"Negotiations in Durban have currently stalled over the refusal of the largest emitters, the US and China, to pledge to cut emissions. India, an emerging country, does not want to sign up to the same emissions cuts as richer nations [...]. In Britain, rising temperatures are expected to cause more droughts, floods, and heatwaves in forthcoming decades. The report came as two papers in nature journals warned that carbon emissions are higher than they have ever been" (Gray, 2011).

"The International Energy Agency, that is represented at the meeting, has warned that the continuing use of fossil fuels like coal, including 25 new power stations built in China every year, is threatening to push the world towards 'catastrophic climate change'" (Gray, 2012).

"Unfortunately, making a difference involves eating less meat, taking fewer flights, walking instead of driving, avoiding processed foods and those long hot showers, burning less coal, insulating your home and planting trees. Nobody would vote for that so you can see why some people aren't keen to get involved" (The Sun, 2015, p.15).

Headings and subtitles

"Is global warming the new apocalypse?" (Ahuja, 2010, p.54).

"The Great Green Con no. 1: The hard proof that finally shows global warming forecasts that are costing you billions were WRONG all along" (Rose, 2013).

"Climate change 'will foster terrorism and fuel immigration to UK'. Millions of people in Bangladesh are likely to be displaced by global warming, leading to radicalisation and migration overseas, military chief warns" (Gosden, 2014).

Drama in faraway places or on natural environment

"The Marshall Islands, at no more than three feet above sea level, are especially at risk of rising seas, one of the many effects of global warming [...]. 'The science is clear. It is irrefutable and it is alarming', [The US Secretary of State John] Kerry said" (Gorman, 2013).

"Glaciers in the Everest region of the Himalayas could be almost completely eradicated by 2100 due to greenhouse gas emissions, scientists have warned. Models show that a decrease of 99 per cent by the end of the century is likely if emissions continue to rise, and even 70 per cent is possible if emissions are reduced" (Gray, 2015).

"Simon Lewis, Royal Society research fellow at the Earth & Biosphere Institute, University of Leeds, said: 'There is not enough land on Earth to plant enough trees to mop up sufficient carbon dioxide to substantially reduce future global warming [...]. 'As no one magic bullet exists to deal with climate change, restoring degraded lands in the tropics, to avoid interfering with growing much-needed crops, could be a very useful contribution to the global climate problem'" (Webster, 2011, p.17).

Dramatic consequences

"Overall, the IPCC warns that violent conflicts, food shortages and serious infrastructure damage will affect the world if global warming continues at its current pace. It argues that rising temperatures will exacerbate poverty and damage land and marine species" (Zolfagharifard, 2014b).

"The biggest threat to the UK comes from the Asian tiger mosquito, which spreads dengue fever and the chikungunya virus. Both cause serious illnesses, which especially in the case of dengue fever can be fatal" (Batchelor, 2015).

"There is one issue that the report does not address: overheating. You would be forgiven for scoffing at the suggestion that Irish homes are in danger of overheating, but the efforts needed to reduce energy use in the eight months of the year that we require heating bring attendant risks [...]. [...] in every scenario on the table, we will need to adapt to the punishment an increasingly volatile climate inflicts upon our homes" (Colley, 2016, p.13).

Techno/market-faith

"Imposing on consumers and businesses higher energy costs [...] has been harmful and left energy policy in crisis. The risk we face is one of power cuts - now that really would be energy saving. Similar wasteful follies should be avoided. If self-interest provides the incentive for countries to limit their contribution to global warming, technology will provide the means" (Smith, 2008, p.23).

"BRITAIN will struggle to 'keep the lights on' unless the Government changes its green energy

policies, the former environment secretary will warn this week. Owen Paterson [...] will argue that the Climate Change Act 2008, which ties Britain into stringent targets to reduce the use of fossil fuels, should be suspended until other countries agree to take similar measures. If they refuse, the legislation should be scrapped altogether, he will say [...]. In his address, he will set out an alternative strategy that would see British homes serviced by dozens of small nuclear power stations" (Hope, 2014, p.23).

"Scientists [...] warn we may have underestimated the full extent of possible extreme events in the future, such as heatwaves [...]. And after the Government abruptly cancelled a £1 billion competition to develop technology to capture and store underground emissions from power stations, the committee warned there was a need to 'urgently' come up with a new approach to the sector" (Swan, 2016).

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Appendix 5. Keywords related to natural symbols

Natural symbols 1988-1997

Macro-area	Sub-area	Keywords	Freq
Water	Habitat	water-ocean(s)-sea(s)-oceanic	747
	Flora/Fauna	coral-reefs-poseidon-	68
		(phyto)plankton-	
		balen-whales	27
N			842
Glaciers	Habitat	ice-snow-glacier(s)-polar-poles-alps-	464
		(ice)caps-icebergs-permafrost-	
		mountain	
N			464
Species	Generic	plant(s)-species-trees-animals	249
	Habitat	forest	74
	Fauna	frogs-mammals	31
N			354

Natural symbols 1998-2007

Macro-area	Sub-area	Keywords	Freq
Water	Habitat	water-sea(s)-ocean(s)-oceanic-seabed	754
	Flora/Fauna	(phyto)plankton-coral-reefs-poseidon	48
		whale(s)-balen	33
N			835
Glaciers	Habitat	ice-snow-mountain-glacier(s)-polar-	456
		poles-alps-(ice)caps-icebergs	
N			456
Species	Generic	plant(s)-species-trees-animals	329
	Habitat	forest	74
	Fauna	frogs-mammals	31
N			434

Natural symbols 2008-2016

Macro-area	Sub-area	Keywords	Freq
Glaciers	Habitat	ice-polar-glacier(s)- pole-cap-glacial-iceberg-meltwater	522
	Fauna	Bear(s)	127
		Penguin(s)	17
N			666
Water	Habitat	sea-ocean(s)-oceanic	456
	Flora/Fauna	coral(s)-reef(s)	108
		fish-plankton	57
N			621
Species	Generic	plants-trees-species	229
	Habitat	forest(s)-woodland-rainforest	95
	Flora	bluebell(s)	53
		musk	10
	Fauna	birds	40
N			427

Appendix 6. Combination of health, ecological and social symptoms

Centre-left: Health and Ecological Symptoms

Health damage and heat waves

"SOMETHING very strange is happening to world climate. The world is warming, but unevenly [...]. A thinner ozone layer would mean greater risk of skin cancer and blindness from cataracts. The thought that global warming now might be being mitigated by the very acid rain that costs our economies billions in water pollution, material destruction, smog and damage to human health, and by the destruction of the high stratospheric ozone shield that we are struggling to protect, is one of the ironies of climate research" (Radford, 1992, p.27).

"The signs of climate change are all around us, such as the melting of mountain glaciers and Arctic sea ice [...]. The heatwave in western Europe in 2003, which killed more than 35,000 people, is widely considered to have been too extreme to have been part of the natural variability of the climate" (Connor, 2009).

"According to the Australian climate commission the number of record hot days has more than doubled in the past 50 years [...]. It cited a study in Melbourne between 1999 and 2004 which found that hospital admissions for heart attacks rose by almost 40% during heatwaves in which the three-day average temperature exceeded 27C" (Rourke, 2013, p.29).

"Plainly, there is a clear health risk when people are exposed to extreme heat. The young and elderly, the socially isolated and people with existing health problems are especially at risk. The advice from health professionals is to avoid physical activity, drink lots of water and seek shade or air-conditioning" (Readfearn, 2014).

"Apprentice trades in northern Australia will swallow capsule thermometers to track their core body temperature during work hours as part of a range of studies to address productivity lost through heat stress in the tropics. A 2015 study found that heat stress cost the Australian economy \$6.2bn in lost productivity [...]. Dr Elspeth Oppermann [...] said she believed the productivity loss was already greater than estimated in the tropical zone of northern Australia, where 'unbearable' conditions persist for months" (Wahlquist, 2016).

