Ideology and change

A Systemic Functional Approach to the Climate Discourse in the British Press

Ingunn Aronsen

A Thesis Presented to the Department of Literature, Area Studies and European Languages

In Partial Fulfilment of the Requirements for the MA Degree

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Supervisor: Professor Hilde Hasselgård

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Abstract

This thesis investigates the climate discourse in selected material from the British newspapers *the Times* and *the Guardian*, with a view to uncover changes through time (1990 to 2014), as well as differences between the two papers that could reflect their ideological inclinations. The thesis approaches this task first through performing a transitivity analysis, a framework from Systemic Functional Grammar as developed by M.A.K Halliday. Language construes our world, representing experience, and the analysis highlights the semantic roles of those who figure in the discourse.

The results from the transitivity analysis contribute to a discourse analysis drawing on Fairclough and van Dijk's critical discourse analyses. The aim is to show tendencies in the structure of the language that could shape how the readers perceive climate change. A main tendency in my results points to a shift in in the placement of responsibility, through a depoliticisation and depersonification of participants, which, most notably, seems to have led to an increased frequency of nature as a principal participant. The tendencies I point out through this thesis could help position readers to understand and conceptualise climate change as 'something that just happened', and something that is impossible to counteract. In this way, language can be effectively harmful.

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1 Introduction

> It is quite an illusion to imagine that one adjusts to reality essentially without the use of language and that language is merely an incidental means of solving specific problems of communication or reflection, The fact of the matter is that the 'real world' is to a large extent unconsciously built up on the language habits of the group (…) We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation.
>
> (Sapir, 1929: 209-210)

Following disastrous weather and dawning realisation of how the earthly conditions we depend on for human life were worsening, the First World Climate Conference (FWCC), convened by various bodies of the UN, took place in 1979. It was tailed by many smaller conferences throughout the eighties, many of which cumulatively resulted in the first scientific report by the International Panel on Climate Change (IPCC) in 1990, and more conferences and summits. In 1992 the United Nations Framework Convention on Climate Change (UNFCCC) came to be, and the Kyoto Protocol (1995) followed; two of the most universally adopted conventions for combatting climate change. In the autumn of 2014, a quarter of a century after the first, the IPCC published their fifth report. In December 2014, the 20th annual meeting of the parties of the UNFCCC (the COP20) was held (WMO, 2014).

While the theme and content of the IPCC reports may not have changed dramatically, other than in their degree of certainty of the impending calamity (Readfearn, 2014), the language used and the way the content is portrayed in the media might have. In this thesis, I investigate a small selection of texts taken from the media discourses surrounding the COP meetings in the years of the first and fifth reports – December 1990, and November 2014 – comparing the language of environmental news coverage following the first IPCC report to the coverage after the fifth.

Arguably, the media is for most people the primary source of information about the environment, and thus becomes key in people's knowledge construction of environmental issues. With the use of the internet ever increasing, we rely more and more on written language to express ourselves, to communicate, and to get information. While everyone sees the world differently, language is our common system of representation, through which we can express our worldview.

Language constructs reality, what we know and how we know it. In today's heavily mediated world (much of the input we receive, and the knowledge we acquire, comes from

news and entertainment media (Boykoff, 2011: 53)), the press helps construct what we call reality, especially where the perspectives are broad and the distances long. The lens of language creates a narrative that we accept as reality because certain channels are commonly held to be objective. When reporting a story, the writer is painting a picture of a situation or a problem, and as such, the reportage becomes a subjective process, because the situation the reporter describes is his or her own interpretation or visualisation of it.

What this leaves us with is that, regardless of whether language is deliberate, we have to investigate the finer nuances of it. If legitimate news channels give an interpretation of climate change that is biased, this will inevitably shape our conception of the world and dictate how we live in it.

1.1 Aim and scope of thesis

A study on climate change coverage by Boykoff (2007) details a steady increase in published news stories (in *the Independent*, *the Guardian*, *the Times* and all papers' Sunday editions) from 2003-2006. While this might be because the sheer amount of news distributed has increased dramatically as we have gotten more and cheaper channels of production and distribution, this nevertheless indicates that there are more articles concerning climate change written today than in 1990 (which my searches in the archives have confirmed), whatever the reason. It seems logical that language use has changed as our awareness of climate change has grown and the knowledge of it solidified.

Because ideology is closely tied to language use, and "the exercise of power, in modern society, is increasingly achieved through ideology, and more particularly through the ideological workings of language" (Fairclough, 2001: 2), I also hypothesised that language use, also in the climate discourse, differs depending on the political view-points of the writer(s).

On the basis of a material of selected texts from the newspapers *the Guardian* and *the Times* from the years 1990 and 2014, this thesis will attempt to address three main concerns tied to diachronic change and ideology. While I cannot hope to answer the question of whether the reality we are presented with is true or not, the first aim of this thesis is to see whether it has *changed* between 1990 and 2014. Secondly, working from the view that language is a subjective representation of events, another aim of this thesis is to identify whether and how institutional ideology and word view results in functional differences in the

language of the two newspapers. These concerns will be addressed by performing a systemic functional transitivity analysis. The results from this analysis will contribute to a discourse analysis drawing on Fairclough (2001) and van Dijk's (1988, 2008) critical discourse analyses. The aim is to show tendencies in the structure of the language that could shape how the readers perceive climate change.

1.2 Definitions

Before progressing further, a few definitions of central terminology is in order. The terms defined here are in popular use in a wide and general sense, and thus, for use in an academic text, need to be narrowed down.

In this thesis, I understand a **text** as a whole, more than a linear sequence of separately understandable sentences (Ricoeur, 1981-212); "It is a cumulative, holistic process" (Ricoeur, 1981: 212). This is why my focus will not solely be the sentence or clause, meaning that, as I'll return to, I will take co-text into consideration when analysing clauses, and interpret my results based on all clauses analysed. "Correctly, the whole appears as a hierarchy of topics, or primary and subordinate topics" (Ricoeur, 1981: 211). The texts in this thesis are primarily the individual articles of my material.

A text may form part of a **discourse**, just like my selected texts from the newspapers form part of the mediated climate discourse. Hajer (1993: 45-46 (cited in Boykoff, 2011: 3)) defines discourse as "an ensemble of ideas, concepts, and categories through which meaning is given to phenomena". Discourses dominate our conceptualisation of the world, framing problems by focusing on specific aspects of a problem (Hajer 1993: 45-46, cited in Boykoff, 2011: 3). "Discourse is the counterpart of what linguists call language-systems or linguistic codes. Discourse is language-event or linguistic usage" (Ricoeur 1981: 198).

Through discourse, most of our **ideologies** are formed (van Dijk, 2008: 22). Although ideology can be approached in a variety of ways, "[w]e assume that ideology is a form of social cognition, shared by members of a group, class, or other social formation." (van Dijk, 2008: 34). Ideology informs group or class 'consciousness' and interests, guiding group socioeconomic, political and social practices. The media is one of the arenas mentioned by van Dijk for acquiring, enacting or organizing ideology and ideological practices (2008: 34).

1.3 Climate change

Citing a selection of scientific research journals, eighteen American scientific societies, the US National Academy of Sciences, the U.S. Global Change Research Program and the IPCC, NASA approximates that "[n]inety-seven percent of climate scientists agree that climate-warming trends over the past century are very likely due to human activities" (NASA, no date). These activities have resulted in increased levels of heat-trapping gases in our atmosphere.

As part of providing a background for my discourse analysis, I will in this chapter attempt to give a general understanding of the science of climate change and a very brief overview of central historical events that will be relevant for my thesis.

In the words of the UK meteorological office, "climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures." (MetOffice, 2015). They cite higher temperatures, changes in rainfalls and in animal behaviour (such as altered migration patterns), sea levels rising, glaciers retreating, melting sea ice and shrinking ice sheets as some of the indicators of climate change. We see all these factors today (MetOffice, 2015). As for the possible *causes* for these changes, "[a]nything that affects the amount of energy being absorbed from the Sun, or the amount being radiated by the Earth" (MetOffice, 2013b), as well as increasing amounts of greenhouse gases in the atmosphere, can change our climate system and have these effects. Whereas changes in the sun's energy output is beyond human control, and "[t]here is natural variability in Earth's climate, (…) the current climate change is very unusual as it is not exclusively part of a natural cycle" (MetOffice, 2013a). Human influence, through for example production of greenhouse gases explains the disturbance in the earth's natural balance.

While the UK meteorological office uses moderate language, their conclusion is nevertheless that global warming "almost certainly" (MetOffice, 2013b) comes down to human influence. The *Working group II contribution to the fifth assessment report of the intergovernmental panel on climate change* is less roundabout in their assessment (which is based on over 12,000 scientific references cited (IPCC, 2013)): climate change is real and occurs now, and is affected by human interference (IPCC, 2014). Because of the nature of climate discourse in the media, I feel it is appropriate to point out that in this thesis I am writing from a position where a 97% consensus is seen as irrefutable.

The critical responses often directed towards global environmental problems are varied. One group of scientists, popularly called climate sceptics, have been vocal in claiming that global warming research is fraught with uncertainties. Famously, these scientists were utilized by the first Bush administration to hinder any affirmative action to reduce greenhouse gas emissions (Hajer, 1995: 278). Another kind of criticism comes from (so-called) Third World parties, who early on spoke up against the emerging discourse on global environment issues. "They saw their own orientations and concerns in environmental and developmental issues being squashed by the rise of the new global problems" (Hajer, 1995: 278). They highlighted the northern bias in remedial strategies, and the way global issues, whose source mainly was in the north, produced solutions primarily from the south. In addition to this, a third line of criticism, founded in social constructivist science sociology, is directed at the alleged impreciseness of some claims, where evidence and research is presented in an imprecise manner. For example, sociologists (Wynne, Shackley, Kwa) have pointed out that the IPCC working groups favour one specific type of scientific approach that leads to a centralization of knowledge and decreased flexibility in terms of including new evidence. This, they argue, blocks certain types of knowledge necessary to assess different policy scenarios (Hajer, 1995: 278).

In the introduction, I gave a rough outline of dates that are central to the climate change debate. It is important to keep in mind that, in line with my argument of political stagnation, the world has not seen a widely ratified climate change protocol since Kyoto in the early nineties. Since the world started taking collaborative action on a global scale, the popularity of the topic among the public has fluctuated. A peak in interest occurred around 2007-2008, with Al Gore's film[1] and Nobel peace prize award, and Obama's presidential election win on an environmentally conscious platform. A decrease in interest followed in 2009, when several scientific actors received harsh criticism. First, "a server at the Climate Research Unit at the University of East Anglia in the UK was breached and over a thousand emails and other documents were posted on the web, leading to an international scandal that the media dubbed 'Climategate'" (Leiserowitz et al., 2012). The content of these emails were used as evidence for how British and American scientists had collaborated to manipulate their data in order to exaggerate the effects of global warming, hide results they disagreed with, and withhold information. The scientists involved argued that "statements had been taken out of context and misinterpreted" (Leiserowitz et al., 2012). This story understandably received

[1] An Inconvenient Truth, 2006

much attention in the media. Furthermore, errors were discovered in the fourth IPCC report (published in 2007), one of which was an "improperly sourced claim that the glaciers of the Himalaya could melt completely away by 2035." This was followed by a record cold winter in the US, which some media outlets, sceptics and elected officials offered as proof of climate change being a hoax (Leiserowitz et al., 2012).

Climate and weather are, in a way, concepts on either end of a scale. Weather patterns make up what we call climate, and only changes over time are seen as climate change. The relationship between weather and climate is used to illustrate the relationship between text and system, but which I mean that Halliday and Matthiessen's focus is not on climate, yet the analogy is interesting, also when reversed. They bring up perspective as a key difference between weather and climate: "they are the same phenomenon seen from different standpoints of the observer" (2014: 27). Weather is the instantiation of the system (climate). "The weather is the text: it is what goes on around us all the time, impacting on, and sometimes disturbing, our daily lives" (2014: 27). We can apply this analogy also to the climate discourse: we talk of climate change in single instances, but together the instances make up a discourse genre (if climate discourse can be called a genre), with the potential to influence.

2 Theoretical background and previous research

Language, communication and interaction form the basis on which we have built our society. British sociologist Basil Bernstein separated between the visible and the invisible components of communication; what is expressed, and what is not. "Bernstein's concept of the invisible and visible components of the communicative act complement our understanding of the true nature of social context, which on the one hand points to cultural history and on the other to speaker's desires, needs and beliefs" (Hasan, 2001). While there are few limitations on *what* someone can say, Hasan raises questions as to *why* we say what we do (Hasan, 2001). This is central to this thesis – reason and choice. According to Bernstein, parameters such as generation, gender, ethnicity, incapacity and class guide our 'coding orientations' or how we distinguish between social subjectivities. Making utterances from our personal points of departure, all text acts on someone's interest. "[F]rom this perspective there is no meaning outside power" (Martin and Rose, 2007: 314). However, Bernstein's distinction fails to fully describe what I will look at. While the components I will look at are visible, I am not looking at what these visible components are expressing solely in terms of content: function is also central. So while I am investigating what the visible says about the invisible, I am not looking directly at what is being expressed. I will look at grammatical functions: visible but subtle because no one really pays much attention to them when reading for content.

In particular, the connection between discourse and shared political and social cognition is of interest to me in this research. The texts and discourses we encounter in socialisation, education, our exposure to the media and the conversations that we have, all help produce and shape our mental representations (van Dijk, 2008: 155). While it would be impossible to prove a direct link between discourse and cognition, I aim to show tendencies.

2.1 Context/ The communicative situation

Who we wish to communicate with, *what* we wish to communicate, and *why*, all influence *how* we communicate; how we choose our words. In Systemic Functional Grammar (henceforth SFG), the concepts of register and genre systematise the relationship between context and text. The way we make use of set constructions, communicative norms, and configurations of linguistic tools, goes under **register**. Different registers for different contexts are unconsciously created and utilised by all practitioners of language. The concept

of register is divided into three main dimensions: field, tenor and mode. Field encompasses the topic of conversation and the role of language in what is happening; tenor encompasses the relationship between the communicators; mode encompasses how the language functions – whether it is written or spoken, for example. The dimensions correspond to the metafunctions of SFG; "the field mainly determines, and is construed by, the experiential meanings that are expressed; the tenor mainly determines, and is construed by the interpersonal meanings; and the mode mainly determines and is construed by, the textual meanings" (Thompson, 2014: 40).

Knowledge and understanding of context, in all communication, has to do with **genre**. Genre is the label denoting a set of expectations tied to the text we are reading. Thompson (2014: 42) gives a short definition of genre as register plus communicative purpose. In terms of the type of media discourse I deal with in this thesis, genre is tied to the social role of the press, a role which journalists and editors continue to describe as one of dissemination of information and not a role as educator. However, in reality, the boundary between the two is blurred (Boykoff, 2011: 165). That it is possible to provide information without it being educative in some way is hard to imagine. While not all journalists or news agencies have to have an agenda, I would argue it is in human nature to wish to convince others of how their world view is the true one, consciously or not.

Paul Ricoeur uses a myth from Plato's *Phaedo* to describe the written word, representing writing as alien, material and external - a gift given to rescue and remedy the weak memory of discourse (Ricoeur 1981: 199). This transience of memory is central to my thesis. Large parts of our identity is collective, and based on common memories and experience. The mass media plays a vital role in representing and sustaining the collective memory of our society. The written sign remains, and while the writing of a daily newspaper is not often revisited by readers, it is revisited by news writers, reiterated and reproduced. Any discourse, be it spoken or written, that is not reiterated is easily forgotten, and isolated events and weather changes are reported interspersed with reproduced and repeated facts, tropes, metaphors, etc. (Ricoeur 1981: 199).

Hasan (2001) questions *why* we say what we do, and part of the answer to that lies in context. Van Dijk (2008) operates with a concept of *models* to explain what discourse participants draw upon in conversation, assuming that discourse production begins from the speakers or writers personal mental models of any given situation or event. The model organises the individual's subjective beliefs. Text is instantiation drawing upon these models,

and depending on a number of circumstances, only fragments of the models need be expressed. To know what to extract from these models, to achieve communication that is appropriate, necessary, useful etc., speakers need to know something about the social and communicative situation they have before them, the occasion, the people they are speaking with or to, and so forth (van Dijk, 2008: 162 - 165). This is relevant to this thesis because in the circularity of discourse production, media output is dependent on input that is partially shaped by other media output.

These individual models, or internal factors that govern how we interpret the input we receive, based on a person's experiences and attitude, accumulated over a lifetime, provides a filter (for lack of a better word) through which he or she sees the world. "Each act of speaking is a social event, behind which lies the history of the individual and so the history of the community of which the individual is a member" (Hasan, 2001).

Drawing this direct connection between text and context and the one's influence over the other is relatively standard, but it is important to keep in mind that while the link may appear direct, it is in fact not. If participants, setting and action – the situational structures – could be directly linked with discourse structures, participants in any given social situation would all talk alike one another (van Dijk, 2008: 165). Fairclough (2001: 52) argues that free speech is in fact a myth, because both what you can and cannot say, and who can say something on what platforms, face constraints.

There is indisputably much power in setting the public agenda, and thus directing what the general public learns of and talks about. In a working paper from 2012, Leiserowitz et al. touch upon how this is especially important for an issue such as climate change, because many of the symptoms of climate change are invisible – greenhouse gases are for example usually not directly visible in the air – and the consequences distant in time and space (Leiserowitz et al., 2012). Another important aspect is that while the climate affects the weather, contextualising this and seeing that all these changes we see are part of a larger change does not always happen, as I discussed in terms of the relationship between weather and climate (section 1.3).

What is more, many reporters do not have adequate scientific understanding of, nor the capacity to research, all cases they cover to the level researchers do; the reporter is communicating other people's research. What is called 'balanced reporting' has become the professionalised and institutionalised journalistic norm: the reporter gives room for all sides of the story to be heard. While this in many cases provides a safe-guard against, for example,

propaganda, in the matter of climate change, adhering to this norm can become problematic (Boykoff, 2007: 470).

The media is sometimes referred to as the fourth estate, a non-governmental institution expected to hold the three governmental estates (judiciary, executive and legislative) accountable. However, British newspapers have traditionally not been reticent when it comes to sharing their political affiliations, and many papers openly support a political party for elections. In 1992, *The Times* voiced support for the Conservatives before the general elections, but they were neutral in 1997. After supporting Labour in 2005, *the Times* again backed the Conservatives in 2010 (BBC, 02.05.10). In 2015, arguing for stability, they remained in favour of the Conservatives (Times, 03.05.15). *The Guardian* supported Labour for the elections in both '92 and '97, though with voiced reservations in '97 (Nessheim, 2012: 48). In 2010, *the Guardian* supported the Liberal Democrats (Guardian, 30.04.10), and in 2015 returned to back Labour, though again with voiced concerns: "This newspaper has never been a cheerleader for the Labour party. We are not now. But our view is clear. Labour provides the best hope for starting to tackle the turbulent issues facing us" (Guardian, 01.05.15).

Newspapers are political by nature, and their alignments seemingly rarely shift far. Because journalists employed by a newspaper are expected to represent that newspaper in the work that they do, the ideology of a newspaper, at least to some extent, is likely to attract journalists that share its world view. Returning to the media's role as setting the public agenda, it seems to follow that political alignments also guide what news stories are prioritised, and how they are portrayed.

2.2 Systemic Functional Linguistics

Language construes human experience; language gives names to things, and through that places them into categories. These categories are in turn construed into taxonomies (Halliday and Matthiessen, 2014: 30). Bound together, and hemmed in by sequences of circumstance, these categories and taxonomies combine in intricate grammatical patterns. Language can express the meaning of/in every human experience, and as such, "language provides a **theory** of human experience, and certain of the resources of the lexicogrammar of every language are dedicated to that function. We call it the **ideational** metafunction, and distinguish it into two components, the **experiential** and the **logical"** (Halliday and Matthiessen, 2014: 30, their

emphasis). This is one of Halliday's three metafunctions of language. Geoff Thompson (2014: 30), whose terms I will be using in this thesis, does not operate with the term ideational metafunction, but instead separates the logical and experiential components and talks about the **experiential** metafunction.

The two other metafunctions will not be important to the present analysis and are thus presented only briefly: Language is also action and interaction – in SFL, the function of this aspect of language is called the **interpersonal** metafunction. The **textual** metafunction examines the aspects of the clause best understood by looking at the language context. Repetition, conjunction, information and thematisation are the most central topics (Thompson, 2014: 145).

The transitivity analysis I have performed fall within the experiential metafunction: the metafunction of using language to talk about the world/language as a representation of the world.

2.2.1 Transitivity analysis

A basic tenet of Halliday's theory is that people use language to represent their experience of the world. Expression requires combining semantic roles to express what happens (**processes**), who or what is involved (**participants**), and associated **circumstances** (Hillier, 2004: 42). An experience is a flow of events, something existing or changing. Representing experience in language, coding it in grammar, creates a narrative, or what Halliday and Matthiessen call "a figure of happening, doing sensing, saying, being or having" (Halliday and Matthiessen, 2014: 213). Processes unfold within circumstances, with the involvement of participants. A transitivity analysis highlights the semantic roles of the participants; as we see in (2.1), the transitivity analysis separates the clause into an actor, a process, the goal the process affects (or in the case creates), and who the intended audience is. This all unfolds within the specification of the circumstance of time.