Diseases and warming temperatures

"In addition to what health experts call 'airport malaria' there have been brief epidemics in Britain, notably after war as servicemen returned with the parasite. The long hot summer has made Britain more comfortable for invading insects, but their tenure is so far temporary" (Radford, 1995, p.5).

"The Quechua people, descendants of the Incas, living at altitudes of up to 4,500 metres, are used to harsh weather. But what they call the friaje is a new phenomenon, believed to be driven by climate change. Last year it sent temperatures plummeting to -35C, killed 50 children and left up to 13,000 people suffering from severe bronchitis, pneumonia and hypothermia" (Howden, 2005).

"These two factories made this small town in Transylvania the most polluted inhabited place in Europe. And they contributed to the climate change that is possibly mankind's greatest challenge [...]. You see its effects in the livestock, the huge number of stillborn or deformed animals. But worse is the effect on the people. There is widespread lung disease, impotence, asthma - and twitching finger, a symptom of lead poisoning" (Antonowicz, 2006, p.20).

"The US Supreme Court will today be asked to force the government to order its environmental regulatory body to control, as a matter of the public health, the amount of carbon dioxide pumped out by vehicles" (Buncombe, 2006).

"Scientists agree [...]. Rising temperatures have melted a fifth of Peru's glaciers in the past 20 years [...]. El Nino-related events have grown more extreme, flooding some areas with rain, causing drought and conflicts over water in others. Toads and foxes have dwindled while rats and mosquitoes have thrive [...]. Communities such as those in the highlands are near-destitute and on the borderline of survival" (Carroll, 2007).

Centre-right: Health and Ecological Symptoms

Uncertain health-related symptoms

"This expert panel concluded that average temperatures are rising, polar icecaps are melting and consequent rises in sea levels could devastate both economic and human life [...]. That is where nuclear power scores because it produces no greenhouse gases [...]. Greenpeace says: 'Nuclear power [...] causes leukaemia clusters and disposal of the spent material pollutes the environment' [...]. But BNFL says: 'A nuclear disaster is less likely than a man being struck by lightning five times in the same year'" (Mail on Sunday, 1997, p.8).

"In the last few weeks, more than 200 people in northern Italy have been infected with chikungunya - a disease that causes crippling muscle pain and fever. One died [...]. A report from the Intergovernmental Panel on Climate Change, launched yesterday in London, forecast more deaths from heatwaves, an increase in skin cancer and higher pollen counts [...]. Dr Bettina Menne, of the World Health Organisation, said: 'We cannot say that the disease was caused by climate change [...]" (Derbyshire, 2007).

Centre-left: Social and Ecological Symptoms

Migration/War and climate refugees

"Already a chronic water shortage affects 80 states accounting for 40 per cent of the world's population. Current projections show the average flow of the Indus River in Pakistan falling by 43 per cent and the Niger in Africa by 31 per cent by 2000. Stand by for water wars in Africa and the Middle East and millions of environmental refugees" (The Guardian, 1996, p.10).

"MILLIONS of people will become environmental refugees and starve [...]. Martin Parry, of the Jackson Environment Institute at University College, London, says that extra heat and droughts will make growing enough food very difficult in some regions. 'We should be spending money now on developing drought resistant crops, plants that grow in saline soils, and on introducing new staple crops into areas where existing staples can no longer be grown because the climate has become too harsh. This is urgent work because it takes time, and time for adaptation is running out because the changes have already begun'" (Brown, 1998, p.12).

"The Sahara has crossed the Mediterranean, forcing thousands to migrate as a lethal combination of soil degradation and climate change turns parts of southern Europe into desert [...]. A fifth of Spanish land is so degraded that it is turning into desert, according to figures released for the first time yesterday, and in Italy tracts of land in the south are now abandoned and technically desert" (Brown, 2000).

"Triggered by the lowest rainfall in living memory, vast tracts of Iran, Uzbekistan, Pakistan and Tajikistan are being reduced to desert [...]. 'The rural population and their livestock in central, eastern and southern parts of Iran have started migrating from their villages to other areas in search of water', OCHA [Office for the Coordination of Humanitarian Affairs] warned" (Bowcott, 2001, p.9).

"People are already on the move. Environmental refugees are leaving the island nation of Tuvalu, which is especially susceptible to changes in sea level and storms, and heading for New Zealand. Across the globe millions of others are set to follow in their footsteps" (The Independent, 2006).

"The conflict in Darfur has been driven by climate change and environmental degradation, which threaten to trigger a succession of new wars across Africa unless more is done to contain the damage, according to a UN report published yesterday [...]. With rainfall down by up to 30% over 40 years and the Sahara advancing by well over a mile every year, tensions between farmers and herders over disappearing pasture and evaporating water holes threaten to reignite the half-century war between north and south Sudan, held at bay by a precarious 2005 peace accord" (Borger, 2007).

"The so-called 'climigration' trial would be the first of its kind, potentially creating a precedent in the US courts for further climate change-related damages cases [...]. A 2006 report from the US Army Corps of Engineers concluded that Kivalina must be relocated because of global warming" (Carus, 2011).

"Kutubdia is one of many islands off Bangladesh and India affected by increasingly rapid erosion and some of the fastest recorded sea-level rises in the world. These 'vanishing islands' are shrinking dramatically. Kutubdia has halved in size in 20 years, to about 100 sq km. Since 1991 six villages on the island of fishermen and salt workers have been swamped and about 40,000 people have fled. Like Hashem, most have relocated to the coast near Cox's Bazar" (Vidal, 2013, p.17).

"But the era of climate warfare is not laying in wait, in some far-flung distant future. It has already begun [...] and the CNA's new study points to the Arab Spring upheavals across the Middle East and North Africa as a prime example. As I've argued previously, violence and unrest in Syria and Egypt can be linked not just to the regional impacts of climate change in terms of water scarcity and food production, but also their complex interconnections with domestic oil and gas scarcity, neoliberal austerity, rampant inequality, endemic corruption, and massive political repression" (Ahmedt, 2014).

"The tiny Biloxi-Chitimacha-Choctaw tribe has called the coastal marshlands of southern Louisiana home ever since their ancestors settled there to avoid forced relocation under the Indian Removal Act of 1830 [...]. Today, less than a quarter of the original inhabitants still live on the island, which has lost 98% of its landmass since the 1950s. Most inhabitants resettled in nearby parishes. As the waters swallowed Isle de Jean Charles decade by decade, the tribe reluctantly began to face the possibility of another relocation [...]. Some residents say they won't go, although it's unclear how much longer their homes will remain standing before the water completely consumes the land" (Spanne, 2016).

"India has set a new record for its highest-ever recorded temperature [...]. Hundreds of people have died as crops have withered in the fields in more than 13 states, forcing tens of thousands of small farmers to abandon their land and move into the cities. Others have killed themselves rather than go to live in urban shanty towns" (Johnston, 2016a).

Culture eradication, morality and social justice

"Green lobbyists point to a threat to indigenous peoples. 'Climate change upsets the dynamics of marine and coastal ecosystems and native cultures that depend on them', Greenpeace said [...]. 'The consequences of global warming are affecting the subsistence way of life of Alaska's Native people now... Climate-caused changes in subsistence ways of life may be the greatest threat to the continued existence of indigenous cultures'" (Campbell, 2003).

"The Inuit people of Canada and Alaska are launching a human rights case against the Bush administration claiming they face extinction because of global warming. By repudiating the Kyoto protocol and refusing to cut US carbon dioxide emissions, which make up 25% of the world's total, Washington is violating their human rights, the Inuit claim" (Brown, 2003a).

"Enele Soponga, chairman of the small islands' alliance and ambassador to the UN of the Pacific island of Tuvalu, said his country and its 12,000 people would be the first to go under. The main island had been inundated three times this year. Vegetable plots had been washed away and there was no drinking water. Some families had moved to New Zealand, but older people wanted to stay" (Brown, 2003b).

"A delegation of Inuit is to travel to Washington DC to provide first-hand testimony of how global warming is destroying their way of life [...]. The delegation [...] will argue that the US's energy policies and its position as the world's biggest emitter of greenhouse gases is having a devastating effect on their communities. Melting sea ice, rising seas and the impact on the animals they rely on for food threatens their existence" (Buncombe, 2007).

"In a clear signal to the US and Europe that developing countries are not prepared to accept a weak deal at next week's Copenhagen climate summit, Abdul Muhith said Bangladesh wanted hosts for managed migration as people began to abandon flooded and storm-damaged coastal areas [...]. Tens of thousands of people in Bangladesh and other low-lying areas of Asia are leaving their communities as their homes and land become inundated" (Randerson, 2009).

"An attack on the environment was an assault on the rights and living conditions of the most vulnerable, [Pope Francis] said, warning that at its most extreme, environmental degradation threatened humanity's survival. 'Any harm done to the environment, therefore is harm done to humanity', Francis said. 'The ecological crisis, and the large-scale destruction of biodiversity, can threaten the very existence of the human species', he concluded" (Goldenberg, 2015).

"Tangier is being swamped by a 'perfect storm' that is pushing the sea level increase to almost double the global average of a 3.5mm rise each year [...]. For Tyler, and others born and raised on the island, fleeing isn't an option, even if the long-term prospects are bleak. 'We are feeling pretty desperate but people won't be just giving up, we'll fight to the end', she said" (Milman, 2015).

"Closer to home, climate change is implicated in Syria's civil war. The unprecedented drought in 2007-10, which climate models indicate can be expected to be repeated in the region as greenhouse gases rise, led to a mass migration to cities, contributing to civil unrest and political instability" (Rockström, 2015).

Risk of intensification

"This, combined with the climate changes observed over two decades, has convinced scientists that something very serious is happening [...]. The floods in Britain and other parts of northern Europe are entirely consistent with climate-change predictions [...]. A fall of two weeks in the annual duration of lake and river ice-cover in mid and high latitudes of the northern hemisphere has already been observed [...]. If this warming were sustained, the complete melting of the Greenland ice cap would result in a rise in sea level of about seven metres (23ft), enough to drown all the major capitals of the world" (Brown, 2001).

"Hindou Oumarou Ibrahim, an indigenous women's leader from Chad, called on countries to following through on their promises. Temperatures in her country were already a blistering 48C (118F), she said, and climate change threatened to obliterate billions spent on development aid over recent decades. 'Climate change is adding to poverty every day', she said" (Goldenberg, 2016).

"One of the main concerns about climate change is it will seriously damage food production, particularly in places prone to flooding and drought, leading to mass famines and the forced migration of climate refugees. The researchers said this had 'already had broad and worrying impacts on natural systems, with accumulating consequences for people'" (Johnston, 2016b).

Everyday life impacts

"In an analysis for the Tories' policy commission on green issues, Professor Mike Hulme shows how the floods that ravaged Europe in 2002 caused more than euros 15bn of damage, but killed fewer than 100 people. Similar flooding in Mozambique in 2002 did far less financial damage, with less valuable property to wreck, but killed more than 700" (Hinsliff, 2006).

"But it also became clear in 2008 that climate change was disproportionately impacting on the poor. Subsistence farmers around the world reported a pattern of increasingly unpredictable seasons and social problems linked directly to water and higher temperatures" (Vidal, 2008).

"On Friday a think tank headed by the former UN secretary-general Kofi Annan reported that climate change was already killing 300,000 people and affecting 300 million" (Lean, 2009, p.10).

"Recent events include a record-breaking heatwave that has seen Moscow blanketed with smog from burning peatlands, the splintering of a giant island of ice from the Greenland ice cap, and floods in Pakistan that have claimed the lives of at least 1,600 people and left 20 million homeless" (McKie, 2010).

"Such volatile temperatures, early in the year, helped contribute to the conditions for the deadly derecho thunder storm which blew through the Washington DC area with hurricane-force winds, killing some 22 people. Brooks said it was one of the most powerful such storms in recent history. [...]. Colorado's fires, outside the cities of Colorado Springs and Boulder, have between them destroyed more than 650 houses" (Goldenberg, 2012).

"This year's UN climate change negotiations follow massive record temperatures around the world, unprecedented melting of the Arctic sea ice, and droughts and heatwaves in the US and Russia which caused world food prices to skyrocket, making it increasingly difficult for poor families in developing countries to put food on the table" (Vidal, 2012).

"Author Prof Will Steffen wrote: Australia's angry summer shows that climate change is already adversely affecting Australians. The significant impacts of extreme weather on people, property, communities and the environment highlight the serious consequences of failing to adequately address climate change" (Aldred, 2013).

Centre-right: Social and Ecological Symptoms

Migration/War and climate refugees

"Climate change is not just producing weird weather conditions, plagues of gruesome insects and the threat of tropical diseases, we are also changing our lifestyles, adopting new fashion trends and adjusting working habits. Our choice of clothes, eating habits and even the way we decorate our homes have all suddenly taken on a strong hint of the Mediterranean" (Winter, 2004).

"The Christian Aid report highlights the situation in Kenya, where climate change is fuelling violence in areas hit by drought [...].The NGO claims farmers in the north of the country have been driven to killing each other over the right to provide their cattle with water at a diminishing number of the region's watering holes" (Daily Mail, 2006, p.36).

"As tropical storms become more severe and sea levels continue to rise, it is only a matter of time before many of the smaller island nations that dot the Pacific wiped from existence. Many of them sit barely above sea level, and already have residents voluntarily uprooting to safer areas" (Gorman, 2013).

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Appendix 7. Use of religious symbols

Centre-left

Climate Change, Biblical prophecies, and apocalypse

"Some archaeologists now believe that the legend on which the story of Noah's flood is based may have evolved at a time when sea-level rises caused catastrophic floods in what is now lowland Iraq [...]. None the less, Gilgamesh and Genesis contain hints of a natural disaster of a magnitude far beyond the capabilities of men at the time. Caught up in the web of myth and legend, there may still lie a prophecy" (Kelly, 1989, p.17).

"The feeling is that Armageddon is just around the corner, with George Bush as the Nikita Khrushchev of our era, pushing the world to the brink in pursuit of naked national self-interest" (Elliott, 2007, p.28).

"'God knows how long this village will last. If it gets worse I will have to go to the mainland. We know the end is coming', says fisherman Jakir Hossain" (Vidal, 2013, p.17).

"Christian Aid is soon to publish a report by Susan Durber examining the links between theology and climate change, in which it will be made very plain that the call for climate justice is something that echoes clearly the challenges found in the biblical prophets to a complacent and short-sighted society. As Durber says: 'Prophets are sometimes unpopular and can be ridiculed by those who have much to lose if people really were to open their eyes. But they are those who consistently, and without fear, speak what they believe to be the truth'" (Williams, 2014, p.30)

Climate Change, religion and morality

"What religious thought - and ritual - can supply is the two things absent from normative consumer liberalism. The first is a belief that the choice between ends is not arbitrary or wholly personal: that there are moral facts of the matter; that saving as much of humanity as possible is an obligation on all of us, and that this is actually true, and not just a matter of preference. The second is the kind of conformism, reinforced by all kinds of social ritual, large and small, which will enforce the social discipline needed to carry societies through some pretty ghastly changes. Let's face it, any adjustment to an ecologically sustainable standard of living is going to be a lot nastier than anything Greece is going through now. It will need considerable determination and solidarity" (Brown, 2012).