(2.1) *[time, extent]* For the third time in a year, *[actor]* Mrs. Thatcher *[Pr: material, intentional]* produced *[goal]* a ringing call *[beneficiary, recipient]* to the international community. (T9-7)

The process of a clause is represented by its verb or verbal group. There are different views on the number of process types; Halliday and Matthiessen (2014: 214-215) distinguish between six types: material, mental, verbal, relational, behavioural and existential, all of which I will present in further detail in this chapter. Nominalisations are Processes that are realised by nouns rather than verb phrases.

Although some are more common than others, the types of processes are not ranked in any way. They are, however, ordered, and Halliday and Matthiessen represent this order as a continuous circle:

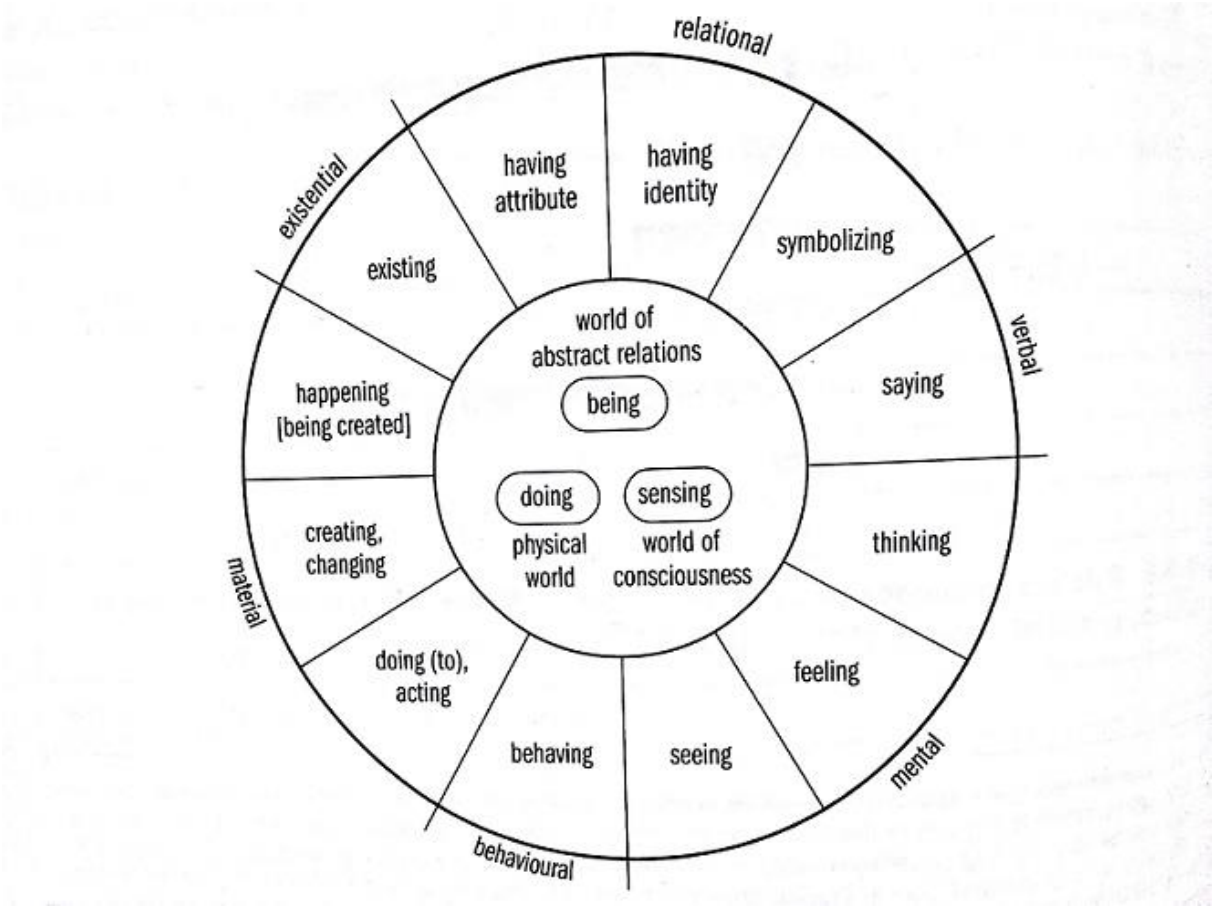

Figure 1 - "The grammar of experience: types of processes in English" (Halliday and Matthiessen 2014: 216)

These categories of process types are prototypical, and in my analysis I will come across borderline cases. A process can be a blend of one or more types.

What is more, this system of transitivity/system of grammatical representation of experience builds on the principle of systemic indeterminacy. "The world of our experience is highly indeterminate; and this is precisely how the grammar construes it in the system of process type. (…) Thus one and the same text may offer alternative models of what would

appear to be the same domain of experience" (Halliday and Matthiessen, 2014: 217). This means that one experience can be represented by several process types.

In the following presentation of the framework of processes and participants, the examples used are, unless otherwise stated, from my material.

Material processes and associated participants

The material processes encode what Halliday and Matthiessen refer to as 'outer' experiences: typically "actions and events: things happen, and people or other actors do things, or make them happen" (Halliday and Matthiessen, 2014: 214).

The actor is the 'doing' participant – there is one in every material process, but it needs not appear explicitly, as we see for example in short passives (ex. (2.6)). Some actions are done to someone or something – **the goal** (Thompson, 2014: 95-96). In example (2.2), which shows a clear doing and done to-relationship, the actor is explicit.

(2.2) (…) as *[actor]* winds *[Pr: material, intentional]* push *[goal]* water *[location]* from the coast of South America toward Australia. (G2-23)

There can also be an affected party called **the beneficiary** (often the indirect object of the clause), an oblique participant; they are further removed from the experiential meaning of the clause, and thus have an intermediate status (Thompson, 2014: 111). Context allows us to distinguish between two different types of material clause beneficiaries: **recipient** and **client**. Illustrated with (non-obligatory) prepositions: something is *to* a recipient, something is *for* a client (Thompson, 2014: 112). For an example of a beneficiary (recipient), see example (2.1).

While not strictly a participant, material processes may also have **scope**, which is an element specifying range or domain (Halliday and Matthiessen, 2014: 346). Elements within this category are not directly affected by the process, but involved in another way (Thompson, 2014: 112). See example (2.3), where the scope is a type of extension to the process.

(2.3) (…) *[initiator]* a text that *[Pr: material, intentional]* would require *[actor]* countries *[scope]* to offer upfront information *[matter]* about the nature of their pledges to cut emissions (…) (G3-8)

Lastly, we have the **initiator**. This is the name of the participant that causes something in a causative expression in a material process clause, as is shown in example (2.3). While a causer may at first glance look like an actor, the causer is more separate from the rest of the process than that, and can appear in mental and relational process clauses as well, albeit under different labels (Thompson, 2014: 129).

In the transitivity system, the category of material processes is the largest and most diverse (Thompson, 2014: 96) and while for some purposes it is enough to focus on the category as a whole, the category of material processes can be further subdivided. Central to my thesis is the distinction between *intentional* and *involuntary* material processes. Involuntary material processes, the label denoting a process instigated without volition, are different from the prototypical material processes I have described in this section. The lack of volition obscures the sharp division between actor and goal presupposed by transitivity analysis, so what seems like a goal is instead the actor, and often there is no goal in the clause at all. In SFG, what is called the ergative perspective sheds more light on these blurred cases (Thompson, 2014: 96, 139).

To illustrate, Thompson (2014: 139) compares three clauses that convey the same message, using three different language patterns:

(2.4) *[Actor]* We *[Process: material]* increased *[Goal]* our profits *[Circumstance]* over the year.
(2.5) *[Actor]* Our profits *[Process: material]* increased *[Circumstance]* over the year.
(2.6) *[Goal]* Our profits *[Process: material]* were increased.

In the clauses in (2.4) and (2.5) the profits are the subject. However, in the second example, which is an involuntary material process (and passive), the profits are the actor and agency is thus obscured. This is dependent on the verb, but a number of English language verbs show this possible alternation in patterns of use (Thompson, 2014: 139).

The ergativity and transitivity perspectives approach material processes from what appears to be opposite ends. "From the transitivity perspective, the Actor does something, which may or may not affect another participant, the Goal. From the ergativity perspective, on the other hand, the Medium 'hosts' a process, which may or may not be caused by another participant, the Agent" (Thompson, 2014: 141). Often, ergativity has to do with change of state, where change is seen as "self-engendered or caused by 'external forces'" (Thompson,

2014: 141). As I will show in chapters 4 and 5, the texts go to some lengths to distance agency.

Similarly, some material processes encode an outcome, without reference to how this outcome came about. Thompson (2014: 120) exemplifies this with the verb 'achieve', which leaves to context or imagination to explain *how* something was achieved.

The diversity of material processes can lead to difficulties in ascertaining whether something is a material process or not. Thompson refers to the material category as a kind of 'default transitivity category', meaning that if a process does not fit the criteria for any of the other categories, it is likely material. However, difficulties in ascribing a category may not only be due to this. Sometimes the meaning of a verb in a given context is blend of two or more process type categories. In these cases, the solution is to categorise the process based on the more dominant meaning. However, if certain blends feature prominently in a text, it might be necessary to take a closer look at these examples (Thompson, 2014: 120).

Mental processes and associated participants

The 'inner' experience, opposing the material 'outer', is one part a replay of the outer experience, recording, reacting and reflecting on it, and one part an own awareness of different aspects of existing (Halliday and Matthiessen, 2014: 214). Mental processes take place in the internal world of the mind, not so much *acting*, but *undergoing* a process (Thompson, 2014: 97).

In terms of semantics, the justification for having a separate category for mental processes is clear, but there are also grammatical differences. One of the differences is that mental processes always include a human participant: the **senser**, in whose mind the process unfolds (Thompson, 2014: 98). The second participant that can go into a mental process is the **phenomenon** – "the kind of entity that can fill the role of [the Phenomenon] is less restricted than the entities that can act as participants in a material process" (Thompson, 2014: 98).

There are four subcategories of mental processes – *perceptive* (which has to do with perception – seeing, hearing), *emotive* (which has to do with feeling), *cognitive* (to do with cognition – knowing, understanding, realising, deciding) and *desiderative* (covers processes of wanting) (Thompson, 2014: 99).

Example (2.7) shows a mental clause. The senser is identified based on "the mind in which the process takes place"; this in contrast to material processes, where there is no such search for the root of the action (Thompson, 2014: 141).

(2.7) *[senser]* Wealthy countries also *[Pr: mental, desiderative]* wanted *[phenomenon]* a review process (…) (G3-9)

The **inducer** is the name of the participant that causes a mental process to come about; causes the senser to sense something (Thompson, 2014: 129).

A further distinction between material and mental processes is that the (cognitive) mental processes can project clauses (Thompson, 2014: 98), meaning that instead of or in addition to a phenomenon, we can see a separate clause that conveys what is sensed/thought. In (2.9), the mental clause projects a material clause.

(2.8) (…) *[senser]* the health organisation *[manner]* wrongly *[Pr: mental, cognitive]* assumed | *[actor]* people *[Pr: material, intentional]* would not take *[goal]* practical steps to protect themselves. (T1-6)

The unmarked mental process clause is where the senser is subject and the phenomenon the object. In further difference to material processes, some mental process clauses can be reversed without needing to be passivised; "the process can be seen either as sensed by the human participant or as triggered by the phenomenon" (Thompson, 2014: 100).

(2.9) *[phenomenon]* Pope Francis's edict on climate change *[Pr: mental, emotive]* will anger *[senser]* deniers and US churches. (G6-1)

Reversal is most common in emotive mental processes, like the one shown in (2.9), but also occurs with the other subcategories of mental processes, in metaphorical clauses that more closely resemble material process clauses (Thompson, 2014: 100-101).

Relational processes and associated participants

Halliday and Matthiessen add another component to the distinction of our experience into inner and outer aspects: the relational processes. These processes are the grammaticalisations

of how we identify and classify our experiences. The relational processes establish relationships between objects, relating "one fragment of experience to another in some kind of taxonomic relationship: this is the same as that, this is a kind of the other" (Halliday and Matthiessen, 2014: 214).

There are two main categories of relational processes – **attributive** and **identifying**. In attributive processes, the participants are **carrier** and **attribute** (Thompson, 2014: 102). Their relationship is betrayed by their names; the carrier carries an attribute given to it; we see this in (2.10), where global warming is given the attribute *plausible but unproven*:

(2.10) *[manner]* As a scientific hypothesis, *[carrier]* man-made global warming *[Pr: relational, attributive, intensive]* is *[attribute]* plausible but unproven. (T7-10)

If a participant causes the attributive relational process to come about, or it is called the **attributor** (Thompson, 2014: 129)

The function of identifying relational processes "is to identify one entity in terms of another" (Thompson, 2014: 102). Both participants refer to the same real-world entity, "relating a specific realization and a more generalizable category" (Thompson, 2014: 102). The general category is the **value**, and the **token** is the specific manifestation that is being identified in terms of the general concept. Which value the writer choses to identify the token by, can in some cases help alert us to any underlying values or concerns: "Essentially, the Value reveals what values or types the writer (and ultimately the culture the s/he is part of) uses to categorise the Tokens that s/he deals with" (Thompson, 2014: 104). Among other discourses, Halliday and Matthiessen (2014: 284) highlight scientific discourse as one where token-value analysis can be central in uncovering traits of the register. Example (2.11) shows an identifying process where *ice* is identified as a concern.

(2.11) (…) *[value]* the main concern *[Pr: relational, identifying, intensive]* was *[token]* ice (…) (T5-9)

While identifying processes often are reversible, attributive processes are usually not, but the attribute can be fronted for a more 'mannered' or formal stylistic effect (Thompson, 2014: 102).

Both attributive and identifying relative clauses can be further categorised as intensive, circumstantial or possessive, giving further specification to the nature of the relation that is established. A possessive relational process denotes possession or part-whole relations (as in example (2.12)); a circumstantial relational process donates a relation of causation or other circumstantial factor; an intensive relational process (see examples (2.10) and (2.11)), typically more common, is more straight-forward.

(2.12) *(value)* These extra deaths *(relational, identifying, possessive)* would include *(token)* 95,000 more people dying each year from malnutrition, 60,000 from malaria, and 48,000 from diarrhoea, (…). (T1-4)

Verbal processes and associated participants

According to Thompson (2014: 106) verbal processes carry traits associated with both mental and material processes; the action of saying something is a result of a mental process.

A verbal process consists of a verb of saying - a communicative verb, denoting a process of relaying a message through language. The participant **sayer**, whose role is apparent by its name, is involved in all verbal processes; if not explicit (as in (2.13)), then implied (as in (2.14)).

(2.13) *[time]* In recent months *[sayer]* the pope *[verbal]* has argued for *[verbiage]* a radical new financial and economic system to avoid human inequality and ecological destruction. (G6-14)

(2.14) *[target]* Wealthy countries *[Pr. verbal]* were accused *[verbiage]* of failing to live up to their earlier promises of mobilising billions to help developing countries fight climate change. (G4-27)

There has to have been a sayer for the situation in the example above to hold true, but it has been left out of the sentence. Sometimes context will give an indication as to who the Sayer can be. The most common type of sayer is human, but it can also be inanimate objects such as reports and letters (which of course have had to be composed by someone, and as such can also be said to contribute to hiding a sayer, for whatever reason).

Verbal process clauses can project clauses, and in these projections, we usually find the message. Projections are not analysed as participants, but as separate clauses, as in example (2.15) where the verbal clause projects a relational clause.

(2.15) *[sayer]* Dr John Knauss, head of the US delegation, *[Pr: verbal]* | that *[value]* yesterday's agreement *[Pr: relational, identifying, intensive]* was *[token]* a watershed which acknowledged that the whole world was "all in this together." (G9-7)

If, however, the message is summarised as a nominal group, this is a participant called **verbiage** (example (2.13) and (2.14) both include verbiage). If the message is summarised as a prepositional phrase, this is not a participant but rather a circumstance of matter.

Another participant is the **receiver**: the human (typically) the message is addressed to. Often appearing as a prepositional phrase, this is an oblique participant, like the beneficiary in material processes. The **target**, the participant to whom the message is *directed,* is not necessarily human, and does not appear with many verbs besides ones to do with talking *about* a topic, such as 'blame', 'accuse', or 'praise' (Thompson, 2014:106-107, 111). Example (2.14) is an example of a verbal clause with a target facing an accusation.

Behavioural processes and associated participants

Behavioural processes carry traits from both mental and material processes. These processes "represent the outer manifestations of inner workings, the acting out of processes of consciousness (e.g. *people are laughing*) and psychological states (e.g. they were sleeping)." (Halliday and Matthiessen, 2014: 215) Not easily categorised on grammatical grounds, behavioural processes are rather identified by semantic aspects; they are processes that are specifically human and psychological, giving definition to the outward representations of mental processes (Thompson, 2014: 109).

There is only one participant associated with behavioural processes, and that is the **behaver.** The behaver must be human. Similar to the scope of material process clauses, behavioural process clauses may include a **behaviour**; though it may look like a participant, it is not analysed as one, but helps specify the process (Thompson, 2014: 109). Example (2.16) shows a behavioural process.

(2.16) *[behaver]* People who are interested in this *[Pr: behavioural]* are also watching *[behaviour]* patterns of atmospheric pressure and flow in the Pacific. (G2-27)

Existential processes and associated participants

The existential process is another borderline case, with relational and material traits. This process type is, as the name betrays, concerned with aspects of existence; being, happening, existing (Halliday and Matthiessen, 2014: 215). The existential process only comments on the existence of something, without saying anything further (Thompson, 2014: 110).

The clauses usually have the existential 'there' in subject position, followed by the verb 'BE', and only one participant - the **existent**.

(2.17) (…) there [*Process: existential*] will be [*Existent*] an increase in summer-time downpours such as the one that hit the Cornish town of Boscastles in August 2004. (T4-16)

Often, the use of existential process clauses signals a choice by the speaker or writer not to represent the participant as directly involved in what is happening. Illustrating this function, processes with the verb 'exist', though commonly existential in meaning, should be analysed as material because here the participant is involved in the process of existing (Thompson, 2014: 110). However, this construction may also be used as to manage information flow, presenting a situation as existing "as a first step in talking about it" (Thompson, 2014: 111).

More on ergativity

Under the headline 'material processes and associated participants', I briefly compared the **ergative** and **transitive** approaches to transitivity analysis. These approaches operate at different levels of interpretation, and complement each other: while the transitive model differentiates between the process types, and the ergative model generalises. The ergative model sees clauses as having a **process**, a **medium**, and sometimes an **agent** (Halliday and Matthiessen, 2014: 333-334). Medium is "the medium through which the process is actualized" (Halliday and Matthiessen, 2014: 336), and the agent is the external cause behind it.

2.3 Critical Discourse Analysis

According to Norman Fairclough, a discourse study "ought to stress both the determination of discourse by social structures, and the effects of discourse upon society through its reproduction of social structures" (Fairclough, 2001: 34). Because the majority of people are not conscious of how the discourse around them, and discourse they themselves produce, can contribute to this, one aim of critical language studies becomes increasing awareness (Fairclough, 2001: 34) Critical Discourse Analysis (CDA, or Critical Language Studies, CLS), concerns itself with studying language with a view to uncover "the connections between language, power and ideology" (Fairclough, 2001: 4), and thus raise public consciousness of issues studied (Fairclough, 2001: 194). Van Dijk formulates a set of criteria of which at least one must be fulfilled for the discourse analysis to be 'critical':

- it must be from the perspective of the dominated;
- it must include experiences of members of this group as evidence in the evaluation of the discourse;
- the analysis must show that the dominant group is committing illegitimate discursive action;
- or the analysis must formulate an alternative to the status quo that is in favour of the dominated group (van Dijk, 2008: 6).[2]

This being said, power is commonly misinterpreted to be inherently 'bad', and that "the analysis of discourse and power is by definition 'critical' analysis." This is a reductive interpretation of power and CDA. The nature of power depends on how it is used; "as when parents and teachers educate children, the media inform us, politicians govern us, the police protect us and doctors cure us – each with their own special resources." (van Dijk, 2008: 17) A main distinction is between use and abuse ('domination'), but distinguishing between the two, determining the legitimacy of use of power, can be difficult (van Dijk, 2008: 18-19)

The tools of CDA are typically employed to uncover ideological imbalances in discourses of conflict and political elections, or to reveal racial, sexual or stereotypical bias (van Dijk, 2008: 94). Environmentalism, too, is political, and originally emerged as "a

[2] While this thesis does not adhere to all these criteria, it does seek to highlight the discursive actions of the dominant group, in a partial effort to describe them as illegitimate or not.

counter-cultural critique of many of the technocratic institutional arrangements that are now associated with ecological modernization." (Hajer, 1995: 102) I would argue that environmental reportage is fraught with ideology, with opposing perspectives, scientifically, economically and morally. The industrialised world is, and has been, the main force behind the environmental change we are seeing, and as more countries are catching up and are building their economy through environmentally harmful industry, there is need for restriction. Yet, there is little political will for this in the industrialised world, and much time is spent debating whether capitalism and sustainable living are at all compatible. The results of this dallying is felt in many developing countries. At the same time as the industrialised west is reluctant to scale back, this is demanded from developing countries.

Studies with a surface structure focus have typically looked at how words are used to group people into for example 'us' or 'them' (van Dijk, 2008: 94). This study has a structural focus – not only surface structure but grammatical structure. This study aims to uncover structures that say something about how we as a society view climate change, and whether this differs due to political alignment.