"'God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moves upon the earth'. The US Christian right has long promoted this line from Genesis 1:28 as a Biblical critique of environmentalism [...]. Nuclear power fits perfectly within a world view that sees splitting the atom as the apogee of human dominance over nature. [...]. Nuclear power's great attraction for those who subscribe to this particular faith is that it would maintain the corporate grip on energy infrastructure at a time when diversified and distributed renewable energy systems threaten to democratise energy supply" (Hollo, 2014).

Religious authorities

"A day after making history by becoming the first pope to address Congress, Francis for the first time asserted that nature - as well as humanity - had rights. 'It must be stated that a true 'right of the environment' does exist', Francis said. An attack on the environment was an assault on the rights and living conditions of the most vulnerable, he said, warning that at its most extreme, environmental degradation threatened humanity's survival. 'Any harm done to the environment, therefore is harm done to humanity', Francis said" (Goldenberg, 2015).

"This is the most exciting and hopeful time for anyone interested in solving the biggest problem that humanity faces. As Pope Francis put it in his encyclical on the environment in June: 'All is not lost. Human beings, while capable of the worst, are also capable of rising above themselves, choosing again what is good, and making a new start ... to embark on new paths to authentic freedom'" (Randerson, 2015).

Condemnation of climate change as religion

"It's a popular rebuke made by climate change sceptics that environmentalism displays all the traits of a religion (the words 'pot', 'kettle' and 'black', spring to mind for some reason), but I have to say I'm left perplexed when I even attempt to understand the logic of creation care through the prism of evangelicalism. Many millions of people hold these views so it would be foolish to ignore this huge constituency, but how do you even go about responding to such beliefs?" (Hickman, 2009).

"Welcome to the age of the eco-martyr. God help us: Nothing will harm climate change campaigners as much as a judge decreeing that the green movement is a faith" (Bennett, 2009, p.37).

"Climate change is such a knotty issue - it looks like a religion sometimes. (And) one of the hardest lessons I've learned in 30 years of writing is that the present is not available to me as a writer. I do envy McEwan his incredible ability to treat it as if it's as understandable the past, but for me the present is so mysterious, so elusive, so uncertain, and in a way so duplicitous" (Flood, 2010, p.13).

"CSIRO chief Larry Marshall said the reaction to his planned cuts to climate science in the organisation is more like religion than science, and compared climate science with the oil lobby in the 1970s" (Slezak, 2016).

Reflection on apocalyptic/religious symbols

"And just as in the broader environment debate, the future of the British garden is cast in apocalyptic terms: the hot, dry, light, modernist world of the climate-changed future garden, against the older, lusher, more colourful and traditional gardens" (Vidal, 2007, p.31).

"[Katharine Hayhoe, atmospheric scientist at Texas Tech University] rejects the idea that climate scepticism among evangelicals was largely rooted in theology. Hayhoe argues conservatives are naturally reluctant to make sweeping changes and that 'when you have an overwhelming problem, denying it is a lot easier to do than acknowledging it and feeling that you can't do anything about it'" (Goldenberg, 2012).

Religious symbols: other uses

"But some of the biggest new green evangelists come from the retail sector, with the much-maligned supermarkets taking a lead. After years of taking flak over its labour practices, Wal-Mart, the owner of Asda, has taken evasive action, trying to prove itself a responsible company by committing itself to using 100% renewable energy, reducing waste and selling more sustainable products" (Mecalister, 2007, p.26).

Centre-right

Climate change cult

"It should not go unnoticed that the so-called UK temperature record was being claimed two to three days before it might, or might not, occur. Facts are not always the strong point of true believers, and global warming has morphed into an ancient-style religion, demanding sacrifice to the Earth, especially, it would seem, by the poor of the developing world" (Stott, 2003, p.20).

"Global warming has become a dogma from which no dissent is to be tolerated. And so the world persists in a policy that will do little to abate global warming - such as it is - but will certainly prevent third world countries attaining the living standards of the West. The overall result will be to leave their populations more vulnerable to natural disasters" (Clark, 2005, p.23).

"[...] poor planet Earth is so apocalyptically grim that even the nuclear threat that scared the heebiejeebies out of us 20 years ago sounds like a picnic in the park in comparison. It's our old friend global warming, of course, which is an old scare story" (Hanlon, 2006, p. 12).

"Like a good citizen I try to keep up with this debate, as I once did with 'global cooling'[...]. Scientists imply that Armageddon is a matter of may or might or could well be, before telling us to use less petrol and flying off to another conference. At such moments I am inclined to join Voltaire in his garden" (Jenkins, 2006, p.16).

"But is the situation above any more ludicrous than the case of Tim Nicholson, eco-warrior? An appeal tribunal has ruled that environmentalism deserves the same protection in law as religious and philosophical belief, thus allowing Mr Nicholson to sue his former employer for allegedly dismissing him over his views on man-made climate change. In Mr Nicholson's words, global warming is not a matter of science, but 'a philosophical belief that reflects my moral and ethical values'" (Radford, 2009).

"Man-made global warming has become scientific orthodoxy, with no room for dissent. Tragically, the traditional caution of my brethren has gone out of the window along with the concept of sceptical peer reviewing to test new theories. Opponents of man-made global warming are regarded as dangerous heretics, as I learnt to my cost. Soon after the IPCC was created, I was invited to what is now the Met Office's Hadley Centre for Climate Prediction and Research in Exeter to hear a presentation on global warming" (Rose, 2013).

"Some are, and there's a streak of absolutism in some green philosophy that helps nobody. Bemoan the building of four new coal power stations in China every week and you're a short step away from bemoaning half a billion impoverished households getting fridges. Environmentalism should be a series of practical steps towards safeguarding our future on this planet, not a faith" (Rifkind, 2014, p.14).

"There recently arrived on the desk of the editor of The Times an extraordinary three-page letter, signed by 13 members of the House of Lords. They informed him in no uncertain terms that, if he wished to save his paper's reputation, he must stop printing articles which don't accord with the official orthodoxy on climate change. Headed by Lord Krebs, its signatories read like a check-list of our 'climate establishment'" (Booker, 2016).

Conflicts between religious cults

"It is a scientific debate which has lately taken on the intensity and bitterness of a theological dispute. Is the greenhouse effect an alleged scientific phenomenon in which industrial pollution causes the earth to warm up an environmental catastrophe which foreshadows the end of nature as we know it? Or is the current brouhaha over global warming simply the latest hypochondriac fad to capture the attention of an impressionable international television audience? Sincere and conscientious scientists do have honest disagreements about the evidence behind the proposition that the earth is in imminent peril from global warming. But recently the debate has begun to degenerate into a slanging match between rival orthodoxies" (Hosenball, 1990).

"The film [...] breaks up the charts and statistics with family movies and Gore reflecting on events that inspired his crusade, including a near-fatal accident involving his son and the death of his sister. But this is essentially a monologue, not a debate [...]. Although intended as an environmental wake-up call, it seems to be playing to the converted" (Johns, 2006, p.17).

Dramatic prophecies

"The Maya practised human sacrifices to please the gods of rain and Chinese soothsayers were employed by the court to divine the seasons, yet neither could have predicted the slow-motion catastrophe resulting from the changing weather" (Sheridan, 2007, p.26).

"The pontiff warned a crowd of more than 11,000 people who gathered to hear him at the White House that the world is at a "critical moment of history" and that immediate action is needed to clean up the planet. He was watched by President Barack Obama, who has been pushing an ambitious green agenda despite fierce opposition from conservative Republicans" (Gutteridge, 2015).

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Appendix 8. Think Tanks' use of science, dramatization and symbols

Bloc 1988-1997 - Use of scientists/science

Scepticism

GCC

Scepticism: denial of the problem

"I was also very troubled by the reference to the business community and the reference to tobacco companies. It is the companies in our nation that have created jobs, invested in new technology, that participate in the voluntary programs. I do not know anyone who does not say that this is a legitimate concern. And so to attack the engine of economic growth and characterize us as denying there's a problem is troubling to me" (GCC, 1997k).

Scepticism: scientific aura/authority of scepticism

"By agreeing to this statement, the American government apparently has targeted for internationally mandated requirements the U.S. agricultural, transport, manufacturing, energy and other industry sectors [...] said John Shlaes, executive director of the Global Climate Coalition. 'American workers and consumers would be the real losers'" (GCC, 1996b).

"Thair Philips, CEO, Seniors Coalition, who pointed out that seniors on fixed income will be hurt disproportionately" (GCC, 1997j).

Scepticism: uncertainty around effects or actions to be taken

"By basing their statement on a very selective reading of climate science, the ministers ignored advice of [the] IPCC [...] and have taken statements out of context which minimize the uncertainties" (GCC, 1996b).

"We are pleased that meteorologists are being asked to consider this important issue because we're confident that when they look at the facts they will understand just how little we know about the nature of long-range global warming predictions" (GCC, 1997f).

"Is an international greenhouse gas trading program the answer to greenhouse worries?" (GCC, 1997g).

Consequences

Consequences: economic impacts

"Business and industry cannot and will not support binding targets and timetables-which would undermine U.S. ability to maintain current levels of economic prosperity-or a 'let's make a deal' approach to negotiations" (GCC, 1997m).

"Contrary to public accounts that the President's plan is 'modest', the plan calls for a 30% reduction in U.S. emissions, which will impact severely on the growth of the U.S. economy beginning in 2000" (GCC, 1997h).

"According to the WEFA analysis, mandatory emission goals could result in a loss of Gross Domestic Product (GDP) equal to \$227 billion (in 1992\$) in 2010 alone" (GCC, 1997e).

Consequences: social impacts

"Before the United States commits itself to a binding agreement the American people and their leaders need to know the consequences of such a policy" (GCC, 1997a).

"GDP, employment, real wage rates, terms of trade, greenhouse emissions and energy taxes would be affected by emission abatement requirements" (GCC, 1997c).

Policy evaluations

Policy Evaluations: inverse climate "(in)justice"

"The Clinton Administration is engaged in an aggressive campaign to build public support for a United Nations agreement that places limits on the use of energy in the United States [...] but exempts China, India and other major emitting countries from comparable restrictions" (GCC, 1997d).

"If anything it appeared, unfortunately, to harden the determination of developing countries to avoid any commitments in the treaty" (GCC, 1997h).

"The Vice President repeated the U.S. insistence that the largest emitters of future greenhouse gases, developing countries, take on meaningful commitments. Exactly what those commitments are – and when they must begin – are crucial points for the success on any climate agreement" (GCC, 1997k).

"I think that only means greater trouble for the economy. There can be no real solution to this that isn't global, that does not have meaningful, actual participation of developing countries, that does not meet the Senate requirement" (GCC, 1997l).

Bloc 1988-1997 - Dramatization

Dramatization: inverse drama

GCC

"Depending on what targets and timetables are adopted, the U.S. economy could lose millions of jobs and suffer significant losses in international trade. In addition, it means higher costs to Americans for everyday necessities, including food, transportation fuels and electricity" (GCC, 1996a).

"American families could expect dramatic increases in consumer prices and unemployment if the Clinton Administration agrees to an international climate agreement requiring mandatory reductions of greenhouse gas emissions" (GCC, 1997a).

"With less than two months before a climate agreement is expected to be signed in Kyoto, Japan, the Global Climate Coalition and a variety of citizen organizations are participating in a discussion of [...] how the Administration's proposed treaty will affect Americans from our cities to the heartland of America" (GCC, 1997i).

"Judy Kent, homemaker and member of Consumer Alert, who told the story of how higher energy costs will affect her and her family in their everyday lives and how she fears what the future will hold for her children if the U.S. embarks on programs to curb the use of energy" (GCC, 1997j).

Dramatization: mockery of drama

"The forecast for Washington today, sunny and breezy with a lot of hot air, as the White House tries to sell its climate policy to television meteorologists" (GCC, 1997f).

"Too many so-called experts have offered a global system of energy caps and permits as an easy and cost-free method to achieve legally binding targets and timetables for emissions reductions" (GCC, 1997g).

Bloc 1998-2007 - Use of scientists/science

Scepticism

Scepticism: denial of the problem

GCC

"A new report by the U.S. Department of Energy's Energy Information Administration injects a dose of reality to the Administration's analysis of the economic effects of the Kyoto Protocol, according to the Global Climate Coalition" (GCC, 1998e).

"A petition signed by 15,000 scientists who dispute the science of global warming and oppose the treaty was revealed by Dr. Jane Orient, president, Doctors for Disaster Preparedness" (GCC, 1999c).

"The Clinton administration has expressed full support for Tokyo's environmental objectives despite no evidence that catastrophic warming is a real threat" (GCC, 1999f).

CATO

"But the bulk of the so-called 'skeptics' (like MIT's Richard Lindzen or UVA's – and Cato's – Pat Michaels) never argued that point in the first place. Instead, they have argued that warming will likely be modest and of no particular consequence" (Taylor, 2006c).

"They [Chuine et al.] must have known that their conclusions were unfounded. In other words, there is prima facie evidence of scientific fraud" (Taylor, 2006h).

"There is not one shred of evidence in the refereed scientific literature speaking of a three-foot increase in sea level in ten years" (Michaels, 2007).

Scepticism: scientific aura/authority of scepticism

GCC

"Glenn Kelly brings a wealth of experience to the Global Climate Coalition', Holmes said. 'We are fortunate to be able to tap both his leadership skills and his expertise with climate issues'" (GCC, 1998f)

"As a goal, the GCC supports efforts to reduce uncertainties and improve current climate models - a recommendation made by a National Research Council panel aimed at improving climate measurement accuracy" (GCC, 1999g).

"Our new web site [...] provides good information and will be an excellent source for journalists, researchers, students or anyone else interested in climate change" (GCC, 2000e).

CATO

"To summarize, we find no direct evidence to support the claims that the Greenland ice sheet is melting due to increased temperature caused by increased atmospheric concentration of carbon dioxide" (Taylor, 2006e).

"Honest scientists [...] concede that there's a non-zero chance that the reigning consensus is wrong and that high concentrations of atmospheric carbon dioxide have far less impact on global temperatures than we think" (Taylor, 2006i).

"Economic analysis does not support many environmental fantasies about the future of humankind under either the 'business as usual' scenario or under the environmentalists' vision of the Book of (Environmental) Revelation" (Taylor, 2007d).

Scepticism: uncertainty around effects or actions to be taken

GCC

"Holmes concluded by supporting [...] continued research to reduce scientific uncertainties" (GCC, 1998b).

"With a number of scientific, economic and diplomatic uncertainties surrounding the issue, practical action – like these voluntary efforts – is a prudent and effective path to follow" (GCC, 1999e).

"Even if all of the scientific uncertainties were resolved, sound policy decisions must consider the economic and social impacts of alternative policy choices" (GCC, 2000b).

CATO

"While there are a number of issues in play, the main thing explaining the differing calculations is the extent to which future warming is discounted into the present" (Taylor, 2006j).

"In short, the number of economists who thought global warming would improve the U.S. economy outnumbered the number of economists who thought that global warming would harm the economy to the extent feared by the Stern Review" (Taylor, 2006k).

"This debate is whether we should or should not care. And if the former, how much should we be willing to sacrifice to do something about it?" (Taylor, 2007a).

Consequences

Consequences: economic impacts

GCC

"This so called 'work in progress' is not good enough to risk millions of American jobs and hundreds of billions of dollars", McDonald declared" (GCC, 1998c).

"Most other studies [...] estimate the costs to the U.S. economy would be much higher than the Administration's estimate" (GCC, 1999d).