One way in which discourse may help perpetuate an idea of a state of affairs, has to do with causality: "who is represented as causing what to happen, who is represented as doing what to whom" (Fairclough, 2001: 43). Causation can for example be hidden in a nominalisation; a process that is expressed as a noun, as if an entity (Fairclough, 2001: 43). Or, it can be hidden as I did before the semi-colon – through passivising. "The power being exercised here is the power to disguise power" (Fairclough, 2001: 43). While one text on its own carries little significance, media power is cumulative: repetition of causation and agency, ways of positioning the reader, etc., will have an effect over time (Fairclough, 2001: 45).

A pertinent question is to what extent people know that this is happening. From whom is this power hidden? It is not given that journalists or editors are aware of why they are passivising or nominalising, and what effect this can have. It is, in other words, impossible to say whether media power is manipulative in the way that it sets out to influence people (Fairclough, 2001: 45).

CDA has faced criticism for actively seeking out texts where there are suspected ideologies and power balances to highlight. However, as Hillier (2004: 38) points out, "events only become 'news' when selected for inclusion in news reports, and different newspapers will report differently in both content and presentation, showing disaffections and also affiliations in their treatments of particular topics." Arguably, every choice is founded in something,

whether or not an individual or organisation is aware of it. Furthermore, not taking a political side is also a political statement (van Dijk, 2008: 7), and explicitly uttering a socio-political stance removes the uncertainty of not knowing where the research is founded.

Furthermore, there are rarely such clear-cut divisions in society that there are one part dominating and one dominated, which is also reductive in that this representation of reality cannot reflect the complexity of power hierarchies and structures in society. There is a logical problem in calling all discourse hegemonic, but as I understand it, that is not what CDA does. Rather, CDA is chosen in cases where the text seems to call for it, or where it seems interesting to employ the theory.

Reading a text from a CDA perspective implies a subjectivity or bias, which I must acknowledge here. Expecting to find something could lead to findings or skewed interpretations in itself.

2.3.1 Journalism and CDA

In *Discourse and Power* (2008), van Dijk establishes a typology of four discourse categories, differentiating them by ways in which power is enacted through social interaction or discourse. One of the categories pertains to media discourse, arguing that not only does reportage describe events and potential consequence, it does so from the view-point of the political, economic, military or social elites. This creates a manufactured consensus, informing the public of the needs of power holders (van Dijk, 2008: 38).

A newspaper may be seen as an elite group, carrying say and credibility, and journalists and owners of media empires are symbolic elites with direct access and control over access to public discourse (van Dijk, 2008: 14). "[P]owerful elites or organizations may decide who may participate in some communicative event, when, where, and with what goals" (van Dijk, 2008: 10). For newspapers, there is no question whether or not they can control participation – they do. Active access to the production of news is controlled by producers and owners, and the access we as consumers have is passive, even though consumers may choose to resist the message through what is called 'dispreferred interpretations' (van Dijk, 2008: 10).

Importantly, though the power of the media is considerable, the audience is not passive in terms of interpretation and processing. Input is interpreted and added to what

people already know on an individual level, thus depending on existing attitudes and ideologies, shared and personal (van Dijk, 2008: 15).

Newspapers have, as mentioned, control over who has access to the discourse. They are also free to choose which sources to include, and the perspective they adopt. For example, government ministers appear much more frequently than the unemployed, and managers and union leaders appear much more frequently than the workers they lead or represent (Fairclough, 2001: 42). Transferring this to the environmental discourse, we mostly hear from representatives of governments, environmental organisations and scientific institutions – large bodies whose populace are part of what might be termed an elite. Through the sources they use and the stories they choose, the media decides who gets attention, what is said about them and how it is said. Van Dijk points out that, according to recent research, journalistic processes of choosing sources and focus are not arbitrary, nor simply based on what is deemed to be of public interest. Instead, "[n]ewsworthiness is based on ideological and professional criteria that grant preferential media access to elite persons, organization and nations, thereby recognizing and legitimating their power" (van Dijk, 2008: 55). In general, the selection of stories benefits the already powerful, and bases itself on readily available and known sources. Newsworthiness is a norm. While researchers disagree on whether journalists generally tend to side with the elite or oppose them, van Dijk and critical theorists assume that journalists typically operate within the general consensus, but with room for critique (van Dijk, 2008: 55-56). Routine coverage may help legitimise the power already afforded to officials and institutions (van Dijk, 2008: 55). "In the British media, the balance of sources and perspectives and ideology is overwhelmingly in favour of existing power-holders" (Fairclough, 2001: 43).

Morten Hajer, in his book, *The Politics of Environmental Discourse*, presents a discourse analysis building mainly on Foucault and Davies and Harré. Foucault held that the subject cannot utilize discursive structures to manipulate their surroundings, and that instead, actors in a discourse hold certain positions, and are products of context and normative practice (Hajer, 1995: 48, 50). Arguing against this, Hajer writes that environmental conflicts, and discourses on the topic, cannot be visualised by actors filling fixed roles: "On the contrary, environmental politics becomes an argumentative struggle in which actors not only try to make others see the problems according to their views but also seek to position other actors in a specific way" (Hajer, 1995: 53). In this way, the discourse depends on all actors, not just the subject, and how they frame and position themselves relating to each other.

Hajer argues against the view of language as a means, used as a passive set of tools, and instead aims to draw a direct line between linguistic structures and cognitive processes. He holds that discourse has a constitutive role in political processes, and that language influences "the perception of interests and preference" (Hajer, 1995: 59), for example through arbitrary phrases, repeated until accepted as "the way one talks" (Hajer, 1995: 57). The subjects involved in the discourse are active parts, not solely manipulated by, although still affected by, discursive limits (Hajer, 1995: 56).

2.4 Environmental journalism / climate discourse in the media

In 2002, investigating coverage in the *New York Times*, the *Washington Post*, the *Los Angeles Times* and the *Wall Street Journal*, Boykoff and Boykoff found that just over 50% of the environmental coverage was what they deemed 'balanced' – that warming as a result of human action and warming as natural variation got roughly the same amount of attention – and thus biased in that it wrongly represented the consensus. A good third of the coverage, 35%, gave an 'accurate' representation, in terms of alignment with the research consensus. A 2004 study into selected US television segments, spanning 9 years, showed almost 70% of segments were 'balanced', and 28% gave an accurate representation. Both studies thus showed a divergence from the consensus – "climate change significantly depicted instead as conflict and contention" – leading Boykoff and Boykoff to refer to the last decade of the 20th century as a 'lost decade'. Boykoff argues that when covering anthropogenic climate change, the concept of balanced reportage potentially becomes a bias. For one, coverage tends to focus on the daily implications rather than the big picture (Boykoff, 2011: 125-129). It is important to note that this "bias as balance" might yet be an unintentional bias.

In 2012, Ytterstad presented a PhD thesis at the University of Oslo where he, after analysing a cross-media selection of Norwegian climate debate discourses, concluded that Norwegian press were too balanced and objective in their reporting, giving climate change scepticism ample room, and not being sufficiently 'truth-seeking' or factual. He held that the facts too often drown in the politics of it all, and that the media, rather than presenting facts (for example how a third of all species on the planet will likely be extinct by 2050 if global warming persists) purveys banal truisms like 'climate change is the greatest challenge of our times' (Kildahl, 24.07.2012).

Climate scientists, and especially in the wake of 'Climategate', have tended to be wary of speaking to the press. Not only are there few material incentives for researchers to engage in public debate because academic reputation hinges mostly on producing and engaging with detailed, peer-reviewed content, the nuances of the subject matter is difficult to represent in its entirety as concisely and succinctly as the press demands. Thus, because researchers cannot properly represent the uncertainties and contingencies in their work, many choose not to engage with the press (Boykoff, 2011: 71).

In *The Politics of Environmental Discourse,* Morten Hajer, whose perspective on discourse analysis I introduced in chapter 2.3.1, utilizes discourse analysis to investigate how one representation/understanding of the climate change discussion comes to be favoured over others, and becomes the authoritative discourse (1995: 44). Hajer looked at British climate discourse of the 70s and 80s, and what he calls ecological modernisation, which he defines as "an efficiency-oriented approach to the environment" (Hajer, 1995: 101). His focus was primarily on the media discourse surrounding acid rain, but also on nuclear power.

As mentioned in chapter 2.3, when environmentalism and environmentalist discourse first started gaining an audience, it carried a strong element of criticism against institutions and government, and morality meeting economic calculation of risk (Hajer, 1995: 103). However, in the early 1980s, disillusioned after a combative public debate on nuclear power, the environmental movement changed tack, adopting terms for debate set by the government and a will to compromise. "Its aim was to be seen as the right kind of people, as realistic, responsible, and professional, avoiding being positioned as romanticist dreamers" (Hajer, 1995: 103). While on the one hand, this was arguably a coming-of-age of the movement, it also put restrictions on the discourse, and, to some extent, discredited the movement. In that lies a discursive paradox: as the topic gained importance and a wider audience, it became difficult for the original, radical activists to control how the issue was defined and to continue arguing their case (Hajer, 1995: 103). It was during the 80s the discourse started to achieve traction in terms of changing conceptualisations of climate issues, yet the debate has not been met with regulatory or policy measures to counteract warming (Hajer, 1995: 101).

An important point in Hajer's research is inter-discursivity, meaning that the understanding of complicated scientific issues (such as acid rain), requires the inclusion and understanding of arguments from other discourses, most notably scientific discourse (Hajer, 1995: 61). (I will return to this later on in the thesis, in connection with scientific discourse and its possible influence on the media discourse.)

Hajer points out that while we all bring our own knowledge, understanding and connotation into how we read 'acid rain', hardly anyone can fully understand all details of it. When it becomes relevant, problems of a complicated scientific nature are reproduced from a scientific discourse into a non-scientific discourse (Hajer, 1995: 61).

3 Material and method

Though performing a transitivity analysis, I am using a methodological and theoretical framework from SFG. My method of analysis is entirely manual, based on a close-reading of the selected texts.

Typical for the functional approach is that different aspects of language are viewed as tools performing separate functions in a context. In short, discourse analysis (and in this thesis CDA) looks at the role of language in enforcing power structures. In the terms used by Bernstein (as defined in Hasan, 2001): by looking at the visible components, it may be possible to say something about the invisible, hidden components. I have analysed the selected texts in search of patterns of language use, more specifically patterns of process types and associated participants. These may in some way convey ideology. Because I am looking for this, reading the texts and analysis results from a perspective of CDA, I am stepping into a biased role that has been the focus of most of the criticism directed towards CDA (addressed in section 2.3).

Since the reader has no other way of interacting with the text besides commenting (if it appears online), there is a clear power imbalance in the communicative situation, with the newspaper the dominant part. In this thesis, I do not define this dominant part as the individual journalists, but as the relevant institutions. Thus, I will not focus on individual journalists in this thesis, but rather the organisation and politics of the newspapers. The argument here is that what the journalists produce goes through editing and otherwise general vetting before anything is published. The power lies in the organisation and/or institutionalisation of thought, and the power that the institution affords the individual journalist. With a newspaper stamp of approval, what is published is given weight and legitimacy (van Dijk, 2008: 12; Fairclough, 2001: 42). Through news, biased personal views may be transmitted, but often these personal biases derive from a shared (within a group) ideology (van Dijk, 2008: 156), a group which in terms of this research may be the particular newspaper.

3.1 Material

Comprising the material for this study is newspaper reportage from two British newspapers: *The Times* and The *Guardian*. I accessed *the Times digital archive 1785-2008* through the

Gale search engine and a UiO university library subscription. I accessed *The Times* articles from 2014 through a private subscription to the digital newspaper, as did I the archives of *The Guardian*. The more recent content on *The Guardian* web page is freely accessible to everyone.

The Guardian and *The Times* are both large, daily papers, with long-standing political alignments and tendencies towards in-depth stories. Due to the size of this study, I considered it more likely that I could get a representative analysis through focusing on two similar media outlets, rather than comparing newspapers differing in style and format. There are, however, differences between the papers – for example in their organisational style, more specifically in terms of ownership. *The Guardian* is owned by an editorially independent trust (the Scott Trust) that also ensures that any surplus at the end of a fiscal year is not taken out as bonuses but rather saved to guarantee future economic stability (Guardian, 06.06.02). *The Times* is owned by News UK (formerly News International), which in turn is owned by News Corp, a publicly traded company chaired by Rupert Murdoch (newscorp.com, news.co.uk).

Boykoff (2007) shows how certain events (such as the G8 meeting in Scotland in the summer of 2005 and Al Gore's *An Inconvenient Truth*) cause spikes in media coverage, (and furthermore a steady incline in published news stories (in *the Independent*, *the Guardian*, *the Times* and all papers' Sunday editions) 2003-2006) (Boykoff, 2007). Because the first IPCC report marked a significant step towards formalising a way to deal with climate change on a global scale, I wanted to select material from that year. However, the IPCC reports are large and heavy with facts and information, and they were published/leaked over the span of a few months. Due to this, and to align my searches with an event that is likely to have caused a spike in media attention, I have based my searches around the climate conferences that coincide with the year of the release of the reports. The 1990 conference was held in November; in 2014, the conference was held in December.

Because the aim of this thesis is to uncover differences in reportage concerning climate change due to editorial stance, I excluded letters to the editor and advertisements, and looked at editorials, news, features etc. Furthermore, to get a text corpus where all the language used is relevant to the environmental question I am interested in, I have only included articles where the main topic is the environment. To illustrate: in November 1990, *The Times* published an article about a quarrel amongst the Nordic Countries about whose nation is home to Santa Claus. Global warming is used as part of a joke about why Greenland is losing the argument (Samstag, 1990) (- because the ice is melting). While this article is

undoubtedly interesting because of how the matter is treated, the rest of the article containing this quote could skew my results.

Because I want to say something general about tendencies in climate reportage, I wanted a random selection, and one that might be representative. I searched the archives and online papers using the terms 'global warming' and 'climate change': phrases that are not new in our vocabulary, nor very technical, but rather, as I interpret them, broad and encompassing.[3] The search filters of the web papers provided me with a list of articles, ranked by relevance.

In 2014, 'global warming' and 'climate change' yield, respectively, 46 and 73 hits in *The Times* online archives from December. Filtering hits by what *The Times* itself deems 'most relevant', I look into the three top results from both searches. Six articles give me 3966 words. Two of the six articles were published in *The Sunday Times.* The six 'most relevant' results for the same searches in *The Guardian* provided texts that came to 4333 words. The articles were relatively long, and getting any closer to even word count proved difficult. Because the study is a qualitative one, I did not adjust the selection by excluding parts of any of the articles to get an even number of words.

Following the same parameters, I chose the highest ranked results of *The Times Online Digital Archives* search, to yield seven articles that together make up 3483 words. In the *Guardian* archives I did the same, but due to a difference in the length of the articles, five articles add up to 3519 words.

The articles from 1990 are scans of the articles as they appeared in print. The 2014 articles are from the online editions of the newspaper. There may be differences in style and variations in genre between print and online that could account for any differences in my results, but I have not taken them into consideration aside from acknowledging it here.

Any errors found in the articles have not been corrected, and may appear in examples.

The most pressing limitation to the material is its small size. The scope of this thesis, however, does not permit a larger selection.

Furthermore, the ideological differences between the papers might not be that considerable. In the mid-60's, there were talks of a *Times/Guardian* merger, because of an unstable national market and because it was thought there was only room for one competitor to *the Telegraph* (Guardian, 06.06.02). However, the newspapers have both in 1990 and 2014

[3] These were also the search terms used by Boykoff in the 2007 study mentioned in chapter 2.3.

stated political differences (given in section 3.1), and the situation in the 60s is possibly not comparable to recent times.

3.2 Method

There is no *one* method or theory of discourse studies, the methods depend entirely upon the aims of the study. This thesis will hold a qualitative description of the discourse structure, building on the data from a (quantitative) transitivity analysis (van Dijk, 2008: 2-3). While my analysis framework gives quantifiable results, it is based on a relatively limited material. I found it useful to illustrate and organise my findings by presenting it in tables and figures. I have, however, chosen to represent my findings mainly in percentages, and not actual instances, partly because the text collections had unequal word counts.

I presented the framework for the transitivity analysis in chapter 2.2.1, but because a framework can never quite explain all the individual quirks of language, nor cater to all analytical needs, I will in this chapter detail personal choices and issues I encountered in my work.

Process types are not tied to specific lexical items, which means that on occasion the same lexemes are analysed as different processes, take examples (3.1) an (3.2):

(3.1) *[token]* Australia *[Pr: relational, identifying, intensive]* named *[value]* worst-performing industrial country on climate change. (G1-1)

(3.2) *[time]* Last month *[actor]* a UN environment programme report *[Pr: material, intentional]* named *[goal]* Australia alongside Canada, the US and Mexico *[role, guise]* as the only countries that were likely to miss their current 2020 targets to cut emissions. (G1-24)

The difference here, as I see it, is that whereas *named* in (3.1) indicates a state, and a semantically reversible relation, establishing that Australia is the worst-performing industrial country on climate change, (3.2) is more focused on the process of naming – the verb has an internal duration. It is also not a passive, so it is not (3.1) reversed.

Furthermore, context can dictate that some verbal groups that on their own would seem to belong to one process category, instead must be analysed as another. These distinctions are vague in many cases.

(3.3) *[sayer]* Many developing nations *[Pr: verbal]* objected to *[target]* this, saying it was unfair to ask (…) (T6-8)

Objected is here analysed as verbal because *saying* is used as a synonym in the next phrase, but an objection could also be non-verbal in, for example, demonstrations or other demonstrative actions. The distinction is perhaps clearer in examples (3.4) and (3.5). In (3.4) the sayer and verbal process *Mr. Patten added* follows a direct quote (quotes are not analysed). Addition could conceivably be a material process.

(3.4) "We now have to finish the building and the architectural work on the problems we still have to resolve," *[sayer]* Mr Patten *[Pr: verbal]* added. (G9-10)

(3.5) *[concession]* However, *[carrier]* The US and EU *[time]* still *[Pr: relational, attributive, possessive]* had *[attribute]* the detailed language about pledges | and *[Pr: material, intentional]* claimed *[goal]* it *[manner]* as a win. (G3-12)

It is unclear whether *claimed* in (3.5) is a verbal process, or if claim can be interpreted closer to the meaning of 'take', albeit metaphorical. I found the dominant meaning to be metaphorical material claiming, like an abstract possession or addition to a list of accomplishments, rather than a verbal act, thus I analysed it as material.

I have tried to keep context in mind as I have categorised processes like the ones outlined in this chapter, and I have tried to be consistent in my work. In some cases, however, the context did not contribute much to decipher the meaning of the verb. In borderline cases, which are bound to crop up when dealing with real, organic texts, I have made a choice in how to analyse them, based on what I have deemed to be the dominant meaning.

3.2.1 Down-ranking

In their functional grammar framework, Halliday and Matthiessen have devised a theoretical concept of rank, which assigns rank to clauses based on the following criteria: A ranking

clause is an independent clause, an adverbial or a non-restrictive relative clause, while down-ranked clauses are embedded clauses in the form of restrictive relative clauses (often post-modifying other clauses) or nominal clauses functioning as subject or object (Thompson, 2014: 24-25). Meaning placed in down-ranked clauses becomes difficult to challenge or negotiate because it is part of part-whole or part-part relations, where value is given according to dependency to other parts of the syntax (Halliday and Martin, 1993: 38-41).

Nominalisations also down-rank meaning in this way, as "the meaning comes to function (…) at a lower rank in the grammar – at the ranks of group/phrase and word, instead of at the rank of clause. (…) …you can argue with a clause but you can't argue with a nominal group" (Halliday and Martin, 1993: 39).

While I will to some extent discuss nominalisations, I will generally not analyse and discuss down-ranked clauses, mainly because they do not always provide clear (or finite) verbs or verbal groups. In my analysis, I adhere to the rank-scale briefly outlined above, and I have excluded clauses with no or (partially) elided verbal groups (like the headline to text T11 – "Sound of global warming"). Other than that, the clauses analysed are afforded the same 'status': for thesis I am supposing that what the reader takes away from a text is the sum of everything in it (this presumes that people read news start to finish: they do not[4], but for the purpose of this thesis I presume so).

When presenting the results, I do not differentiate between projected and projecting clauses; if the projected clause follows a verbal or mental process verb, I have analysed and included it. I also do not separate between external vs. internal sources. By this I mean that, as stretches of reported and indirect speech are consciously included in the text (omission is always an option), what is presented will always in some way represent the institution that presents it. Inclusion of a source depends on the newsworthiness of it, as judged by writers. Arguably, the job of journalists and editors is one of structuring/ordering second-hand knowledge into a package that communicates something in a way that is understandable to the reader. With language, they relay an event or fact that they did not orchestrate or call into being, and, arguably, all journalistic content is in this way mediated: originating in a source, but ultimately presented as a product of the writers.

However, although the inclusion of direct quotation is also editorial choice, in these cases the source of the grammatical patterns and structure used is not editorially determined.

[4] As implied by the inverted pyramid often used to illustrate how journalists structure their articles – conclusion first, then the most important supporting information, ending with background – anticipating their readers will stop reading before the end (Nielsen 1996).

Quotations will figure in my discussion but they will be presented separately from the rest. However, where the quotation is not presented in its entirety, but fitted into the sentence, the writers have taken liberties with the intended sentence structure, and I include it in the main part of my results. This is the case, for example in G11-10: "John Houghton, director of the Meteorological Office, who led a UN study of 400 scientists climatic change, told The Observer yesterday that if emissions continued to rise at present rates, the world *'may become hotter than it has ever been'*" (my emphasis) and in T11-5: "Chris Patten, the environment secretary, who was representing Britain at the meeting, said yesterday that it was going to *'make the conventional round of disarmament look straightforward by comparison'*" (my emphasis). Here the quotation starts in the midst of the process (was going to make), and thus there is editorial control over it, and it is included in the numbers for regular text rather than quotes.