"But it is clear that the Kyoto Treaty will exact a punishing price on the American economy" (GCC, 1999f).

CATO

"If the petitioners win, American carmakers may face the equivalent of Kyoto global warming standards, imposed by judicial fiat, despite Congress's umpteen rejections of the Kyoto regime" (Moller, 2006).

"Prof. Dasgupta does not criticize Stern's use of a 0.1% discount rate (that's Prof. William Nordhaus' job) per se. He criticizes the use of that discount rate while simultaneously ignoring the difference in well-being between present and future generations" (Taylor, 2006l).

"Blair Gibbs, of the Taxpayers' Alliance, said: 'It's bad enough that politicians want to take so much of our money away in tax. For them also to intrude into our homes in order to have the ability to penalize us even further is simply unacceptable'" (Mitchell, 2007).

Consequences: social impacts

GCC

"The Kyoto Protocol [...] endangers our children's future and promises to do virtually nothing to improve the environment" (GCC, 1998a).

"This study is a wakeup call for American workers and their families', GCC Chairman Connie Holmes said. 'It's a reality check for those who claim that the Kyoto Protocol will have only a modest impact on America'" (GCC, 1998f).

"The Kyoto Protocol [...] would cap family and business use of heating oil, electricity, coal, gasoline and natural gas" (GCC, 1999a).

"Only by working together on common-sense proposals like many of our on-going partnerships can we protect our environment, our families and our economy" (GCC, 1999b).

"If the U.S. Senate were to ratify the Kyoto Protocol on climate change, the sticker shock for gasoline and other oil products that American families are struggling with today will seem like small change by comparison" (GCC, 2000a).

CATO

"After all, why waste time and money fighting for a hopeless cause? Why not 'get a seat at the table' and try to minimize the damage that emissions controls might inflict on your business?" (Taylor, 2006b).

"If the petitioners win, American carmakers may face the equivalent of Kyoto global warming standards, imposed by judicial fiat, despite Congress's umpteen rejections of the Kyoto regime" (Moller, 2006).

"Blair Gibbs, of the Taxpayers' Alliance, said: 'It's bad enough that politicians want to take so much of our money away in tax. For them also to intrude into our homes in order to have the ability to penalize us even further is simply unacceptable'" (Mitchell, 2007).

Policy evaluations

Policy evaluations: techno/market faith

GCC

"Thousands of U.S. companies, including our members, have improved energy efficiency, invested in energy technology and re-thought strategic plans for new facilities. As a result, emissions today are much lower than they would have been without these initiatives" (GCC, 1999a).

"Candidate Gore endorses GCC agenda; new climate initiative calls for innovation, market solutions (GCC, 2000d).

"The Global Climate Coalition today urged the European Union to join the United States in moving climate change policy in a new direction based on a forward-looking technology-centered approaches" (GCC, 2001).

CATO

"Pollution is simply a neighbor's garbage dumped in your backyard without permission. If we simply recognize and enforce property rights for nature, the need for most environmental regulation goes away. That's the libertarian pitch anyway, and it goes by the moniker "Free Market Environmentalism," or "FME" to its acolytes" (Taylor, 2006d).

Policy evaluations: inverse climate "(in)justice"

GCC

"The Protocol itself does not involve commitments from more than 130 countries that account for more than 50% of current emissions" (GCC, 1998c).

"And without the developing world, the costs of carrying out the treaty will be far higher, the study found" (GCC, 1999d).

"The Global Climate Coalition urged negotiators to move beyond the contentious Kyoto Treaty by negotiating a program of actions that can be endorsed by both developing and developed countries" (GCC, 2000e).

CATO

"Apparently, the poor, unwashed masses of China should stick to their bikes while the rest of us jet around to U.N. conferences where we can worry about global warming and the oncoming environmental Armageddon in peace" (Taylor, 2006a).

"Even if Great Britain were to shut down its economy and zero-out all greenhouse gas emissions, growth of those emissions in China would wipe out Britain's greenhouse gas reductions within about two years" (Taylor, 2007c).

Folk devils

Folk devils: environmental lobbies as folk devils (scientists, politicians, and green activists)

CATO

"Scientists are supposed to seek truth first, as indicated by the scientific data collected. The pursuit of truth and data is never supposed to end for the scientist. The declaration that the global warming debate is over says more about global warming proponents' agenda than it does about the science of global warming" (Taylor, 2006f).

"Unfortunately, the media is largely blind to the increasing weirdness of the debate and seems to have signed on as PR operatives for the New Church of the Earth Redeemed" (Taylor, 2006g).

"That Greenpeace resorts to such a tactics does not surprise. Those with good arguments pound the arguments; those with poor arguments pound the table" (Taylor, 2007b).

Bloc 1998-2007 - Dramatization

Dramatization: inverse drama

GCC

"There is no question that the Kyoto treaty will have a dramatic effect on [...] American families" (GCC, 1998d).

"Phillips said the drastic cutbacks in energy use would have severe effects on Americans' standard of living" (GCC, 1999c).

"Kelly said decisions made without the benefit of adequate scientific understanding could have devastating, far-reaching economic, social and lifestyle implications without any environmental benefit" (GCC, 1999g).

"Indeed, strategies that provoke serious economic, social, environmental, or political dislocations could affect worldwide development as profoundly as any potential adverse climate change" (GCC, 2000b).

CATO

"Apparently, the poor, unwashed masses of China should stick to their bikes while the rest of us jet around to U.N. conferences where we can worry about global warming and the oncoming environmental Armageddon in peace" (Taylor, 2006a).

"New American car emissions count for only 6% of worldwide carbon dioxide emissions. Eliminating these emissions wouldn't necessarily reverse global warming or even appreciably slow it-particularly given the dynamic nature of emissions in developing countries" (Moller, 2007).

"Even if Great Britain were to shut down its economy and zero-out all greenhouse gas emissions, growth of those emissions in China would wipe out Britain's greenhouse gas reductions within about two years" (Taylor, 2007c).

Dramatization: mockery of drama

GCC

"It's an agreement long on compromise but short on common sense" (GCC, 1998a).

"GCC Executive Director Glenn Kelly said. 'I always thought Fantasy Island was a myth, but it seems the guests are producing some very amusing economic analyses these days. Nowhere else on Earth can you find the kind of magic dust that produces estimates like these'" (GCC, 1999h).

"Now we must continue to find new opportunities for our message of 'common sense instead of Kyoto'" (GCC, 2000c).

CATO

"I can tell you without hesitation that enviro beat reporters are more often than not little more than PR vessels for organized environmental interest groups" (Taylor, 2006b).

"What should we make of this story hot off the wires suggesting that global warming means more sex for weaker grey seals?" (Taylor, 2006m).

"A backlash is brewing among REAL scientists who are getting sick and tired of bed-wetting hysteria surrounding climate change" (Taylor, 2007a).

Bloc 1998-2007 - Symbols

Symbols: ecological symbols

CATO

"Max Mayfield, director of the National Hurricane Center, [...] had the audacity to not blame last year's Hurricane Katrina on global warming" (Michaels, 2006).

"There is no trend towards increasing drought area in the United States that is related to planetary warming" (Michaels, 2007).

Symbols: human symbols

GCC

"Our children deserve the same economic opportunities that we enjoy today. This treaty puts those opportunities in harm's way" (GCC, 1998c).

"Only by working together on common-sense proposals like many of our on-going partnerships can we protect [...] our families" (GCC, 1999b).

"The sticker shock for gasoline and other oil products that American families are struggling with today will seem like small change by comparison" (GCC, 2000a).

Symbols: religious symbols

CATO

"The Global Warming Cult" (Taylor, 2006g).

"That bit about God being particularly angry or plotting to destroy the world - Well, that's a bunch of nonsense, but hey, he got the big picture right" (Taylor, 2007a).

Bloc 2008-2016 - Use of scientists/science

Scepticism

Scepticism: denial of the problem

CATO

"Scientists with a working knowledge of atmospheric dynamics started to review the situation and found scant evidence for global warming" (Michaels, 2011).

"But a new, more moderate group is emerging, one colloquially known as the 'lukewarmers'-folks who acknowledge a human role in climate change, but who think that the resulting change will be moderate, will remain well within our abilities to adapt, and question the need for actions to mitigate future change in lieu of other, more pressing issues (issues that will go a long way toward improving our adaptive response)" (Knappenberger & Michaels, 2015a).

"But there's a third possibility they refuse to acknowledge: that it's real but not dangerous. That's what I mean by lukewarming, and I think it is by far the most likely prognosis" (Michaels & Knappenberger, 2016e).

GWPF

"New UK Met Office global temperature data confirms the world has not warmed in the past 15 years" (GWPF, 2012a).

"Scientists routinely blame reductions in summer ice, despite there being little evidence to support the idea: in fact years of low summer ice extent are often accompanied by big increases in bear populations. According to Dr Crockford, polar bear scientists are being `wilfully blind to the facts'" (GWPF, 2015e).

"Mid-19th century warming likely to be natural, not human-induced, says independent climate scientist" (GWPF, 2016d).

Scepticism: scientific aura/Authority of scepticism

CATO

"Once again I'll rely on analyses done by scientists who are not part of the community of skeptics" (Goklany, 2008a).

"We at the Center for the Study of Science, as with the rest of the Cato Institute, are very proud not only of the quality of the work we produce but also of our values" (Michaels, 2015b).

"One of our favorite lukewarmers, Matt Ridley, was invited by the Global Warming Policy Foundation to give its 2016 Annual Lecture." (Michaels & Knappenberger, 2016e).

GWPF

"GWPF calls on IPCC to implement fundamental reforms without delay" (GWPF, 2010c).

"Global warming policy foundation calls on government to suspend unilateral climate targets" (GWPF, 2011d).

"GWPF calls on government to deliver on UK shale development" (GWPF, 2016b).

Scepticism: uncertainty around effects or actions to be taken

CATO

"There is no consensus in the scientific community on the role of carbon dioxide in climate change" (Illarionov, 2009).

"With so many conflicting and complementary processes involved, the net effect of any global warming influence would be virtually impossible to know or ascertain" (Knappenberger & Michaels, 2013a).

"Just how much warming has been offset by human-induced changes in cloud characteristics is one of the great unknowns in climate science today" (Michaels & Knappenberger, 2016b).

"Due to climate variability, 'trend testing results might be biased and strongly dependent on the data period selected'" (Idso, 2016).

GWPF

"Suggestions by the Met Office that a warming trend will resume in the next year or two should be treated with reserve in light of the recognised difficulties in making such confident predictions" (GWPF, 2009).

"The former publication gave the misleading impression that the 'science is settled' – the new guide accepts that important questions remain open and uncertainties unresolved" (GWPF, 2010d).

"New paper proposes cost-effective climate policy that gets around key scientific uncertainties" (GWPF, 2013a).

Consequences

Consequences: economic impacts

CATO

"I simply believe that the costs of doing something about that warming by reducing greenhouse gas emissions are greater than the benefits" (Taylor, 2009).

"After all, government has proven itself so capable of finding the most cost-effective solutions to any problem in the past, and there's no better way to reduce the debt than to tax the economy to death" (O'Toole, 2014b).

"While climate change will impart an economic cost, it is manageable and small in comparison to the price of actively trying to mitigate it" (Michaels & Knappenberger, 2016f).

GWPF

"It is clear that the UK cannot afford, above all unilaterally, to move to a low carbon, let alone a zero carbon, economy. A low carbon economy means a high energy cost economy" (GWPF, 2010b).

"The Global Warming Policy Foundation warns that any attempt to turn back the clock to the dark period of centralised energy planning will not only damage Britain's economy, but will almost certainly end in failure" (GWPF, 2012b).

"European and other governments have burdened their countries with unilateral and hugely expensive climate and green energy targets. As a direct result, energy prices and fuel poverty are rising in many countries, making them poorer and less competitive" (GWPF, 2014a).

Consequences: social impacts

CATO

"But we should be equally horrified when government tries to invent costs and then impose them upon us" (Michaels & Knappenberger, 2013).

"They will, however, be able to use those plans to increase transportation, housing, and other consumer costs" (O'Toole, 2014a).

"In light of the extraordinary dangers to human civilization posed by climate change, democracy quickly becomes in their eyes an inconvenient form of governing" (Michaels & Knappenberger, 2016a).

GWPF

"Decarbonisation requires growing subsidies from the taxpayer and sharply increased energy bills for business, industry, and the householder. This would make little sense at any time, but is particularly damaging at a time when our public finances are in a mess and the economy is weak" (GWPF, 2010b).

"The Government has already allocated £3.87 billion of taxpayers' money to international climate finance. Since 2011, more than half of this funding has been allocated to low carbon energy development with only around a quarter being used for adaptation purposes" (GWPF, 2014d).

"Lord Nigel Lawson, Chairman of the Global Warming Policy Forum, added: 'The UK's unilateral Climate Change Act is forcing British industry and British households to suffer an excessively high cost of electricity to no purpose'" (GWPF, 2015g).

"According to the Government's Low Fossil Fuel price scenario that is now probable, by 2020 a medium sized business will see electricity prices 76% higher than they would be without green policies, and that prices to households will be some 42% higher" (GWPF, 2016c).

Policy evaluations

Policy evaluations: techno/market faith

CATO

"One of the main recommendations in my recent paper on climate change and trade was to reduce trade barriers on 'environmental goods and services'" (James, 2009).

"Carbon dioxide emissions per person in these developed countries have been on the decline since at least 2000 [...]. There are several causes for this trend, one of which is free enterprise [...]. While history shows that corporations can be serious polluters, we also know that the free market helps to reduce emissions" (Rugolo, 2014).

"It is from these existing and future technologies-largely made possible by free market conditions-that the solutions to poverty and accompanying environmental degradation will be rooted" (Knappenberger & Michaels, 2015b).

GWPF

"Matt Ridley, the author of the GWPF report, said: 'Abundant and relatively cheap shale gas promises to lower the cost of gas relative to oil, coal and renewables. It indefinitely postpones the exhaustion of fossil fuels and makes reducing emissions of carbon dioxide possible without raising energy prices'" (GWPF, 2011a).

"Either way we get the right outcome, and the market will reward industries and investors who make the most objective use of available science in forming long term plans', [said Professor McKittrick]" (GWPF, 2013a).

"The knock-on effects of a shale gas revolution could be significant: cheaper energy could make UK manufacturing more competitive, gas and electricity bills could fall and the rising trend in fuel poverty could be reversed" (GWPF, 2016e).

Policy evaluations: inverse climate "(in)justice"

CATO

"The Kyoto Protocol imposes no direct costs on developing countries and holds out the prospect of large amounts of transfer payments from industrialized to developing countries via the Clean Development Mechanism or an Adaptation Fund. Not surprisingly, virtually every developing country has ratified the Protocol and is adamant that these features be retained in any son-of-Kyoto" (Goklany, 2009b).

"[...] just the usual attempts by the developing world to shake down our already shaky economy in the name of climate change" (Michaels, 2010b).

"The road to global warming is paved with China's good 'intentions'" (Michaels, 2014).

GWPF

"Dr Peiser said: '[...] The deal is further proof, if any was needed, that the developing world will not agree to any legally binding caps, never mind reductions of their CO2 emissions'" (GWPF, 2014f).

"The Paris agreement is another acknowledgement of international reality. The deal is further proof, if any was needed, that the developing world will not agree to any legally binding caps, never mind reductions of their CO2 emissions" (GWPF, 2015g).