A note on the presentation of my results

Because I sort my material into year and newspaper, I will present my analyses in four different parts. These four different parts are presented in categories of the process types. The limited size of my material thus leads to the numbers/percentages in, for example, the verbal processes of the Guardian 1990 material, being too small for the frequencies to be significant. I will nevertheless present the frequencies in order to make broad generalisations in the chapters comparing diachronically and ideologically, but I will refrain from making comments beyond that. This goes for all analysis chapters.

Due to the restrictions on time and word count of the thesis, I have had to prioritise when deciding which aspects of the transitivity system to focus on. The analysis itself provided a guide for this, in that the analysis showed a certain tendency, however, further narrowing was needed. For example, some process categories (existential and behavioural) appeared with little frequency, and therefore the results from the analysis of these clauses have not been included in the following chapters. Furthermore, I had to choose to present the results tied to the most common types of participants (actor, senser, etc), both because of limitations of scope and a wish to focus on the results most likely to be representative.

All the examples from my material are followed by a parenthesis including a letter and two numbers, which provides information pointing to from where it is taken: which newspaper, which article, and which clause, respectively. For instance, using example (3.5),

G3-12 means that the clause is from *the Guardian*, the article assigned the number 3, and clause number 12 from the top. To find the articles, or links to the articles, see the appendices.

4 The Guardian

The Guardian has set down four written priorities as a guide to how they report on the environment and climate change:

> **1)** Prioritise coverage of the dangers of climate change
> **2)** Encourage readers to reduce their environmental impact
> **3)** Agree on a policy to encourage more sustainable newsprint sourcing
> **4)** Improve environmental management at newspaper and magazine print sites
>
> (Guardian, 2006)

A 2006 audit into whether *the Guardian* reportage sticks to this, is positive, and Richard Evans, the auditor, writes that the newspaper "has been able to report significantly raised levels of public awareness", (Guardian, no date), as reported by the readers themselves through a 2006 Guardian readership survey (Guardian, 2006). Though I have found no independent verification, and though the audit is now nearly a decade old, at the least this indicates that the paper takes climate change seriously. A comment by then-editor Alan Rusbridger makes explicit the importance the newspaper places on informing the public so they can make educated choices and reduce their environmental footprint (Guardian, 2006).

This chapter will present the analysis of the material from *the Guardian*, studying both years separately and then providing a comparison.

4.1 November 1990

This chapter will lead with an overview of the processes found in *the Guardian* 1990 material, then deal with the process types in separate chapters.

4.1.1 Overview of process types found

As Figure 2 shows, the majority of the processes identified through my analysis are material, at 41 percent. The second most common, relational processes, make up 32 percent of the material. Fifteen percent of the clauses contain verbal processes, and ten percent of the processes were mental processes. Existential and behavioural processes each make up one

percent of the material, and because of this low frequency, reading something out of them becomes challenging. Therefore, I have not discussed these categories, and because the percentages for behavioural and existential processes are similar in the other parts of my material, they have not been dealt with at all anywhere in this thesis.

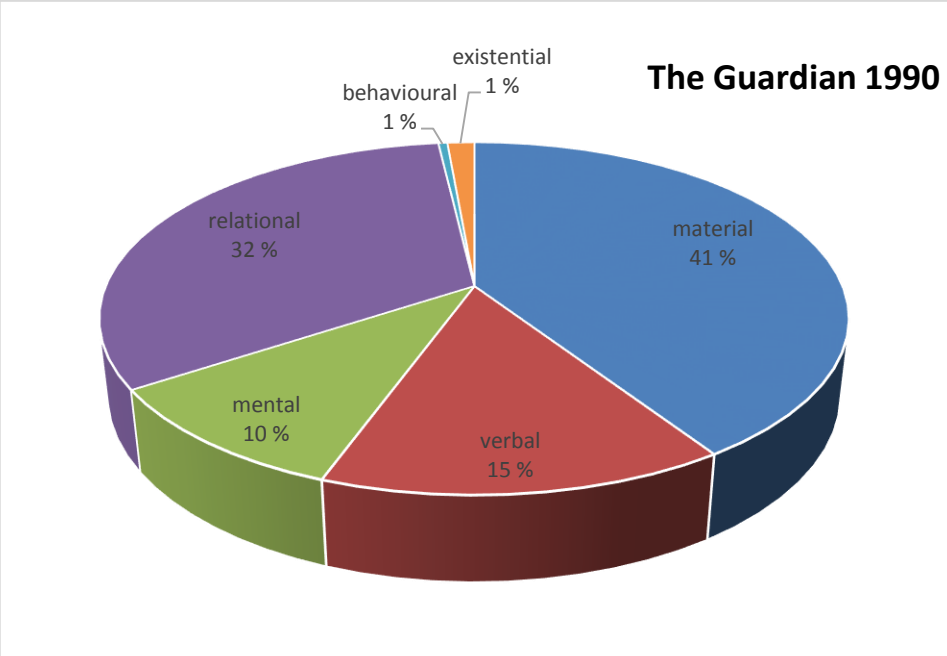

Figure 2: Processes found in the 1990 material from the Guardian, without quotations. N=216.

These percentages were calculated after the quotations were identified and separated from the material.

4.1.2 Material processes

In terms of material process and the scope of this thesis, a main point of interest lies with actors; who is given agency? Figure 3 gives an overview of the actors of the material processes, grouped into categories. Some of the actors merited a closer look, either because of the process they enacted, or because of their own nature.

I have attempted to strike a balance between establishing categories broad enough that it is possible to read trends out of them, without making them too broad to be nuanced. The category "other sentient actors" include (human) actors that were not specific enough for me to ascertain to whom exactly they were referring, and they did not fit into any of the other categories. When constructing the categories, I have kept in mind the division between types

of actors, for example through separating between 'scientists' and 'science', 'negotiators and officials', the 'conference' they participate in and 'the outcome of negotiations'. The largest categories, which I will further detail later in this chapter, all reflect the topic of the articles: the climate and the climate conference. Some have to do with the debate; others, the debaters.

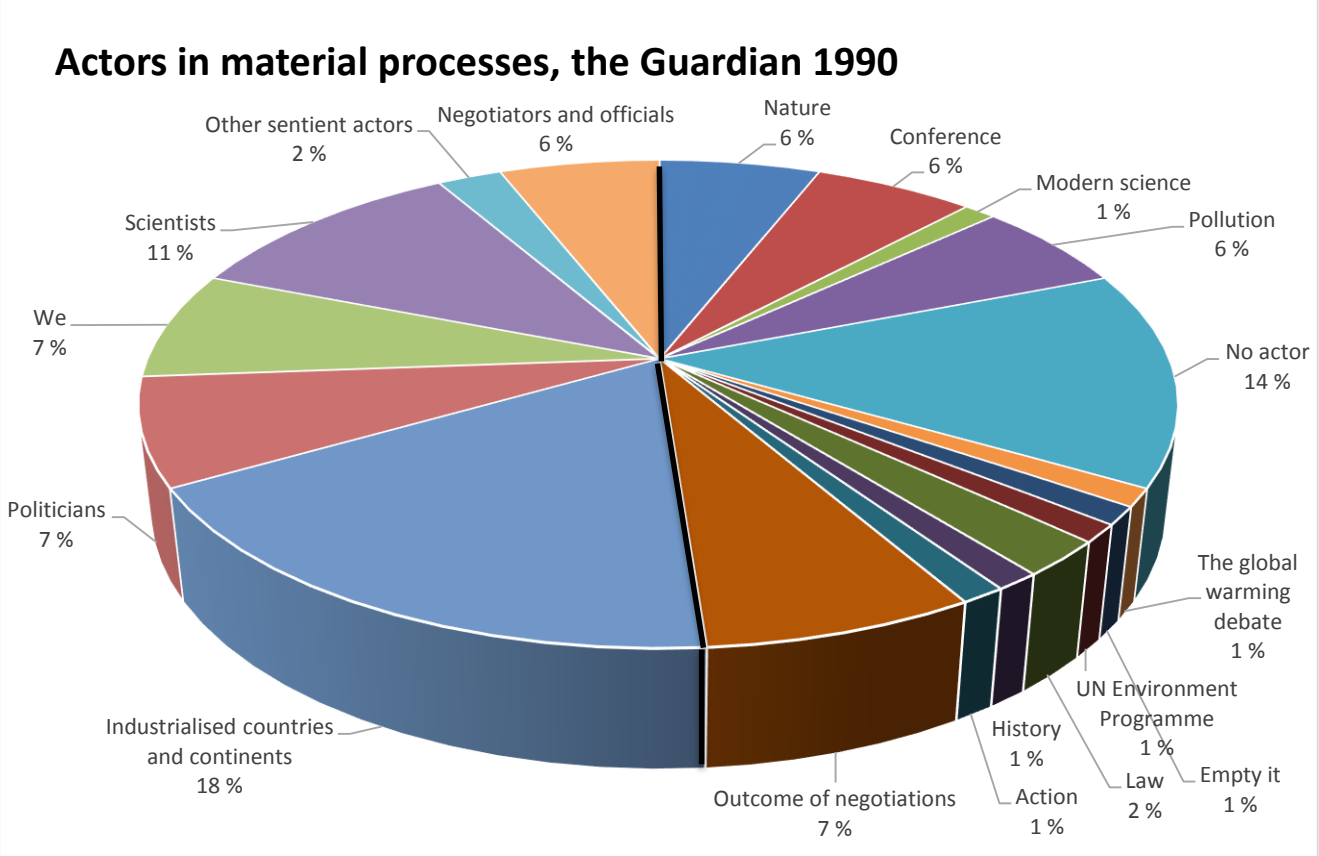

Figure 3: Actors in material processes, the Guardian 1990. N=88.

An interesting dimension to my discussion of actors is that not all the actors identified here could, in reality, perform or instigate an action. It is not a criteria for material processes that actors are capable of acting with volition, yet I think that highlighting this, because of the nature of the texts I have analysed, is essential in describing the focus of the discourse. I will return to this in chapter 6. The actors capable of action with intent make up 51% of the actors in this part of my material – Figure 3 shows this distinction with a black line dividing sentient from non-sentient actors – and non-sentient actors make up 49%. I have named the categories based on Merriam-Webster's definition of 'sentient': aware; able to feel, see, hear smell or taste; ability to respond to or be conscious of these sense impressions. I have grouped countries (and Europe) with the sentient actors, because the way these labels are used imply

actions performed by the people in government or other governing institutions, and thus *potential* for intent and underlying human volition.

As we can see from Figure 3, the group labelled 'industrialised countries and continents' forms the largest group of actors. These mostly include the US, references to Europe in what appears to be an institutionalised sense (the EU), and to the general idea of the industrialised/developed world, as in example (4.1).

(4.1) (…) *[actor]* many industrialised countries *[Pr: material, intentional]* could cut *[goal]* their emissions *[extent]* by at least 20 per cent over the next 15 years using technologies that are already available and cost-effective. (G11-7)

The implication here is that the labels denoting countries, regions and continents represent institutions of government, and thus this is where the real agency lies.

The second largest category is one where the processes did not have an explicit actor at all ('no actor'). The processes portrayed as being called into being by no one at all are, most notably, related to what has to be done in terms of organising the conference, and agreeing on the accord the conference aims to set out; 'an international conference is to be held in Brazil', 'additional procedural mechanisms are required', 'the IMF articles of agreement were negotiated', the modal 'a number of other principles and provisions should also be set out' and 'decisions must be taken now', as well as the attitudinally coloured 'the issue was fudged in the final document'.

Nature, too, can be affected by a hidden actor, as we see in example (4.2). The process here is also passivised and modalised, and the affected (goal) is subject (underlined):

(4.2) *[sayer]* They *[Pr: verbal]* warned that *[goal]* <u>many plant and animal species</u> *[Pr: material, intentional]* would be wiped out and *[goal]* large human populations *[Pr: material: intentional]* would be forced to migrate *[reason, cause]* because of drought, if *[goal]* action *[Pr: material: intentional]* was not taken. (G8-5)

The material clauses in example (4.2) are projected, and the sayer, *they*, makes anaphoric reference to 'Politicians from 100 countries, including Mrs Thatcher', but the utterer of the message does not carry agency for the material processes.

Passivising is one way of obfuscating agency and creating distance between agent and process, but passive clauses may still convey explicit agency. Of the material processes from *the Guardian* 1990 material, 10.9% were passives, and a third of these do not have an explicit actor. The participants affected by the passive material processes do not appear to be skewed to one particular category. As shown above, a very wide category of' aspects to do with deal-making can comprise half of them.

Nature is only a goal in a passive material process in the one instance shown in example (4.2); 'many plant and animal species', and it is paired with the negatively loaded verbal group 'would be wiped out'. Global warming, and, possibly, the circumstance of reason 'drought' is given in context, and a clause of condition ('if action was not taken') included, but there is no actor in this clause, and no actor to be inferred from the context. There is only the implication that global warming is the culprit.

Another large group of actors is 'we', appearing as actor in 7% of the material process clauses in *the Guardian* 1990 material. These instances all seem to be references to general 'we', as human beings or citizens of the earth.

(4.3) *[contingency]* Even if *[actor]* we *[Pr: material, intentional]* stopped *[goal]* emissions *[time]* tomorrow (…) (G7-18)

Interestingly, some actors are in fact quite similar to processes in themselves, i.e. they are nominalisations. This is an example of down-ranked processes; instead of being presented as interrelated clauses, one process is down-ranked to function as nominal group and participant. As Halliday and Martin argue, "[t]his has tremendous implications for the texture of the discourse unfolding in this way. For one thing, it is less negotiable, since you can argue with a clause but you can't argue with a nominal group" (Halliday and Martin, 1993: 39). The reasoning here is that because it is nominalised, the information is taken for granted, and becomes more difficult to challenge; often it is presented as given or shared information, sometimes forming a jumping-off-point for the rest of the clause. Example (4.4) is a clear example of an actor that is in reality a process, enacting another process:

(4.4) *[actor]* Taunting scientists into presenting facts they don't fully believe in *[Pr: material: intentional]* helps *[beneficiary]* nobody. (G7-43)

Who is doing the taunting in (4.4), and thus not helping anybody, is not clear.

The following examples also illustrate this; in (4.5), someone must have brought the rules into existence, and in (4.6), the experience must 'belong' to someone and the protocol must have been developed by someone. This agency is hidden deep in the participants, however.

(4.5) (…) *[beneficiary]* negotiators *[Pr: material: intentional]* will not be assisted *[actor]* by the existence of a well-developed body of rules of customary international law. (G10-12)

(4.6) *[actor]* The experience of the 1985 Vienna Ozone Convention and the subsequent Montreal protocol *[Pr: material: intentional]* makes it clear *[goal]* that to do this a framework climate convention must contain language providing for the effective transfer of "clean" technologies and for equitable and appropriate funding mechanisms to compensate these countries for the fiscal consequences of "signing on". (G10-27)

In the following two examples, natural processes are portrayed as actors, not giving attention to the fact that these natural processes are influenced by human activities. Also interesting is how in example (4.7) 'change' appears as verb, and as the head of the noun phrase serving as actor in example (4.8).

(4.7) (…) *[Process: -]* will *[actor]* atmospheric circulation patterns and the amount of cloud around *[-: material: involuntary]* change *[manner]* enough to absorb most of the shock, *[comparison]* rather like the crumple zones on a car? (G7-6)

(4.8) (…) *[actor]* changes in tropical circulation patterns *[Pr: material: intentional]* had prevented *[scope]* the world's average surface temperature from rising as much as it might have done. (G7-11)

As detailed in section 2.2.1, when discussing material clauses it is possible to distinguish between involuntary and intentional processes. In involuntary processes, volition is absent or blurred, and the actors of the clause often seem more like goals.

(4.9) *[actor]* formal negotiations *[Pr: material, involuntary]* will begin *[time]* in February 1991. (G10-6)

(4.10) *[actor]* the Geneva conference on global warming *[Pr: material, involuntary]* ends. (G7-1)

Involuntary processes denoting beginnings and endings are common constructions, and it is understood that the situations described have involved and will involve human actors. There are, however, differences also in the kinds of involuntary processes: compare (4.10) with example (4.11):

(4.11) *[actor]* The conference, *[condition, contingency]* however, *[Pr: material, involuntary]* failed *[scope]* to set targets for stabilising or cutting carbon dioxide emissions. (G9-13)

In (4.11), we see a clear blurring of responsibility. It is still understood that the conference consists of representatives in discussion, and that they failed to come together on an agreement of targets, but by summarising what in itself is a process with different actors as one inanimate actor, the human responsibility for the failure becomes side-lined.

In examples (4.12) and (4.13), the environment and/or pollution are actors in involuntary material processes.

(4.12) (…) *[actor]* the atmosphere *[Pr: material, involuntary]* has finally stabilised… (G7-17)

(4.13) (…) if *[actor]* levels of carbon dioxide in the atmosphere *[Pr: material, involuntary]* were not to rise *[manner/extent]* by more than 50 per cent above natural levels. (G11-8)

Example (4.7), too, is an example of nature as actor in an involuntary material process. Common for these clauses, is that the actors seem to be results of processes enacted by humans or industry which in turn is created by humans. There are several layers of nominalisation between agency and actor. In section 2.2.1, I noted how the ergativity

perspective might shed more light on these examples where we see a change of state, but where agency is not with the actor. Nature, here, by the terminology of the ergativity framework, is the medium which hosts the process, and agency lies elsewhere.

4.1.3 Relational processes

Just under a third (32%) of all processes in the selected articles from *the Guardian* from November 1990 – seventy clauses – are relational. Of these, forty-three are attributive and twenty-seven are identifying. I will present my findings from these two sub-types of processes separately.

Identifying relational processes

The participants appearing as token and value in *the Guardian* 1990 material did not lend themselves to categorization as well as the actors (or, as we will see in 4.1.4, the sayers), but some types reoccurred, and I will discuss these here.

	Intensive Identifying	Circumstantial identifying	Possessive identifying
Percentages	78%	15%	7%
Raw freq.	21	4	2

Table 1: Distribution of types of identifying processes: all identifying relational processes in the 1990 Guardian material make up 100%.

As we can see from Table 1, the majority of the identifying relational processes are intensive. The difference between the three lies in what type of identifying relationship they set up. Example (4.14) shows a typical intensive identifying relational process, with a more specific token and broader value.

(4.14) *[value]* The answer *[Pr: relational, identifying, intensive]* is *[token]* that no one really knows. (G7-7)

I show the two less common types in examples (4.15) and (4.16), in what appears to be their typical form in my material. In this part of my material, possessives indicate identification based on possession in a broader sense, and circumstantials often indicate causation of the kind seen in (4.16).

(4.15) *[token]* These *[Pr: relational, identifying, possessive]* include *[value]* appropriate international legal mechanisms for environmental impact assessment, for public access to relevant information, and for review of activities.

(4.16) (…) and *[value]* forecasting into the next century *[Pr: relational, identifying, circumstantial]* requires *[token]* stretching current knowledge, arguments and models to their limits. (G7-29)

In terms of general tendencies, many of the participants, both tokens and values, are either down-ranked clauses, nominalisations (see example (4.17)) or noun phrases. Three of the tokens are infinitive phrases.

(4.17) So *[token]* the negotiation of a framework convention on climate change *[Pr: relational, identifying, intensive]* can only be *[value]* the first step in a continuing process of remedying these very significant deficiencies. (G10-18)

One pattern I notice is a trend of concise values that in a way summarise the token: 'the plan', 'the answer', 'the essential point', 'the object' (as in goal), 'the aim' and '"the final outcome"'. Not all are neutral, meaning that it possible to see authorial values shining through. These are what Francis (1994) calls *labels* – common in press texts, according to Francis – lexical cohesive devices that classify and nominalise meaning that is lexicalised elsewhere in the co-text. In example (4.18), the value 'the essential point' is given a token (which is a process in itself), presented as fact, which is thus given status as central and important.

(4.18) *[value]* The essential point *[Pr: relational, identifying, intensive]* is *[token]* that changes in greenhouse gas concentrations over the coming 50 years are going to administer a shock to the atmospheric energy budget. (G7-12)

In example (4.19), *this* has anaphoric reference to the attitudes of the general public and governing bodies, an attitude described as a willingness to not act, and instead test whether nature can withstand the changes we are enforcing on it. The value given to *this* is the rather

generous *plan* (when the lack of a plan indeed is the problem, and it seems the article writers agree).

(4.19) *[token]* This *[Pr: relational, identifying, intensive]* seems to be *[value]* the plan.

'This' as a token recurs four times, 'these' once, and non-restrictive 'which' once (see ex. (4.23)). They are all anaphoric, referring to a previous clause.

Warming, climate change and weather, too, appear repeatedly as tokens (in five instances), notably given values that indicate the gravity of the situation, as shown in examples (4.20) and (4.21):

(4.20) But *[token]* a warming of 3C per century *[Pr: relational, identifying, intensive]* may be *[value]* the greatest shock the climate system has experienced.

(4.21) *[token]* Climate change *[Pr: relational, identifying, intensive]* is *[value]* a significant threat. (G7-30)

In four instances, weather, pollution and climate change figure as the value participant.

Legal and structural provisions are tokens in as many as seven analysed clauses (as seen in example (4.22)), and figure as value in four analysed clauses.

(4.22) *[token]* the legal obligations of states *[Pr: relational, identifying, circumstantial]* are based principally upon *[value]* rules of customary international law which are unclear, ill-defined, and ill-suited to deal with the scientifically documented degradation of the environment. (G10-14)

Example (4.22) gives another example of a circumstantial identifying process, of which there are four. Three of them set up a relationship of time and location, but the example shows a case that is perhaps more specific to scientific language; in the terminology of Halliday and Martin (1993: 65), this kind of relation established is external, and carries aspects of causation.

In (4.23), we see another phrasing typical of scientific writing; here *which* is anaphoric reference to the accord signed at the end of the 1990 conference. This is also circumstantial,

though the causation is less clear than in (4.16); here 'would mean' is taken to imply 'would lead to'.

(4.23) (…) *[token]* which *[Pr: relational, identifying, circumstantial]* would mean *[value]* advanced countries cutting carbon dioxide emissions and providing financial and technical aid to developing countries to do the same. (G9-3)

Another scientific style example is seen in example (4.24). Here, *will translate directly into* is analysed as relational, because the meaning is similar to *mean*.

(4.24) (…) *[Pr: relational, identifying, intensive]* will *[value]* rising levels of CO2 *[Pr: relational, identifying, intensive]* translate directly into *[token]* an increase in temperatures at the earth's surface… (G7-6)

Attributive relational processes

As with the participants in the identifying processes, the participants in the attributive processes are not so easily categorised, and as was the case with tokens and values, carriers are typically also longer phrases as we see in example (4.25), most often down-ranked clauses or noun phrases.

(4.25) *[contingency, concession]* Despite the general political welcome *[carrier]* the hundreds of environmental groups lobbying the meeting *[Pr: relational, attributive, intensive]* were not *[attribute]* happy. (G9-14)

The underlined carriers of examples (4.26) and (4.27) both presuppose that the reader agrees with these presented 'facts' that serve as spring boards for the rest of the clauses or sentences.

(4.26) *[carrier]* The whole spectacle *[Pr: relational, attributive, intensive]* is *[attribute]* unedifying (G7-26)

(4.27) *[contingency, condition]* Despite the consensus of the scientific community reflected in the final Intergovernmental Panel on Climate Change (IPCC) report last August,

[carrier] the reality of global warming *[Pr: relational, attributive, intensive]* is *[attribute]* both distant in time and uncertain in its consequences. (G10-8)

In terms of the subtypes of attributive relative clauses in *the Guardian* 1990 material, the dispersion is as presented in Table 2.

	Attributive Intensive	Attributive circumstantial	Attributive possessive
percentages	79%	14%	7%
raw freq.	34	3	6

Table 2: Distribution of types of attributive processes: all attributive relational processes in the 1990 Guardian material make up 100%.

'We' appear as carriers four times (9%); two of which are possessive, the other two intensive. The possessives are instances where the possession is metaphorical; having a role, having trouble. In example (4.28) the possession is also, in a way, an achievement, which could have been within the scope of material processes – however, the focus here lies on the end state: having a result.

(4.28) *[condition, contingency]* Given that, on present form, *[carrier]* we *[Pr: relational, attributive, possessive]* are not going to have *[attribute]* a cut-and-dried result on global warming (…) (G7-37)

The circumstantial processes are of time, as in example (4.29), or metaphorical location. Example (4.29) is also an example of a recurring carrier in *the Guardian* 1990 material: 'it'. Appearing as carrier in 18% of the clauses, the most common type the empty *it*, with empty reference, as the one in example (4.29).

(4.29) (…) *[time]* before *[carrier]* it *[manner]* really *[Pr: relational, attributive, circumstantial]* is *[attribute]* too late to do much about it (…) (G7-37)

The ones that are not empty, are anticipatory, referring to an element placed at the end of the clause (likely to comply with the principle of end weight), like in example (4.30). The extraposed subject in (4.30) is a that-clause.

(4.30) *[attributor]* Science *[Pr: relational, attributive, intensive]* makes *[carrier -]* it *[attribute]* clear *[- carrier]* that nothing less than dramatic reductions in emissions of greenhouse gases will stop the inexorable warming. (G11-13)

Another rather large group of carriers are ones tied to legislation and regulation, like 'the traditional system of international law (…)', 'the procedures (…)', 'the institutional basis (…)' and 'the framework convention'. Nature, global warming and pollution also frequently appear as carriers, as we saw one example of in (4.27), and as we see in (4.31) and (4.32):

(4.31) *[contingency, condition]* But for practical purposes, *[carrier]* the world's average surface temperatures *[Pr: relational, attribute, intensive]* is *[attribute]* irrelevant: (…) (G7-20)

(4.32) *[carrier]* The two biggest polluters, the United States and the Soviet Union, (…) *[Pr: relational, attributive, intensive]* are not *[attribute]* ready even to do this. (G11-6)

To attempt to say something about any kind of evaluation afforded to these carriers, either as attribute or elsewhere in the sentence, I have tried to categorise every clause as either positive, negative or neutral/non-evaluatory. Just under half of the clauses in this part of the material are negatively evaluated. The negative evaluations mainly criticise the state of the debate and the situation (as in example (4.33)), or the regulatory system and procedures for increasing focus and action on climate change. In (4.32), we also saw negative evaluation given to specific international figures and their (un)willingness to act upon climate change.

(4.33) *[carrier]* the "it's too late so why bother?" argument *[Pr: relational, attributive, intensive]* is *[attribute]* just plain wrong. (G7-22)

The remaining half of the carriers are evenly split between being positively attributed (see example (4.34)), or neutrally evaluated. In example (4.34) *this issue* refers to the issue of global warming.

(4.34) (…) *[carrier]* the issue *[Pr: relational, attributive, intensive]* is *[attribute]* too important to get sidetracked by mud-slinging or calls for facts that no one can provide. (G7-1)

4.1.4 Verbal processes

The verbal processes in this part of my material are not frequent enough that they can be said to carry significance, but I have included some percentages for later, rough, comparison. The majority of the verbal processes project.

What is perhaps most interesting about the verbal processes is ascertaining who is making an utterance. Who is 'allowed' to speak, permission given by being allotted space in the articles, can give us an indication of the underlying intentions or attitudes of the institution providing the platform.

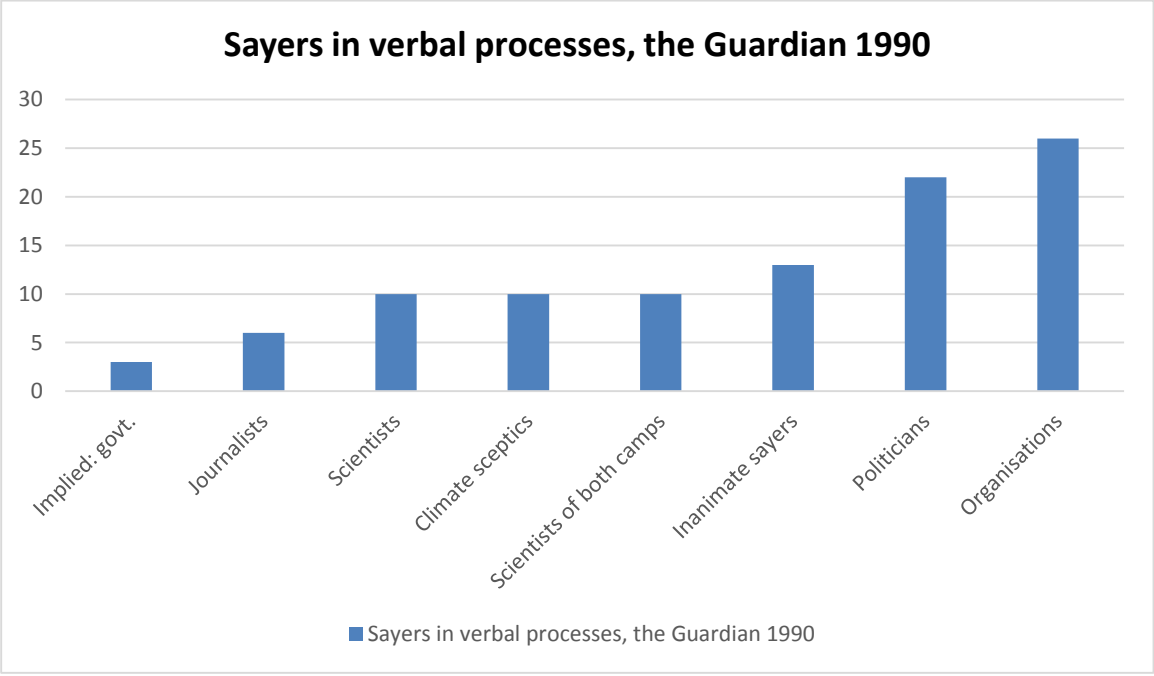

Figure 4: Groups of Sayers in verbal processes, the Guardian 1990. In percentages. N=32.

In Figure 4, I have grouped sayers not through the actual labels given to them, but who they denote, like I also did with actors in the material processes. Of the sayers, six instances are the pronouns 'they' and 'he', in anaphoric reference to already introduced sayers. In example (4.35), both clauses are verbal, the first clause projects the second, and in both clauses the sayer is grouped as scientists.

(4.35) (…) *[sayer]* climate scientists *[Pr: verbal]* may have to admit | that *[sayer]* they *[Pr: verbal]* cannot tell *[recipient]* the world *[verbiage]* what to do (…) (G7-37)

As Figure 4 shows, climate sceptics (here taken to mean climate sceptical *scientists*), scientists (meaning scientists that do not deny climate change; I use the term as it is used in the articles), and the groups in combinations are allowed a say to an equal degree. This alone would suggest that the balanced reportage norm holds true to this section of material. However, the category I have called 'organisations (rep)', consists of sayers that are representatives from Greenpeace (a scientific advisor), the European Commission (the environmental commissioner), the British Meteorological office (their chief, a scientist), the UN environment programme (their director), the Association for the Conservation of Energy and the US delegation to the 1990 COP; all experts in their fields, all advocating the actuality and factuality of climate change, yet not referred to as scientists.

Only one of the verbal processes is passive:

(4.36) *[target]* They, in turn, *[Pr: verbal]* are accused *[matter]* of soliciting cheap publicity. (G7-25)

Here *they* refers to climate sceptics, and their accusers (i.e. the sayers) are not revealed by context or surrounding clauses.

Three (12%) of the sayers are inanimate, indicating that they are not innately capable of making an utterance. In these cases, the sayers were 'studies', 'history' and 'articles and TV-documentaries'. Of these, 'articles and TV-documentaries' and 'studies' are in reality the *forums* in which something is uttered, rather than the utterers themselves, although they are presented as sayers. In the case of 'history', someone has to interpret the history and communicate it – in example (4.37), history is supposedly telling us that where there is public and political will, international law permits the speedy establishment of treaties and new institutions – history in itself cannot do this, human thought process is required:

(4.37) (…) *[sayer]* history *[Pr: verbal]* tells *[recipient]* us (…) (G10-36)

Several politicians are also referenced, represented in the table as a separate category. One is a general reference, 'they', referring to politicians from 100 countries, three refer to President Bush; once by name, once by pronoun ('who'), and once by no sayer but a clear indication to him being the sayer. Three instances is to the then British environment secretary, twice by name and once by pronoun ('he').

4.1.5 Mental processes

The mental processes were not frequent enough for detailed quantification to make much sense. However, I will highlight a few interesting examples, and provide some numbers for later, rough, comparison. First, Table 3 shows the distribution of the types of mental processes, shown in percentages and, in parentheses, raw frequencies.

Cognitive	Perceptive	Emotive	Desiderative
63.5% (14)	13.5% (3)	4.5% (1)	18% (4)

Table 3: Types of mental processes found in the 1990 the Guardian material. Raw frequencies in parenthesis.

Of the 22 mental processes in this part of the material, three (13,5%) are passive; two of these do not specify a senser. Five (23%) of the sensers are nations or governing bodies (as in example 4.37), three (13.5%) are scientists.

(4.37) *[senser]* Nations such as India and China *[Pr: mental, perceptive]* will be listening *[phenomenon]* for promises of aid (…) (G8-21)

Four sensers (20%) are either rules or guidelines to the conference, as in example (4.38), or the conference itself. These are the only inanimate sensers in this part of the material, if nations and governments are disregarded.

(4.38) *[senser]* The existing international legal rules and the system for the protection of the global atmosphere *[Pr: mental, emotive]* suffer from *[phenomenon]* the effects of greenhouse gases suffer from at least four major weaknesses.

In one instance, the world is a senser, but it seems to refer to the people of the world, and not the earth itself, although it uses the pronoun 'it':

(4.39) *[senser]* The world *[Pr: mental, cognitive]* should understand *[phenomenon]* the risks it is taking in continuing to rely on fossil fuels. (G7-44)

Including the instances where there is no senser, almost a third of all sensers are not innately capable of sensing, like the senser shown in (4.38).

4.2 December 2014

I will compare 1990 to 2014 in chapter 4.3; in this chapter I will present my findings from *the Guardian* 2014-material, along the same parameters as for my 1990 findings.

4.2.1 Overview of process types found

As Figure 5 shows, at 39%, material processes form the largest category of processes in the 2014 material from *the Guardian*. Relational processes make up the second largest category with 28%. Verbal and mental processes make up, respectively, 21% and 10% of the material. As with the 1990 material, percentages were calculated after the quotations were identified and separated from the main material.

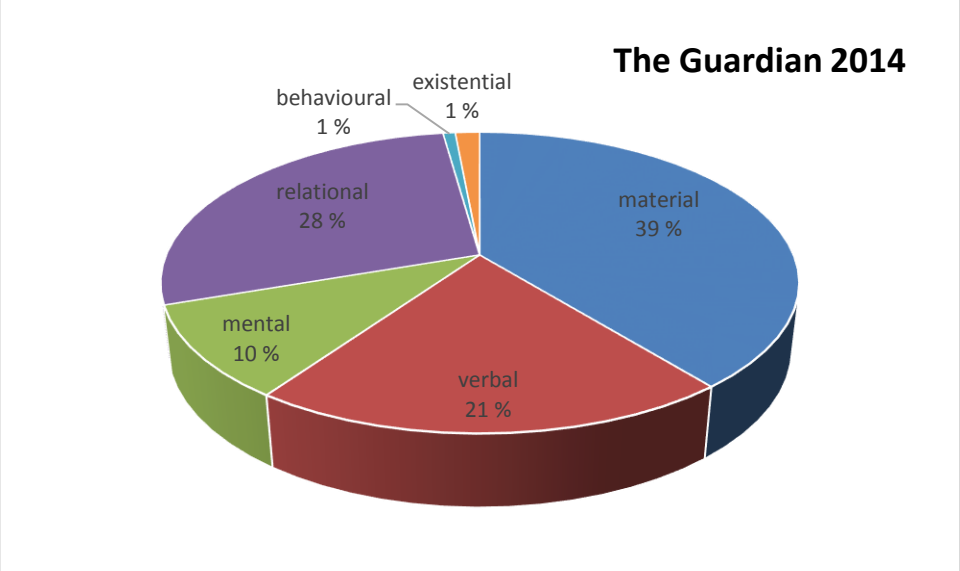

Figure 5: Processes found in the 2014 material from the Guardian, without quotations. N=271.

4.2.2 Material processes

As in section 4.1.2, I have put together a chart detailing groups of actors in the material from 2014.

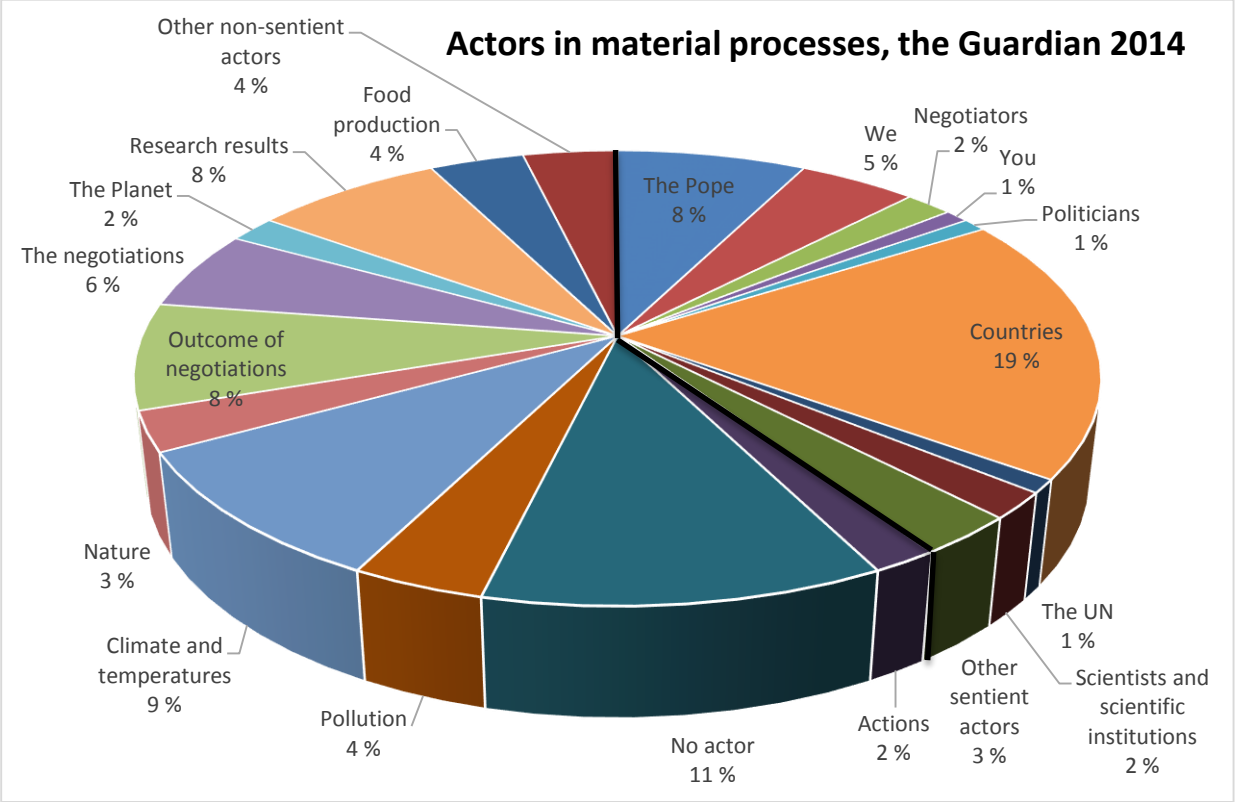

Figure 6: Actors in material processes, the Guardian 2014

The largest group of actors fit into the category called 'countries', which includes in large part references to 'all countries', but western countries where they are specified. The second largest category is one where the processes did not have an explicit actor ('no actor').

The participant types reflect the fact that the material is taken from the media discourse surrounding the 2014 climate conference: 'the negotiations', 'outcome of negotiations', 'negotiators', 'politicians', 'the UN', and that climate research is a part of the reason for and provides the backdrop to the negotiations: 'research results', 'scientists and scientific institutions' (which example (4.40) illustrates).

(4.40) (…) *[actor]* the researchers *[Pr: material, intentional]* tested *[goal]* 30 computer models *[reason, purpose]* to establish the most likely scenario. (G5-7)

One of the largest categories, however, breaks this pattern: 'the Pope' (8%). One of the articles concerns the Pope's actions and views on climate change, and it is a long article, thus we see this large category that is not necessarily as representative for this type of discourse as the other categories are likely to be.

The categories 'nature', 'climate and temperatures', 'the planet', 'food production' and, arguably, 'pollution', are linked in that they are all tied to nature or processes affecting nature, yet grouping them as a single category would hide the nuances. What they share, however, is that they are aspects of nature in a participant role indicating that they perform an action, and together they make up a significant percentage of the actors: 22%. These nature-actors are not capable of volition. As marked by the black line through Figure 6, less than half of the actors (42%) are, or have the potential to be, sentient. While, as I have mentioned, it is not a prerequisite that actors in material processes act with volition, this number gives dimension to the fact that these texts seem to have a focus that does not reflect the cause and effect of climate change: that we as human beings, acting with volition (though not always through informed choices), have sped up climate change.

(4.41) *[actor]* Global warming *[Pr: material, intentional]* will cut *[goal]* wheat yields. (G5-1)

Example (4.41) is a good example of warming conveyed as a direct actor influencing nature. The actor in example (4.42) contains a down-ranked clause where a temperature phenomenon presented as fact is actor.

(4.42) *[actor]* The fact that a non-El Niño year (so far) may break the all-time temperature record *[Pr: material, intentional]* should give pause *[beneficiary, representatives]* to all the contrarians who tried to tell you global warming has halted. (G2-45)

Another category that is interesting is 'we', because of the possibility of it saying something about shared responsibility or that "we are in this together." These are mostly general references, concerned with measuring global warming, how much heat 'we' are 'gaining', or 'reaching' as in example (4.43). Two instances carry a more narrow reference; in these 'we' are the group of scientists who have produced a paper and written the news reportage based on this.

(4.43) *[contingency, condition]* Even with the short-term ups and downs of the Earth's climate *[actor]* we *[Pr: material, intentional]* are reaching *[scope]* new heights *[matter]* in terms of surface temperatures. (G2-44)

Another personal pronoun also figures as a participant with generic reference: 'you'. The context here is research procedure.

(4.44) (…) or *[actor]* you *[Pr: material, intentional]* gather *[goal]* heat flow information *[]* from satellites, (…) (G2-42)

Just over 10% of the material process clauses have a passive verbal group, and of these just over a third have explicit actors. In example (4.45), 'much' does not really tell us anything, and the verb 'was made' is also not very descriptive.