"So far it has not reduced our 'carbon footprint' as we have outsourced our carbon emissions to developing countries such as China" (GWPF, 2016f).

Folk devils

Folk devils: environmental lobbies as folk devils (scientists, politicians, and green activists)

CATO

"Lindzen's version is between scientists who make 'meaningless or ambiguous statements' on climate change, which are translated into alarmist declarations by the global warming lobby, to which politicians respond by shovelling more money to the scientists" (Michaels, 2013).

"What Climategate taught the bully cohort of scientists was they could continue to bully their colleagues, sabotage their publications, and intimidate journal editors with impunity" (Michaels & Knappenberger, 2014).

"The President is hell-bent on an endless string of executive actions aimed at manipulating the energy market and reducing our energy choices along the way" (Knappenberger & Michaels, 2014b).

"[University of Nottingham's Paul] Matthews added this insight concerning the heavy-handed tactics of environmental alarmists: The ironic point that increasingly dire messaging about climate change may encourage skepticism is supported by the work of Feinberg and Willer (2011), and also by Bashir et al. (2013), who found that environmental messages can backfire among those who have a negative view of activists" (Michaels & Knappenberger, 2015).

GWPF

"Claims by politicians and lobbyists that green energy policies will create a few thousand jobs are not supported by the evidence" (GWPF, 2011c).

"Over many years, the BBC's treatment of climate change issues has been marked by bias, ignorance, credulity and – in the latest episode – unwarranted concealment. The behaviour of the Corporation throughout has failed to measure up to professional standards" (GWPF, 2012c).

"All this paper demonstrates is that climate scientists should take some basic courses in statistics and Nature should get some competent referees" (GWPF, 2015b).

Bloc 2008-2016 - Dramatization

Dramatization: inverse drama

CATO

"The new American Power Act, a bill that doesn't know how to achieve its mandates, has a completely unknown but astronomical cost, and doesn't do a darned thing about global warming. Such a deal!" (Michaels, 2010a).

"While reducing vulnerability to climate change is a worthy goal, blind support for mitigation measures – regardless of the invalidity of the claims – constitutes what might be called bankrupt morality" (Lindzen, 2013).

"By making energy unaffordable, the policies Francis wants will impede economic development, so that, decades from now, when a repeat of Haiyan barrels through the Islands, many more will die" (Michaels, 2015a).

GWPF

"It is irresponsible to be actively promoting expensive alternatives that have already led to increasing fuel poverty in the UK and the EU" (GWPF, 2014d).

"Dr Goklany said: 'Climate change is a moral and ethical issue, but it is a strange ethical calculus that would justify wiping out the gains we have made in human well-being over the last few centuries at the same time devastating the natural world. The Vatican's advisors appear to have lost their way'" (GWPF, 2015f).

"Described by the PM's special adviser as 'an act of self harm', our climate change policies are harming our standard of living, our jobs and our industry" (GWPF, 2016f).

Dramatization: mockery of drama

CATO

"This has not been a good week for the global warming alarmists. They've been caught with their pants down on the Climate-gate email scandal" (Michaels, 2009).

"Just as butterflies should not be sued for causing tsunamis, a handful of utility companies in the North-eastern United States should not be sued for the complex (and disputed) harms of global warming" (Shapiro, 2011).

"Just in Time for Halloween Come Some Scary Global Warming Predictions" (Knappenberger & Michaels, 2013b).

GWPF

"'On one of the most important and far-reaching issues of our time, its coverage has been so tendentious that it has given its viewers a picture not just misleading but at times even fraudulent', Christopher Booker said" (GWPF, 2011f).

"Consensus? What consensus?" (GWPF, 2013b).

"The WWF and American walrus biologists have categorically linked the Point Lay mass haul out event to global warming, but available evidence suggests that's alarmist nonsense', Dr Crockford said" (GWPF, 2014c).

Bloc 2008-2016 - Symbols

Symbols: ecological symbols

CATO

"Environmentalists quickly blame the storm on global warming – or at the very least, claim that warming will inevitably lead to more Katrina-like hurricanes" (Taylor, 2008a).

"Every time there is some sort of weather disaster somewhere, someone blames it on human-caused global warming" (Knappenberger, 2014).

"So, the next time you read that such and such extreme precipitation event was made worse by global warming, you'll know that there is precious little actual science to back that up" (Michaels & Knappenberger, 2016c).

GWPF

"For many decades to come, and probably longer, mankind's influence on the frequency of extreme weather events will be insignificant" (GWPF, 2011e).

"Whenever an extreme weather event (such as a heat-wave, a flood, a drought or a tropical storm) is widely reported by the news media, a heated debate about its possible link with global warming is set off" (GWPF, 2013c).

"Author Andrew Montford said, 'We are constantly bombarded with insinuations that storms and floods are caused by or 'linked to' climate change" (GWPF, 2014b).

"Scientific reports about large walrus haul outs that have occurred repeatedly over the last 45 years show that they are not new phenomena for this region" (GWPF, 2014c).

"The WHO also assumes that higher carbon dioxide levels will have no beneficial effects on crop yields, despite scientific studies having confirmed that this is precisely what will happen in a wide range of crop species" (GWPF, 2014e).

"On International Polar Bear Day 2015, a new briefing paper by Susan Crockford reveals that behind the alarmist claims of environmentalists lies a conservation success story" (GWPF, 2015d).

"Polar bear scientists 'wilfully blind to the facts'" (GWPF, 2015e).

"Claims that droughts are getting worse are not supported in the scientific literature" (GWPF, 2016a).

Symbols: human symbols

CATO

"This superstition persists despite the current reality that more Europeans die in winter than in summer" (Goklany, 2008b).

"hunger and child labor are as low - and job opportunities for women as high - as they are today partly due to the direct effect of fossil fuel powered labor saving technology" (Goklany, 2009a).

"The idea that human-caused global warming is going to increase heat-related mortality is simply outdated and wrong" (Knappenberger & Michaels, 2014a).

GWPF

"If the British people are to make significant sacrifices and accept major changes in their life style they need to have confidence in the integrity of both the underlying science and the way in which it is processed" (GWPF, 2010a).

"Andrew Montford has reviewed the sad truth about various schemes to 'save the planet' from the demonized but life-giving gas CO₂: from bird-killing windmills, native peoples expelled from their ancestral lands, to fraud in the trading of carbon credits" (GWPF, 2015a).

"[...] claims that 'climate change' was behind the conflicts in Darfur and Syria are shown to be based on highly partisan scientific studies that ignore a host of conflicting evidence" (GWPF, 2016a).

Symbols: religious symbols

CATO

"For all the moral and ethical posturing surrounding the sanctity of 'the scientific process' [...] James Hansen's recent call to literally criminalize disagreement with him about climate change is a more radical assault on the scientific process and the scientific method than anything forwarded by the Bush administration" (Taylor, 2008b).

"It's a scientific poseur, properly classified as a belief system, like religion" (Pilon, 2011).

"We've discussed how the appetite for producing 'interesting' results [...] leads to climate alarm becoming 'a self promulgating collective belief'" (Michaels & Knappenberger, 2016d).

GWPF

"In a dispassionate but devastating critique of current policies, Andrew Turnbull also criticises the blind faith in the propositions of the Intergovernmental Panel on Climate Change (IPCC) given that they do not bear the weight of certainty with which they are often expressed" (GWPF, 2011b).

"In it [Rajendra K. Pachauri] states: 'For me the protection of Planet Earth, the survival of all species and sustainability of our ecosystems is more than a mission. It is my religion and my dharma'" (GWPF, 2015c).

"The trade unions have a choice between a policy based on the eco-dogmatism of green campaigners and the GMB Union's energy policy that focuses first and foremost on safeguarding UK manufacturing and tackling fuel poverty', said Benny Peiser" (GWPF, 2016b).

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