(4.45) *[goal]* Much *[Pr: material, intentional]* was made *[reason, cause]* of recent reports (…) (G2-45)

Another interesting passive occurs in a question, seen in (4.46); interesting because the question is actually inquiring into the reason for the deep-sea storage.

(4.46) So, why *[Pr -]* is *[goal]* more heat *[- material, intentional]* being stored *[location]* in the deep oceans? (G2-21)

A number of the participants are nominalised processes, implying human participation as in (4.47) or made explicit as in (4.48).

(4.47) (...) *[contingency, condition]* that if *[actor]* greenhouse gas emissions *[Pr: material, involuntary]* continue to grow *[manner]* at current rates (…) (G5-6)

(4.48) *[actor]* Human emissions of greenhouse gases *[Pr: -]* cause *[goal]* the earth *[- material, intentional]* to warm. (G2-3)

Just under 7% of the participants include restrictive relative clauses (which are embedded clauses functioning as modifiers), making the process-like nature of them even more pronounced: 'the deal that emerged early on Sunday', 'heat which was being buried in the Pacific waters' (ex. (4.49)), 'The fact that a non-el Niño year (so far) may break the all-time temperature record'.

(4.49) *[actor]* Heat which was being buried in the Pacific waters *[Pr: material, involuntary]* end up *[location]* elsewhere. (G2-26)

I analysed example (4.49) as material, because the focus does not seem to be on the end state, but on the process of movement, but another alternative could have been to analyse it as a circumstantial attributive relational process. (4.49) is further an example of a noun phrase with a restrictive relative clause appearing as part of an actor. The restrictive relative clause is down-ranked, but as we see, it has a passive past progressive verb (with no actor were we to analyse the clause using transitivity analysis).

Example (4.50) is interesting because neither the rest of the sentence nor its context says anything about who considers there to be much work remaining, or what *much* is. If this is authorial voice shining through, this sheds light on the newspaper's attitude towards the process of developing a deal on climate change.

(4.50) But *[goal]* much *[time*] now *[Pr: material]* remains to be done *[condition]* if *[value]* the broad outlines agreed at Lima *[Pr: relational, identifying, intensive]* are to materialise *[token]* in a full-fledged climate deal. (G4-30)

Furthermore, the notion that *much remains to be done* is not sourced, in that we are not given any impression of whose understanding this is.

Of the material processes, 19% are involuntary. Interestingly, in these involuntary processes, the actor is most commonly the planet or global warming/pollution; the former should be expected to be a goal in this case, and global warming and pollution should rather be results. Twice the planet itself is presented as actor in the material process of heating, as we see in examples (4.51) and (4.52):

(4.51) *[manner]* How fast *[Pr: -]* is *[actor]* the planet *[- material, involuntary]* heating? (G2-4)

(4.52) *[contingency]* In order to measure *[manner]* how fast *[actor]* the planet *[Pr: material, involuntary]* is heating (…) (G2-6)

In four instances, food production is an actor in an involuntary material process, as in example (4.53).

(4.53) *[actor]* Global wheat yields *[Pr: material, involuntary]* are likely to fall *[manner]* significantly (…) (G5.3)

As we also see in (4.53) with the adverbial adjunct of manner 'significantly', the verbal group or adjoining adverbs in these involuntary processes is often accompanied by something value-laden. In example (4.54) we see the verb 'continues' which appears more than once as an involuntary process in the material. Examples of the adverbs appearing with the verbal groups are 'likely' (see example (4.55)), 'rapidly', 'nearly certain', 'at current rates', and 'increase'.

(4.54) *[actor]* Global warming *[Pr: material, involuntary]* continues *[concession]* despite continuous denial. (G2-1)

(4.55) *[actor]* Global temperatures *[Pr: material, involuntary]* would still likely rise *[manner, degree]* more than 2C (…) (G1-10)

In examples (4.54) and (4.55), the actors are actually results of other processes, processes enacted by humans or human industry. According to the ergativity perspective, these nature actors do not carry agency, but are the mediums that host the processes. Agency lies elsewhere.

4.2.3 Relational processes

28% of all processes in the selected articles from *the Guardian* from December 2014 seventy-six clauses – are relational. Of these, twenty-nine are identifying, and forty-seven are attributive. The two different subtypes will here be presented separately.

Identifying relational processes

As we can see from Table 4, the majority of the identifying processes in the 2014 Guardian material are intensive.

	Identifying Intensive	Identifying circumstantial	Identifying possessive
Percentages	83%	7%	10%
Raw freq.	24	2	3

Table 4: Distribution of types of identifying processes: all identifying relational processes in the 2014 Guardian material make up 100%

A typical intensive process, where a less specific value describes a more detailed token is:

(4.56) *[value]* The leading idea *[Pr: relational, identifying, intensive]* is *[token]* that changes to Pacific winds have created a temporary condition which resembles a La Niña event. (G2-22)

The possessives are all metaphorical, regarding inclusion as in example (4.57). Example (4.57) can also serve as an example of the value/token identification and why presenting these participants in a systematic way is complicated. In possessive identifying processes, the value-token labelling is difficult, but in part-whole relations like these, Thompson (2014: 127) seems to favour classifying the whole as the token, even though the token here is the least specific participant.

(4.57) (…) *[token]* Catholic climate sceptics also *[Pr: relational, identifying, possessive]* include *[value]* John Boehner, republican leader of the House of Representatives and Rick Santorum, the former republican presidential candidate. (G6-26)

Another interesting part-whole possessive that carries traits of cognition or perception as well, is example (4.58), which also is a frequent type of phrase in scientific writing:

(4.58) *[token]* This paper *[Pr: relational, identifying, possessive]* focuses on *[value]* the current energy imbalance, the recent trends in atmospheric temperatures, and the issue of the so-called "pause" of global warming. (G2-15)

The circumstantial processes are concerned with time and, as in example (4.60), place:

(4.59) *[value]* That language *[Pr: relational, identifying, circumstantial]* remains *[token]* in the text *[accompaniment]* although with a rider "in light of different national circumstances". (G4.38)

In terms of patterns in what appears as the different participants, most of the values are noun phrases. Of these, a large portion contains processes in down-ranked clauses as in example (4.60), or consists of nominalised processes like 'a measure' in example (4.61).

(4.60) *[token]* The five page text agreed on Sunday *[Pr: relational, identifying, intensive]* represents *[value]* the embryonic phase of the deal due to be delivered in Paris. (G4-15)

(4.61) *[token]* the SOI *[Pr: relational, identifying, intensive]* is *[value]* a measure of the difference in pressure anomalies *[location]* between Tahiti and Darwin, Australia. (G2-33)

Some values are also evaluative, like 'the so-called pause', 'the important thing', 'the leading idea' (ex. (4.56)), 'a model country' and the opposing 'the worst-performing industrial country'. Who is making these characterisations can be unclear, as in example (4.62), where the source of the evaluation is not given:

(4.62) *[value]* The issue that mattered above all to developing countries *[Pr: relational, identifying, intensive]* was *[token]* deciding who should carry the burden of emissions cuts, and getting the money flowing for climate aid (G3-4)

Both token and value in example (4.62) contain down-ranked clauses, and the token also includes nominalisations ('deciding', 'getting the money flowing', 'cuts').

A few of the values appear to act as conversation points or summaries, like 'another thing to watch', and 'the point I am trying to make'. A number of the tokens are concerned with weather and the measurements of weather: 'The IPO or the PDO', 'the southern oscillation index (SOI), 'the SOI'. 'El Niño/La Niña cycles', 'that changes to the pacific winds have created a temporary condition which resembles a La Niña event', and the long down-ranked clause 'These wind patterns in the pacific and surface water temperatures in the same region help dictate short-term and multi-year temperature fluctuations worldwide'.

Also, the climate talks and products thereof frequently participate as tokens: 'in the text', 'the draft text', 'in a full-fledged climate deal', 'the five-page text agreed on Sunday', 'a break with one of the defining principles of the last 20 years of climate talks', 'deciding who should carry the burden of emissions cuts, and getting the money flowing for climate aid'.

The prepositional phrases 'in a full-fledged climate deal' and 'in the text' are, respectively, intensive and circumstantial. The circumstantial 'in the text' has to do with location, while, as we see in example (4.63), the intensive process is a little different. There seems to be a degree of eventuality and transformation incorporated in the verb phrase.

(4.63) (…) *[condition]* if *[value]* the broad outlines agreed at Lima *[Pr: relational, identifying, intensive]* are to materialise *[token]* in a full-fledged climate deal (G4-30)

Countries also appear as tokens a number of times: 'Australia' (which appears twice), 'Denmark', and 'The US and EU'.

Attributive relational processes

Table 5 gives an overview of the types of attributive processes found in the 2014 Guardian material:

	Attributive Intensive	Attributive Circumstantial	Attributive possessive
Percentages	73%	18%	9%
Raw freq.	34	9	4

Table 5: Distribution of types of attributive processes: all attributive relational processes in the 2014 Guardian material make up 100%

The possessives are metaphorical, as are the circumstantial processes, giving metaphorical location, and (non-metaphorical) time.

The carriers in *the Guardian* 2014 material are mostly shorter noun phrases, with few nominalisations or down-ranked clauses. There are few humans as carriers, and more concepts to do with the environment and climate deal, as in example (4.64):

(4.64) *[time]* but after a day of brinkmanship on Saturday (…) *[carrier]* the deal *[Pr: relational, attributive, intensive]* was *[attribute]* done. (G4-28)

'It' appears as carrier eight times; once its reference is empty, but many times the reference is extraposed, like in example (4.65).

(4.65) (…) *[contingency, concession]* even though *[carrier -]* it *[Pr: relational, attributive, intensive]* is *[attribute]* difficult *[- carrier]* to implement the required measurements.

Several different countries appear as carrier, Germany, Saudi Arabia, China, the US, and Australia which appears twice.

'Much' appears twice as a carrier that does not say much at all, in examples (4.66) and (4.67). Both times the verb is 'remains', and although, as in example (4.66), a number of circumstances, including reason, is given in the sentence, the source of the utterance is not given, which is interesting considering the value-laden nature of the attributes.

(4.66) But *[carrier]* much *[Pr: relational, attributive, intensive]* remains *[attribute]* uncertain [matter] about the prospects of a deal emerging [location and time] from Paris [reason] – not least because of the problems that arose [time] during the negotiations in Lima. (G4-22)

(4.67) But *[carrier]* much *[Pr: relational, attributive, intensive]* remains *[attribute]* vague or poorly defined. (G4-34)

4.2.4 Verbal processes

As in section 4.1.4 on verbal processes in *the Guardian* 1990 material, I have grouped sayers based on who they denote, meaning that personal pronouns are categorised based on their reference.

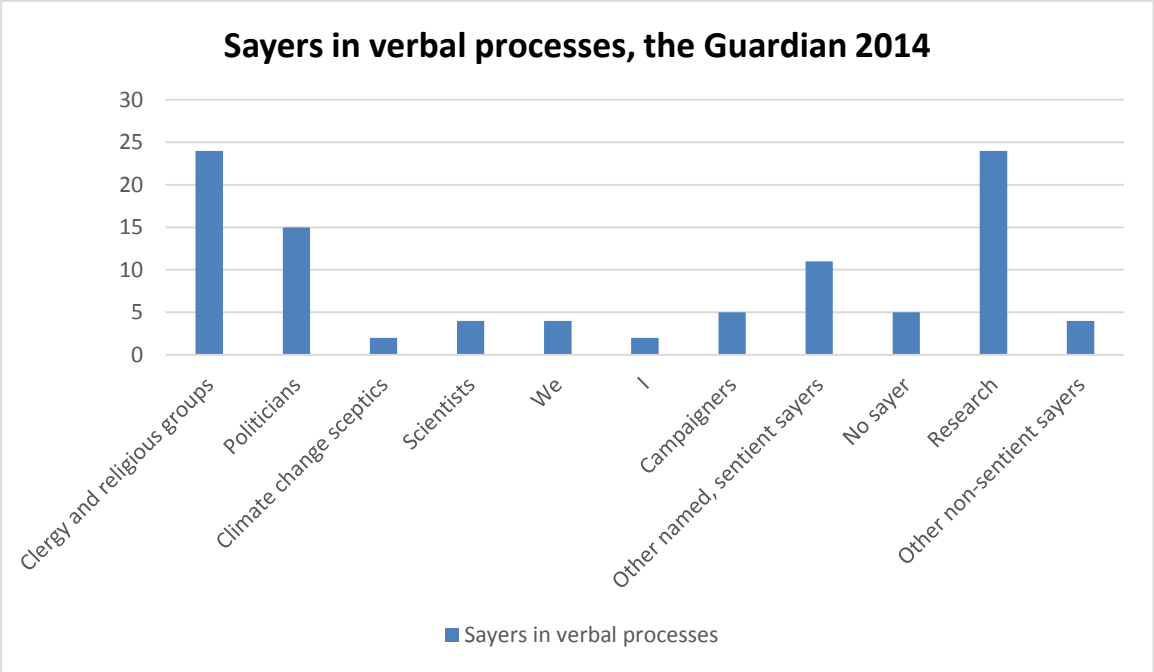

Figure 7: Groups of Sayers in verbal processes, the Guardian 2014. In percentages. N=56.

As we can see from Figure 7, one of the largest groups of sayers in the 2014 *the Guardian* material is 'clergy and religious groups'. The Pope is also included in this. These sayers participate solely in the aforementioned text about the Pope, and as such are not comparable to any of the other sections of my material which do not contain a text with this focus.

The participant group I have called 'research' is a wide category, containing references to research, methods (as in example (4.68)) and also presentations of results (papers and reports), and it is also one of the two largest groups at 24%.

(4.68) Fortunately *[sayer]* both of these methods *[contingency]* when used by climate scientists *[Pr: verbal]* tell *[verbiage]* the same story. (G2-10)

The participants in this group are examples of metonymy. Metonymy is "a referential strategy where a speaker refers to an entity by naming something associated with it" (Saeed, 2009). We can surmise that, because the research is done by scientists, it is in fact they who are speaking, but through their research.

The scientists behind the research, however, do not directly figure as prominently as sayers as their results do. Scientists, understood to mean researchers who do not contest climate change, appear as sayers twice (4%). Climate change sceptics, likely understood to be researchers, appear as sayer once (2%).

The participant group called 'politicians' is third largest at 15%; the group includes references to presidents, ministers and secretaries.

(4.69) *[sayer]* Stern *[Pr: verbal]* acknowledged *[receiver]* to reporters (…) (G4.39)

Respectively, 4% and 2% of the sayers in the 2014 Guardian material are the personal pronouns 'we' and 'I'.

In the material, there are also instances of there being no sayer, in all 5%, as in example (4.70), which is also passive:

(4.70) *[verbiage]* The answer to these questions *[Pr: verbal]* were addressed *[location]* in a recent paper (…). (G2-14)

Example (4.71) is an interesting example of a passive verbal cause. Here the accusations have a target, and we are given the content (verbiage) of the accusation, but the source of it remains hidden. Only 3.6% of the verbal processes in the 2014 material are passive.

(4.71) *[target]* Wealthy countries *[Pr: verbal]* were accused *[verbiage]* of failing to live up to their earlier promises of mobilising billions to help developing countries fight climate change. (G4-27)

When performing the analyses, the verbs 'show' proved challenging to place. In the end I classified them as verbal because the focus seems to be on the uttering of something, like with the verbal iterations of 'write', albeit uttered by research. See example (4.72).

(4.72) *[actor]* Global wheat yields *[Pr: material, involuntary]* are likely to fall *[manner, extent]* significantly as *[actor]* climate change *[Pr: material, intentional]* takes hold, *[sayer]* new research *[Pr: verbal]* has shown.

28% of the processes come from an object or something that cannot actually utter something; 24% of these are 'research' as in examples (4.68) and (4.72).

4.2.5 Mental processes

Table 6 shows the distribution of mental process types in this part of the material.

Cognitive	Perceptive	Emotive	Desiderative
48% (13)	37% (10)	11% (3)	4% (1)

Table 6: Types of mental processes found in the 2014 the Guardian material

Of the 27 mental processes in the material, three are passive, and none of these specify a senser, as in example (4.73), where the agent of the questioning is not specified neither implicitly nor explicitly. There are in total seven processes that leave out the senser, and none of these provide sensers implicitly either.

(4.73) But *[phenomenon]* that hypothesis *[Pr: mental]* has been widely questioned (…) (G5-12)

The active mental processes without sensers are all a bit strange, like the phrasing 'it looks as if he will give it a go', and like we see with the use of 'agree' in example (4.74).

(4.74) *[phenomenon]* The five page text *[Pr: mental, cognitive]* agreed *[time]* on Sunday (…) (G4-15)

Personal pronouns appear as senser in almost half of the mental process clauses, mostly 'we' (eight times), but also 'you' (four times), and 'they' (once). In one instance the reference is general, in 'some people'; 'the researchers' appears once, 'wealthy countries' once, 'deniers and us churches' once, 'pontiff' once, 'international negotiators at the Lima climate change talks' once. All sensers in this part of the material are innately capable of sensing, if we disregard the instances where there are no explicit sensers and count 'wealthy countries' as a reference to the people in power in these countries.

4.3 Comparison: changes seen after 24 years

In this section, I will compare the results from my analyses of *the Guardian* 1990 and 2014 material. First, in section 4.3.1, I compare the frequencies of process types, and in 4.3.2 and 4.3.3, I compare aspects from the two years that differed most.

4.3.1 Frequency in use: types of processes

Table 7 shows the percentages of process types from both years.

	***The Guardian* 1990**	***The Guardian* 2014**
Material: intentional	38%	32%
Material: involuntary	3%	7%
Relational: attributive	20%	17%
Relational: identifying	13%	11%
Mental: cognitive	7%	5%
Mental: perceptive	1%	4%
Mental: emotive	1%	1%
Mental: desiderative	2%	-
Verbal	15%	21%
Existential	1%	1%
Behavioural	-	1%
Total	216 processes / 3519 words	271 processes / 4333 words

Table 7: A comparison of process type frequencies in the Guardian 1990 and 2014 material

The 2014 material has 4% fewer relational processes over-all and 2% fewer material processes, though there are 4% more involuntary material processes in the 2014 material. The 6% difference in verbal processes is the largest difference in frequencies. None of these differences in frequency are statistically significant, according to the P value calculated using Fisher's exact test.[5]

To ascertain whether or not the distribution of process types is 'normal', or deviates from other texts in some way, I attempt to hold them up to the results from other transitivity analyses. It proved difficult to find studies done exclusively on news reportage, thus I have included a couple of studies done using general corpora consisting of both spoken and written texts for comparison. Matthiessen (1999: 16) shows a distribution of process types with 51% material, 23% relational, 10% verbal, 9% mental, 5% behavioural and 2% existential. These numbers do not differ much from either years.

[5] The calculation tool was found at http://graphpad.com/quickcalcs/contingency1/

In a later study with a larger, but still general corpus of both spoken and written texts, Matthiessen (2006: 106-107, 124) reports 38.5% material processes, 37.5% relational processes, 10.8% mental processes, 8.7% verbal processes (and 5.8% behavioural and existential processes). In this most recent study, compared to my material, only the verbal processes differ markedly from his percentages, and this difference seems natural due to the nature of the press genre and its use of quotations.

Now, none of these studies are done exclusively on press text; a study that would be more directly comparable proved difficult to find. However, example studies by Thompson (2014: 135), using very limited size press material (50 clauses) shows a slightly different distribution: 42% material, 24% relational (16% attributive and 8% identifying), 22% verbal and 8% mental (cognitive only). This study more closely mirrors my findings from 2014, where the verbal processes are frequent.

4.3.2 Actors and material processes

A number of actor types appear in both the 1990 and the 2014 material. Beginning with the human or sentient actors, 'we' appears in 7% of the processes in 1990, and 5% in 2014. In 1990 politicians are portrayed as actors in 7% of the material processes, but in 2014, the number is down to 1%. Similarly with 'scientists', they appear as actor in 11% of the processes in 1990, and in 2% in 2014. We instead see 'research results' as actors in 8% of the processes in 2014.

'Countries' appear almost as commonly in 1990 and 2014, at 18% and 19%. In 1990 the countries are industrialised, and continents (which do not appear as actor in the 2014 material) are also included in this category.

The category 'no actor' include 14% of the actors in 1990 and 11% in 2014.

Nature, pollution, food production and climate and temperatures, here presented together because they are related concepts, appear as actors in 12% of the material processes in 1990. In 2014, they make up 20%.

In the 2014 material, 42% of the actors have the potential for voluntary or considered action, while 51% are capable of this in the 1990 material. What these numbers indicate, which we can also see from my comparison here, is that there are fewer specified, human actors in the 2014 material. Instead, the actors are more removed – often products instead of

producers: in the material this is seen as 'outcome of negotiations' instead of 'negotiators', as 'research' instead of 'researchers'.

Of the material processes from *the Guardian* 1990 material, 10.9% were passives, and a third of these do not have an explicit actor. The number for 2014 is almost identical, just over 10%, but of these just under two thirds do not have a stated actor.

4.3.3 Sayers and verbal processes

As previously discussed, journalistic writing (and text production in general) is a product of several sources and wide-reaching influences, consciously and unconsciously included by several authorial voices (in edited work). The most explicit kind is, of course, quoted speech, where the source is given and the words are presented in unedited form.

In analysing my material, I distinguished between quoted speech and edited text, but because of the limited scope of the thesis and my material, the quotations made up such a small part that I could not delve too deeply into the process categories. However, the broad numbers are interesting to compare across both time and ideology, partly because when seen in correspondence to verbal processes, they can hint at an interesting trend.

One of the largest differences between 1990 and 2014 I noted was that the 2014 material included more quotations than the 1990 material, which in turn corresponds with the increase in verbal processes with projection. Furthermore, where I in 1990 could use eight categories to represent the sayers, I needed eleven groups to give nuance to the sayers in the 2014 material. This could indicate there are more voices being heard in 2014; however, while the 1990 material solely features sayers that are sentient or there is an implied human behind the participant (like in 'organisations'), about a third of the sayers in the 2014 material are inanimate, most notably the 24% that is 'research'.

The groups of sayers in the 1990 and 2014 material do not correspond very well. The groups 'climate sceptics' and 'scientists' appear in both parts of the material, but with greater frequency in 1990. Other than these groups, none of the groups correspond.

Lastly, while I have included partial quotation incorporated in clauses of edited text in the main section of this chapter, I found the use of so-called scare-quotes in example (4.75) interesting, and worth mentioning here. Perhaps because of the combination of authorial voice and voice that appears to be coming from someone else, the lack of sourcing for the part in the quotes becomes apparent. Since it is within citation marks, it cannot be authorial voice,

but whether it is a general reference to the vague 'everybody' or if the author(s) have someone specific in mind who made the utterance, the context does not clarify.

(4.75) *[carrier]* He [*Pr: relational, attributive, intensive]* has been called *[attribute]* the "superman pope". (G6-3)

4.3.4 Summary

In summary, the most significant difference between the texts I have analysed from *the Guardian* from 1990 and 2014, is connected to verbal processes and citations. The verbal process is more much more loosely tied to actual human utterance in 2014 than in 1990, and there are more different groups of sayers than in 1990.

The overarching diachronic trend in types of sayers and actors in this part of the material is fewer sentient sayers and actors in 2014 than in 1990. Rather, nature increasingly takes on these roles, and also, we see metonymy in how researchers increasingly seem to speak and act 'through' their research.

What seems to be recurrent in both years is the frequent appearance of long, factually heavy participants, often nominalisations. Many participants include, or are, down-ranked clauses, and I have not analysed these as separate clauses. As some of my examples have shown, these down-ranked clauses are frequently passive, and some are non-finite.

5 The Times

I have structured this chapter the same way as I structured chapter 4, and present my findings along the same parameters. I will compare and discuss some of my findings from the two newspapers in chapter 6. In this chapter I will present my findings from *the Times* from November 1990 (section 5.1) and December 2014 (section 5.2), and compare the two in section 5.3.

Note: I searched for, but did not find a statement of purpose or internal review of *the Times'* climate reportage similar to the one I found on *the Guardian* webpage, and presented in the introduction to chapter 4.

This chapter will present the analysis of the material from *the Times*, studying both years separately and then providing a comparison.

5.1 November 1990

This chapter will lead with an overview of the processes found in *the Times* 1990 material, then deal with the process types in separate chapters.

5.1.1 Overview of process types found

As Figure 8 shows, the largest group of process type is material, with 45%. Relational processes make up the second largest category with 24%, while mental and verbal processes make up portions of, respectively, 14 and 15%.

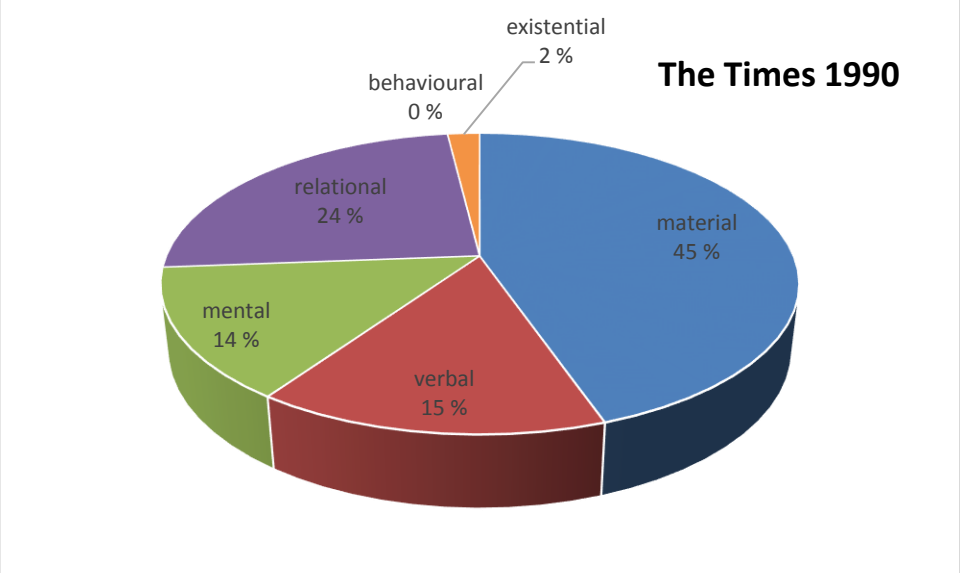

Figure 8: Processes found in the 1990 material from the Times, without quotations. N=206.

5.1.2 Material processes

As in the previous sections, a main point of interest in terms of material process clauses lies with actors, because these participants are typically portrayed instigators of actions. Figure 9 shows the types of actors I identified in *the Times* 1990 material, grouped on the basis of the denotations of the words used as actor (meaning that, for example, when pronouns are used, I have used their referent to classify them).

As we see from the figure, 'politicians' is the largest group of actors with 20%. This group consists mainly of British political figures, but also two references to global political leaders. Margaret Thatcher, then prime minister in Britain, is actor in over 74% of the instances, often by name, title or pronoun, but also once with the evaluative 'a prime minister who claims to be a scientist' (see example (5.1)).

(5.1) *[goal]* Computer models predicting temperature rises very much smaller than their proven margins of error *[Pr: material, intentional]* are being used *[actor]* by a prime minister who claims to be a scientist.

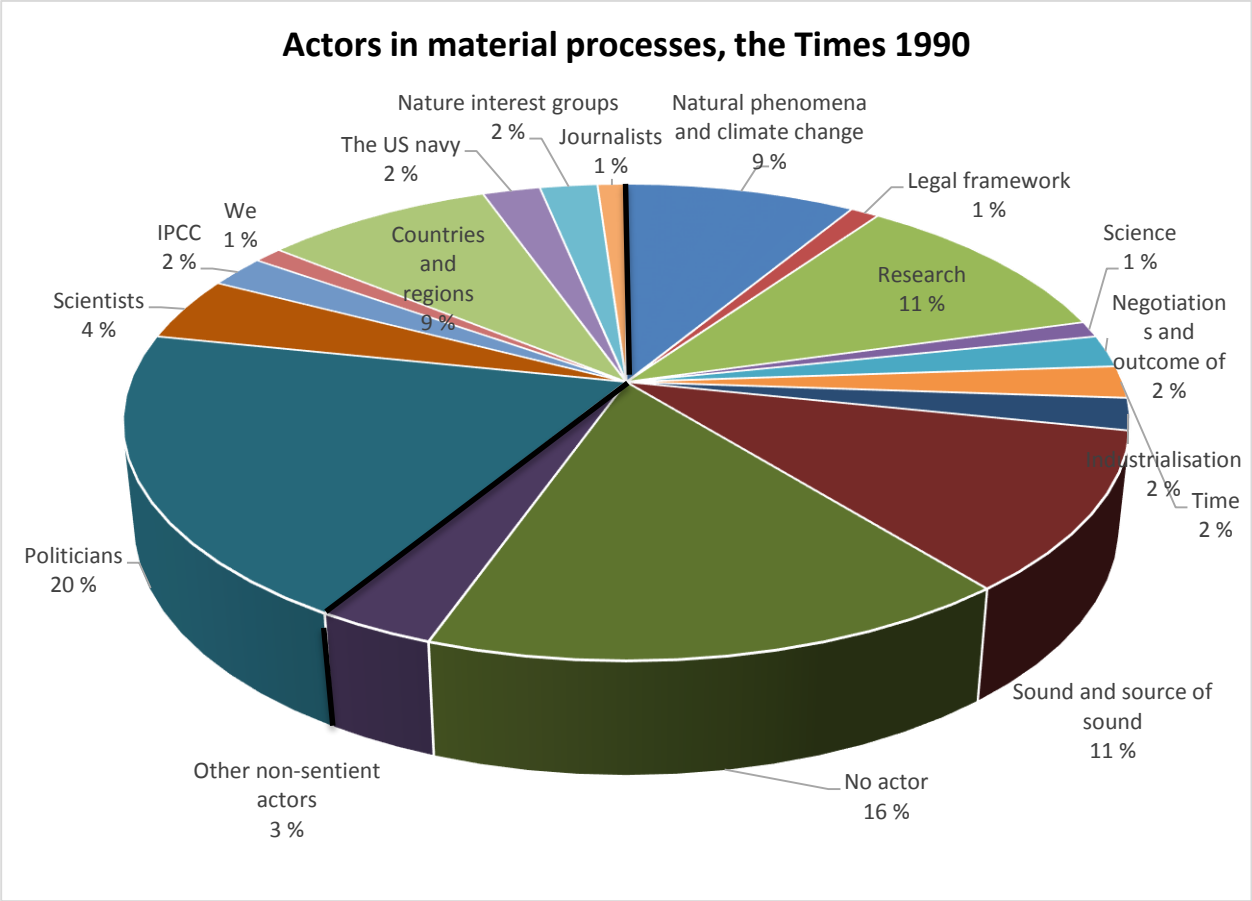

Figure 9: Actors in material processes, the Times 1990. N=206.

The second largest category, with 16%, is 'no actor'. This group consists only of instances where neither clause nor context specified an actor. In cases where the actor was clearly specified in context, I included these in the appropriate group. 22% of the material processes are passives; not all of them are without actor. Example (5.2) shows a passive with no actor.

(5.2) *[time]* Twenty years ago *[goal]* a sound made in the ocean off Western Australia *[Pr: material, intentional]* was picked up *[manner]* without any difficulty *[location]* in Bermuda, half way around the world. (T10-12)

There does not seem to be a very clear pattern to the types of processes that do not specify an actor, or of the goals affected.

'Research' is another large group with 11%; considerably larger than the researchers themselves ('scientists') at 4%. Possibly, the people referred to in the group labelled 'IPCC' also refer to scientists, working for the UN in the working groups and committees. This

category makes up 2%. Example (5.3) is from the 'research' category; the models referred to are computer models that are in essence records of climate data and research.

(5.3) *[contingency]* In the two earlier cases, *[actor]* the models *[time]* first *[Pr: material, intentional]* produced *[goal]* a really frightening scenario. (T7-14)

'Countries and regions' makes up 9% of the material. Eleven percent of the actors make up a group I have called 'sound and sources of sound', an example of which can be seen in example (5.4) below. These actors are specifically tied to one of the articles which concerned the measurement of ocean temperatures by measuring sound as it travelled through the oceans. This actor category, in the same way that 'the Pope' appeared in a single text in *the Guardian* 2014 material (see section 4.2.2), thus does not necessarily say anything about the general nature of these texts, and the high percentage could be a peculiarity of limited material.

(5.4) *[actor]* Sounds *[Pr: material, intentional]* do not travel *[manner]* downwards *[reason]* because of the increasing pressure at greater depths. (T10-15)

The group 'natural phenomena and climate change', and the actors this group encompasses, make up 9% of the processes in the material. See example (5.5).

(5.5) *[actor]* A couple of cold winters *[Pr: material, intentional]* will take *[scope]* the froth off the debate, (…) (T-740)

In terms of agency and the overarching topic of this thesis, it is also interesting to look at how and if nature and associated topics are portrayed as goals. In the material clauses of *the Times* 1990 material, the goal is often a legal framework or other measures to combat change, references to pollution (as in example (5.6)), or references to counteracting climate change. We see the latter in example (5.8), which is underspecified in terms of what these counteractions entail.

(5.6) *[goal]* A large proportion of the world's seabirds *[Pr: material, intentional]* could be wiped out *[actor]* by an ecological disaster off the coasts of Britain or Ireland such as a large oil spill (…) (T12-2)

(5.7) *[actor]* The world community *[time]* yesterday *[Pr: material, intentional]* launched *[goal]* its response to global warming (…) (T11-2)

In one instance the goal is weather, and this goal has a non-sentient actor (research model predictions), and one time we see climate change as an actor affecting nature as a goal (example (5.8)).

(5.8) (…) *[actor]* climate change and rising sea levels *[Pr: material, intentional]* would threaten *[goal]* low-lying areas, water resources, agriculture, forests and fisheries. (T8-4)

Roughly 7% of the processes are nominalisations such as 'the development of the science of global warming' and 'binding protocols on greenhouse gas emissions and possibly the destruction of tropical forests', or noun phrases containing down-ranked clauses such as 'a prime minister who claims to be a scientist' (see example (5.1)). Example (5.9) is also an example of such a process.

(5.9) *[actor]* The time taken for sound to travel from Heard Island to San Francisco *[Pr: material, involuntary]* will increase *[manner]* by as much as a quarter of a second a year. (T10-25)

Example (5.9) is also an example of an involuntary process. 14% of the material processes in this part of the material are involuntary. Most of these are processes of beginning; 'should begin', 'began', 'was getting into full swing'; or not beginning/ceasing; 'disappeared', 'diminished', 'will not come about'; or processes concerning time passing; 'will take (several hours)', '(the time) taken'; or processes saying that something took place, like 'has been happening' and the following example:

(5.10) *[actor]* Their recommendations *[manner]* immediately *[Pr: material, involuntary]* went before *[scope]* government officials drafting a declaration for approval by heads of state and ministers in the final stage of the conference ending on Wednesday. (T8-3)

I have divided the chart in Figure 9 in two with a black line. This line separates the actors capable of, or denoting someone who is capable of, performing an action of their own volition. Only 40 % of the actors in this part of the material are actually capable of this. The largest non-sentient groups of actors are four I have already discussed: 'research' with 11% (which is significantly larger than the group representing humans doing the research), 'sound and source of sound' (11%) and 'natural phenomena and climate change'. Other non-sentient actors are 'time' and 'industrialisation', besides groups tied to the convention: 'negotiation and outcome of negotiation', and 'legal framework'. The category 'other non-sentient actors' contains the remaining non-sentient actors that were difficult to categorise.

5.1.3 Relational processes

Just under a fourth (24%) of all processes in the selected articles from *the Times* from November 1990 – 50 clauses – are relational. Nineteen of these are identifying, 31 are attributive. I will present my findings from these two sub-types of processes separately.

Identifying processes

As we can read out of Table 8, the majority of identifying processes in this part of the material are intensive.

	Intensive identifying	Circumstantial identifying	Possessive identifying
Percentages	75%	10%	15%
Raw freq.	14	2	3

Table 8: Distribution of types of identifying processes: all identifying relational processes in the Times 1990 material make up 100%

The possessives establish part-whole relationships through verbs such as 'contained' and 'included'.

(5.11) *[contingency]* However, *[token]* the speech *[Pr: relational, identifying, possessive]* contained *[value]* no new policy initiatives (T9-14)

There are two circumstantial processes; both passive variations of 'be based on', and typical of scientific writing. Within Halliday's distinction of externally and internally relational clauses (Halliday and Martin, 1993: 65), both are internal, and there is an indication of causation, in that in both cases, shown in example (5.12) and (5.13), the values have served as jumping-off points for the creation of the tokens.

(5.12) *[token]* All three *[Pr: relational, identifying, circumstantial]* are based on *[value]* predictions made by computer models, a notoriously slippery branch of lower mathematics. (T7-13)

The 'three' refer to predictions and models describing a grim future where climate change has run unchecked. Note also the evaluative apposition in the value in example (5.12); the entire article seems to attempt to create doubt as to the validity of the threat of climate change. In example (5.13), the report in question is the first IPCC report.

(5.13) *[token]* Its report *[Pr: relational, identifying, circumstantial]* is based on *[value]* 1988 figures. (T7-21)

The most prominent pattern in the types of participants appearing as token, is a frequent recurrence of *this* with anaphoric reference. Twice *this* refers to the action of Thatcher speaking about something, once to Thatcher basing her knowledge and arguments on computer models, once it refers to the actions taken by the German government to reduce CO2 emissions, and once the reference is to the cooling of the oceans:

(5.14) *[token]* This *[Pr: relational, identifying, intensive]* was *[value]* the trend that led many climatologists in the Seventies to forecast an ice age; (…) (T7-32)

The remainder, excluding four of the tokens which either include down-ranked processes or nominalisations, are nouns or noun phrases with no discernible or striking thematic or structural similarities.

Nine of the nineteen participants analysed as values include down-ranked clauses, like the restrictive relative clause included in the noun phrases appearing as values in examples (5.15) and (5.16).

(5.15) *[Value]* The only document that many politicians at Geneva this week will read *[Pr: relational, identifying, intensive]* is *[token]* the policy makers' summary of working group three. (T7-21)

(5.16) *[token]* Mrs Thatcher, President Bush and President Gorbachev *[Pr: relational, identifying, intensive]* are *[value]* "climate criminals" who have refused to counter the threat of global warming. (T8-5)

In the value in example (5.16) it is possible to glean an authorial voice; the writers identify three heads of state as criminals against the environment.

In two clauses, the value is realised by short noun phrases with a pre-packaged interpretation of the token: 'the truth' (ex. (5.17)) and 'the situation'. These are further examples of labels (c.f. (Francis, 1994)), discussed in section 4.1.3.

(5.17) *[value]* The truth *[Pr: relational, identifying, intensive]* is *[token]* that there are many things in the IPCC report that must be disputed, energetically. (T7-9)

Example (5.18) also shows a value packaging the token as a noun – 'a test' – here postmodified by a prepositional phrase giving further detail on what sort of test it is.

(5.18) *[value]* The greatest test of how far the world community could act together *[Pr: relational, identifying, intensive]* would be *[token]* its ability to stop or limit damage to the environment. (T9-11)

Attributive processes

As we can see from Table 9, the large majority of attributive processes in this part of my material are intensive.

	Intensive attributive	Circumstantial attributive	Possessive attributive
Percentages	80%	13%	7%
Raw freq.	25	4	2

Table 9: Distribution in types of attributive processes: all attributive relational processes in the Times 1990 material make up 100%

The circumstantial processes mostly deal with time or location; we see an example of the latter in example (5.19):

(5.19) *[carrier]* Sound waves *[Pr: relational, attributive, circumstantial]* are trapped *[attribute]* in a layer of ocean water about a kilometer below the surface. (T10-13)

The possessive attributive processes are all metaphorical, as seen in example (5.20). This is an interesting example also because of the general reference of the carrier – who 'we' are is not specified.

(5.20) (…) *[carrier]* we *[time]* now *[Pr: relational, attributive, possessive]* have *[attribute]* at least 200 years' experience of pumping carbon dioxide and other greenhouse gases into the atmosphere. (T7-27)

The carriers to a large degree reflect the topic of climate change: 'a basic framework convention on the atmosphere', 'the overheated rhetoric in Geneva', 'the world', 'ocean and atmosphere', 'a rise of even a fraction of a degree', and there are carriers of several variations on science and research. Interestingly, three carriers are noun phrases involving what has been called 'the human sacrifice' needed to combat climate change, betraying an interesting perspective. Twice, human sacrifice is given the attribute 'essential', but *the human appetite* for it, as we see in (5.21), is *limited* (and note the initial adverb):

(5.21) Fortunately, *[carrier]* the human appetite for sacrifice *[Pr: relational, attributive, intensive]* is *[attribute]* limited. (T7-39)

'It' is a recurrent carrier in the material. In several cases, 'it' is anticipatory subject, and the extraposed subject appears at the end of the clause (likely in compliance with the principle of end weight). In three out of these four cases, the carriers are prepositional phrases as in (5.22).

(5.22) (…) *[carrier -]* it *[Pr: relational, attributive, intensive]* should be *[attribute]* possible *[- carrier]* to detect regional variations in warming as well. (T10-26)

'It' also appears twice with anaphoric reference, and, similarly, so do 'that', 'which' and 'they' (ex. (5.23)), retrospectively giving an attribute to a carrier that does not directly appear in the clause.

(5.23) *[carrier]* They *[Pr: relational, attributive, circumstantial]* will cost *[attribute]* about $2 million (…) (T10-28)

Most remaining carriers are noun phrases with definite, indefinite or no article, as in example (5.24). In some instances, these are nominalisations as in example (5.25).

(5.24) *[time]* Meanwhile, *[carrier]* the overheated rhetoric in Geneva *[Pr: relational, attributive, intensive]* is *[attribute]* premature and potentially very damaging. (T7-41)

(5.25) *[carrier]* A rise of even a fraction of a degree *[Pr: relational, attributive, intensive]* should be *[attributive]* detectable. (T10-6)

When considering the rest of the clause – verb and attribute – just over half are non-evaluative, and the attributes present facts tied to the carriers, as (5.26) is an example of:

(5.26) *[reason, cause]* Since *[carrier]* ocean and atmosphere *[Pr: relational, attributive, intensive]* are *[attribute]* closely linked, (…) (T10-7)

In the other half, there are ten negatively evaluative clauses and five positive. The negative clauses are not negative because of inherently negative attributes; but the evaluation can for example be in the verbal group as in example (5.19), where the attribute is non-evaluative but the verbal group is 'is trapped', or, as is the case in example (5.27), the words 'no choice' give a negative interpretation of the entire sentence, which without the 'no choice' would appear entirely factual.

(5.27) (…) *[carrier]* the sound *[Pr: relational, attributive, possessive]* has *[attribute]* no choice but to travel horizontally along this wave guide *[manner, comparison]* rather like the sound in a doctor's stethoscope. (T10-16)

5.1.4 Verbal processes

There are 31 verbal clauses in this part of the material. I have grouped the sayers in these processes into categories, presented in Figure 10.

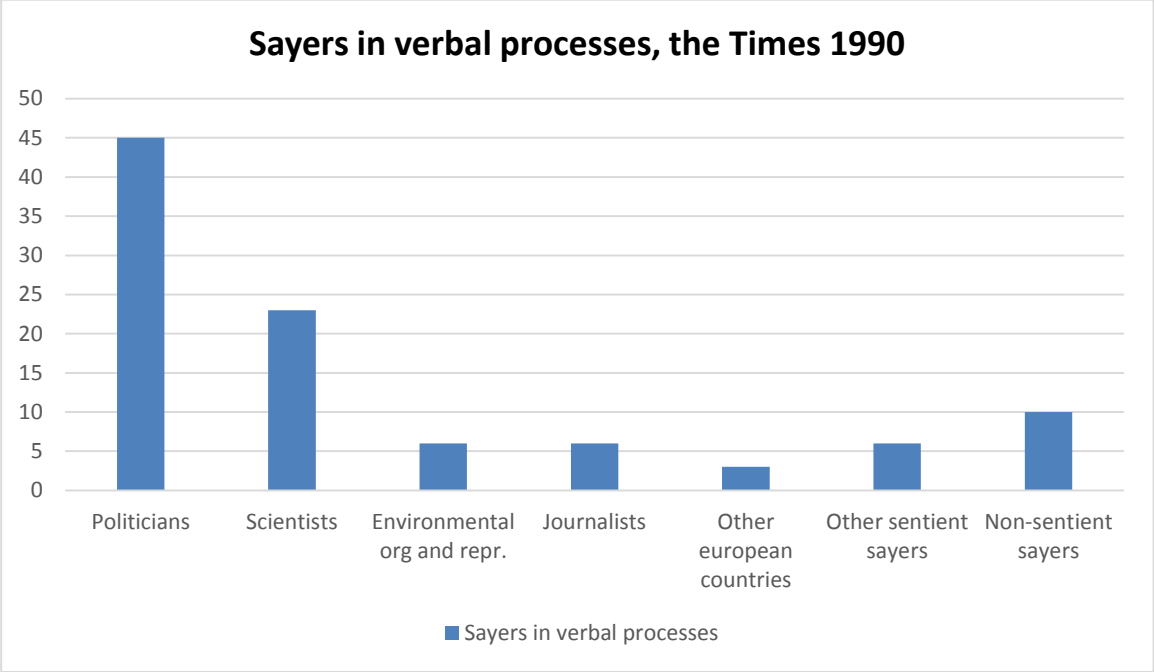

Figure 10: Groups of Sayers in verbal processes, the Times 1990. In percentages. N=31.

The largest group of sayers in this part of the material goes into the group 'politicians'. Within this group, the largest portion refers to current Prime Minister Margaret Thatcher, and the remaining sayers are politicians representing the Green Party, the Conservatives, Labour and the liberal Democrats equally. There is one generic reference to 'ministers', implying British ministers, thus conservatives. Example (5.28) illustrates an interesting type of verbal clause, where the verb does not directly imply verbal action, but where the context clarifies what is vague in the verb.

(5.28) *[location]* In her address to the World Climate conference *[time]* on Tuesday *[sayer]* Mrs. Thatcher *[Pr: verbal]* made *[verbiage]* a remark that chills the blood. (T7-3)

Another large group is 'scientists', within which falls scientists with the IPCC, a generic reference ('the scientists'), and named scientists tied to educational institutions.

The non-human/non-sentient sayers are 'this' (referring to the range of uses of an experiment), and, implied, 'the report', and, as we see in example (5.29), 'the latest figures' (here, the verbal clause is followed by a projected material clause).

(5.29) (…) *[contingency]* although *[sayer]* the latest figures *[Pr: verbal]* suggest *[actor]* this *[Pr: material, involuntary]* will not come about *[time]* until well into the century after next. (T7-22)

All the verbal process clauses except one in this part of my material are in the active voice.

5.1.5 Mental processes

As has been the case with the mental processes in *the Guardian*, these were not numerous enough that I could present them in a percentage based chart without the percentages being misleading.

Table 10 shows the distribution of mental process types in *the Times* 1990 material. As we can see, the cognitive processes outnumber the other types.

Cognitive	Perceptive	Emotive	Desiderative
78% (23)	15% (4)	7% (2)	-

Table 10: Types of mental processes found in the 1990 the Times material

The largest group of sensers are scientists, both named individuals and groups; the latter is seen in example (5.30).

(5.30) *[senser]* More than 700 scientists at the Second World Climate Conference *[Pr: mental, cognitive]* agreed *[phenomenon]* on the inevitability of global warming, *[accompaniment]* with consequences "unprecedented *[time]* in the past 10 000 years", (…) (T8-2)

Five of the mental processes do not specify a senser, and of these four are passive. In total, five mental verb groups are passives. Examples (5.31) and (5.32) are passive mental process clauses without specified sensers.

(5.31) (…) *[contingency]* but in the dash towards international action *[phenomenon]* doubts *[Pr: mental, cognitive]* have been forgotten. (T7-11)

(5.32) *[phenomenon]* Mrs Thatcher's excursion from a beleaguered Downing Street *[Pr: mental, perceptive]* may be seen *[manner]* as a renewed show of leadership *[contingency, condition*] when her policies and management style are under fierce attack. (T13-5)

In addition to the five clauses that do not specify a senser, five have a senser that is not innately capable of sensing. This means that a little over a third of the 29 clauses either do not have sensers, or have sensers that physically cannot sense. When placed as sensers – mental processes being predominantly human – this could imply a personification. Sentient sensers are participants such as countries, scientists, governments, or generic references to people, while non-human sensers include microbes, a survey and, as in example (5.33), research equipment.

(5.33) *[senser]* A three-year survey *[Pr: mental, cognitive]* found | that *[token]* the three million seabirds off the west coast of Scotland *[Pr: relational, identifying, possessive]* included *[value]* more than half the total breeding numbers of Manx shearwater, puffin, black guillemot and gannet. (T12-3)

5.2 December 2014

In chapter 5.3, I will compare 1990 to 2014. This chapter includes a presentation of my findings from the 2014-material, along the same parameters as for my 1990 findings.

5.2.1 Overview of process types found

Figure 11 shows all the processes found through analysing my Times 2014 material. The largest group is material processes, which make up 38% of the verbal groups in the analysed clauses. Verbal processes make up the second largest group with 28%, closely followed by relational processes at 26%. Mental processes make up 6% of the analysed verbal groups.

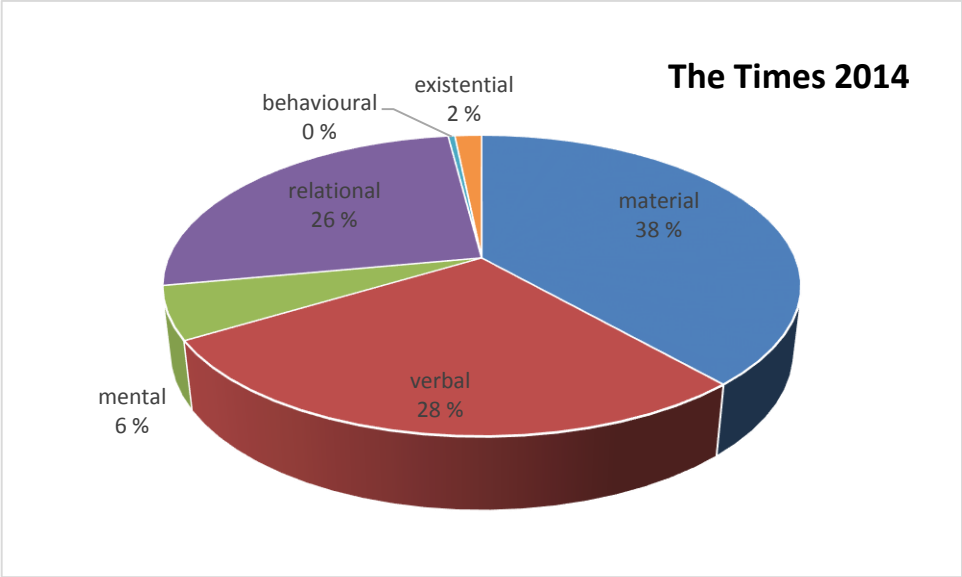

Figure 11: Processes found in the 2014 material from the Times. Quotations not included. N=206.

There are four existential processes and one behavioural process in the analysed material, which add up to 0 and 2%. As in previous sections, these processes will not be discussed.

5.2.2 Material processes

Figure 12 shows the major groups of actors found in the 2014 *the Times* material process clauses. The figure shows actors we have seen before, such as 'politicians', 'scientists' and 'countries', and actors reflecting the topic of the articles: 'climate change/global warming', 'pollution', 'weather' and 'ocean temperatures'.

The group labelled 'other non-sentient actors' contains actors that were numerous enough in the previous chapter to merit a separate category. For the sake of the readability of the figure, they have been merged, but I will present them in more detail below. The smaller part of the pie, isolated by the black lines, shows actors that plausibly can be thought to be human such as politicians and scientists, or be represented by human beings such as organisations.

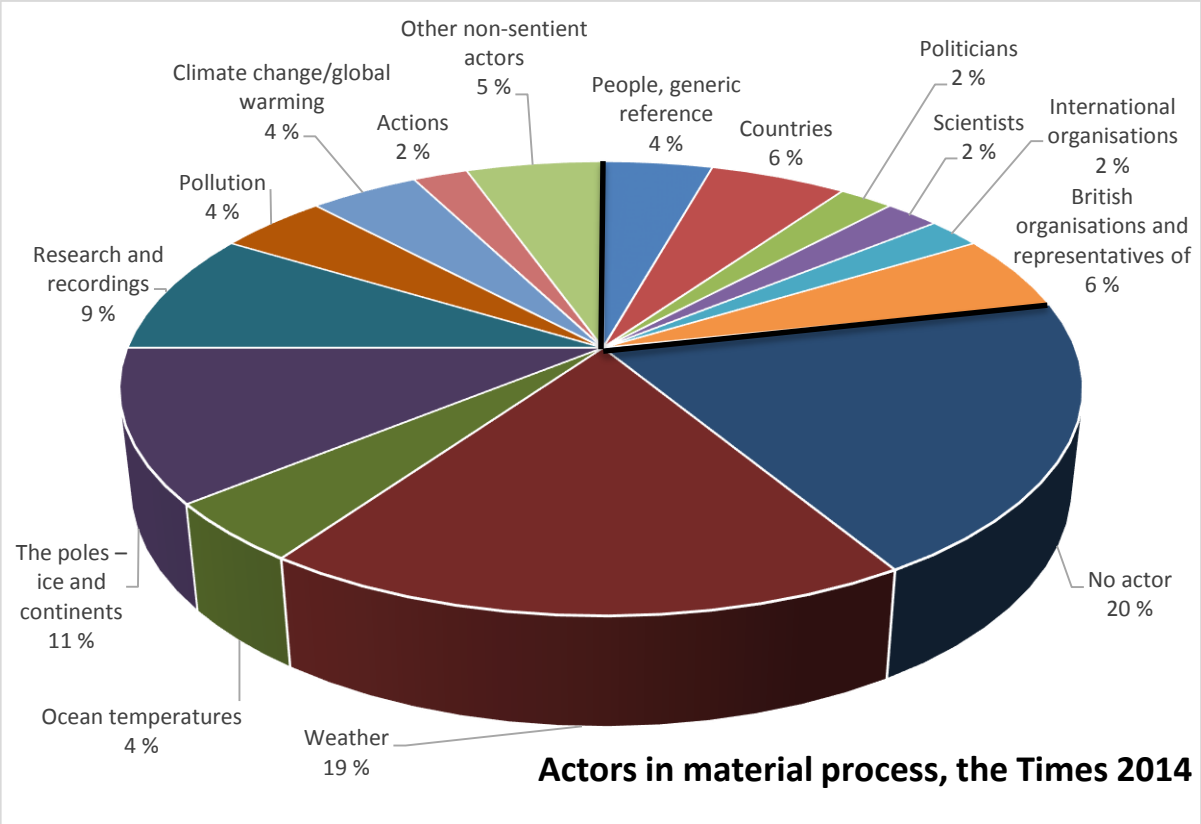

Figure 12: Actors in material processes, the Times 2014.

The largest group of actors is the one called 'no actor', indicating clauses that do not make the actor explicit. Clauses without actor make up 20 percent of the material clauses in this part of my material. In example (5.34), who or what has pumped the heat is not specified.

(5.34) (…) *[goal]* much of the extra heat *[Pr: material, intentional]* has been pumped *[location]* into the oceans rather than into the air. (T3-27)

The second largest category is the one labelled 'weather'. Most of the actors in this category are direct descriptions in the form of noun phrases, like 'twelve months of extreme weather', 'last week's snow and blizzards' or 'a cold December', yet four actors appear, as in example (5.35), as long phrases which include down-ranked clauses.

(5.35) *[actor]* A year of extremes for Britain's weather that has seen 2014 becoming, so far, the warmest and fourth wettest on record *[Pr: material, involuntary]* is due to finish *[manner]* with a freezing spell that could see temperatures in central England fall to as low as -10C.

Both examples (5.35) and (5.36) are also involuntary processes. 19% of the material processes in this part of the material are involuntary. A third of these are passive. All of the actors are non-sentient, and mostly fit into the categories of 'ice and the poles' and 'weather' from Figure 12.

(5.36) *[actor]* A cold December *[Pr: material, involuntary]* could change *[goal]* that, (…) (T2-4)

That here refers to the prognosis of the UK having a record breaking year in terms of recorded temperatures. In (5.36), the process has to do with change, and in addition to this, a large portion of the involuntary processes also involve the beginnings and ends of states or events, appearing as variations on 'end' (as in ex. (5.35)), 'begin', 'result in', 'fall', 'extend', 'rise' and 'increase' (as in ex. (5.38)).

Warming and cooling also appear as involuntary processes, with the Antarctic as actor in both instances. Ice also 'melts' and 'floats'. In one instance, as shown in example (5.37), an actor which in Figure 12 is labelled 'weather', drifts:

(5.37) *[actor]* A high-pressure zone forming south of Iceland this weekend *[Pr: material, involuntary]* is expected to drift *[location]* eastwards over the UK *[time]* during tomorrow and Tuesday, *[accompaniment]* bringing an unusual combination for Britain of bright sunshine, clear blue skies and the lowest temperatures seen for at least a year. (T5-4)

Categories like 'the poles - ice and continents', 'ocean temperatures', 'pollution', 'climate change/global warming' and, to an extent, 'research and recordings' are related, in that they reflect the topic of the articles in my material, and have to do with aspects of nature and the research on these topics. Example (5.38) is from the category 'the poles – ice and continents'.

(5.38) *[contingency, concession]* However, *[actor]* the extent of sea ice cover around Antarctica *[Pr: material, involuntary]* has increased *[manner]* substantially. (T3-4)

An interesting clause, both because it is a passive with an inanimate actor, and because it is involuntary, is example (5.39):

(5.39) *[goal]* Heat *[Pr: material, involuntary]* is being lost *[actor]* by the Antarctic (…) (T3-20)

Of the material processes, a total of fifteen percent are passive. All the passives in the material have to do with either the climate conference, as in example (5.40), or with weather or temperatures, as seen in example (5.39). The passives that have to do with the conference concern the drafting or scrapping of a deal, or the hosting of the conference.

(5.40) *[beneficiary]* Governments *[Pr: material, intentional]* were being asked to draw up *[goal]* a global treaty to cut greenhouse gas emissions (…) (T4-18)

The category 'countries', include only general references to countries, some of which are premodified: 'developing countries', 'many developing countries', 'poor countries', 'large countries' and 'countries'.

The category 'people' includes actors with generic reference. One reference is simply to 'people', and one to 'the whole world' meaning the population, while 'people in Leek, Staffordshire' is more specific, while still being a relatively broad reference.
The actors that have been labelled 'other non-sentient actors', are varied, but actors that we now recognise from the previous sections. One of these actors is 'the earth', and another 'the final text', referring to the written product of the 2014 conference. Another, 'climate change deal', broader and more generic in its reference, is the ideal outcome of the negotiation.

A small portion of the actors include nominalisations or down-ranked clauses – together a little above 8%. We can see the longest actor of this section of the material in example (5.35) above. That example includes a down-ranked that-clause. Example (5.41) is an example of a nominalisation:

(5.41) *[actor]* changes in oceanic currents [Pr: material, intentional] are taking [goal] heat [location] away from Antarctica. (T3-9)

5.2.3 Relational processes

27% of all processes in the selected articles from *the Times* from December 2014 – 66 clauses – are relational. Twenty-six are identifying, forty attributive. I will present my findings from these two sub-types of processes separately.

Identifying processes

As we can read from Table 11, half of the identifying relational processes in the analysed material from *the Times* 2014 are intensive; circumstantial identifying processes make up 31% and the possessive identifying clauses make up 19% of the material.

	Identifying Intensive	Identifying Circumstantial	Identifying possessive
Percentages	50%	31%	19%
Raw freq.	13	8	5

Table 11: Distribution of types of identifying processes: all identifying relational processes in the Times 2014 material make up 100%

Example (5.42) is a typical example of an identifying intensive clause:

(5.42) (…) *[value]* the difference *[Pr: relational, identifying, intensive]* was *[token]* that the wind blowing the pollution was mixed with red dust from the Sahara desert that made it unusually visible. (T5-28)

Four of the five identifying possessive clauses of the material set up part-whole relationships using the verb 'include'. The one remaining, 'does not take into account', is also a part-whole relation, though defined by the *non-existence* of the part-whole relation. As we see in example (5.43), 'does not take into account' means 'does not include'. 'Heatwave deaths' refers to the projections for deaths if temperatures rise and we begin seeing more frequent deadly heatwaves.

(5.43) (…) *[token]* heatwave deaths *[Pr: relational, identifying, possessive]* does not take into account *[value]* "improved heat health protection measures; early warning systems". (T1-10)

Two of the eight identifying circumstantial processes are variations on 'be based on', and the remainder include the verb 'mean'. I will discuss both of these types of circumstantial processes in greater detail in chapter 6.

Roughly a third, or 34%, of the values in the identifying relational clauses include down-ranked clauses, like the one in example (5.44). This is internally relational, implying description. 'It' refers to the scientific finding that greenhouse gas emissions raise the risk for wetter winters.

(5.44) *[token]* It [*Pr: relational, identifying, intensive]* reflects *[value]* a growing belief among scientists that climate change is having a direct effect on the weather, especially in making extreme events such as floods and droughts much more likely. (T4-5)

Example (5.44) has a material aspect, in that it is possible to interpret 'reflect' less metaphorically.

The majority of the values do not overtly evaluate the tokens. A possible exception might be example (5.45), where 'this' refers to the ice sheet covering Antarctica has grown, which, scientifically is not evidence going against other research on global warming, however much of the clause in example (5.45) tries to make it so.

(5.45) *[token]* This *[Pr: relational, identifying, intensive]* is *[value]* a problem for the climate scientists (…) (T3-7)

Most of the values are relatively long – most have four words or more – and these values are ascribed to what are mainly shorter tokens, which in many cases take the form of noun phrases premodified by a definite article.

(5.46) *[token]* The deal *[Pr: relational, identifying, intensive]* sets *[value]* the framework for a treaty to be signed *[location]* in Paris *[time]* next December *[reason]* to limit global warming to 2C above pre-industrial times. (T6-5)

Most of the tokens have to do with temperatures and weather, or, as in example (5.46), the deal being debated at the 2014 conference.

(5.47) *[token]* The forecast for coastal flooding victims *[Pr: relational, identifying, possessive]* does not include *[token]* "population relocation"(…) (T1-10)

Attributive processes

As Table 12 shows, the majority of attributive relational clauses are intensive, and circumstantial and possessive attributive clauses appear in similar amounts but to a much lesser extent.

	Attributive Intensive	Attributive circumstantial	Attributive possessive
Percentages	80%	10%	10%
Raw freq.	32	4	4

Table 12: Distribution in types of attributive processes: all attributive relational processes in the Times 2014 material make up 100%.

Example (5.51) shows an intensive attributive process.

Two of the circumstantial processes have to do with location, like in example (5.48), and two of them use the verb 'bring' in an interesting way, which I have taken to be equal to 'be', judging by the way they are used in the sentence. See example (5.49).

(5.48) *[carrier]* Antarctica, *[contingency, concession]* however, *[Pr: relational, attributive, circumstantial]* is surrounded by *[attribute]* open ocean. (T3-11)

(5.49) *[carrier]* the following month *[Pr: relational, attributive, circumstantial]* brought *[attribute]* one of the finest Indian summers for years – the driest September since 1910 and average temperatures 1.3C above normal. (T5-32)

The possessive relational processes all concern metaphorical possession, as in example (5.50):

(5.50) *[carrier]* The UK *[Pr: relational, attributive, possessive]* is also expected to have *[attribute]* its warmest year in records dating back to 1910 (…) (T2-3)

The carriers to a large extent reflect the topic of the articles: we see references to weather and temperature ('the global temperatures', 'average temperatures', 'ice cover', 'the freezing spell', 'extreme weather events'), to the conference, agreements and measures ('key issues', 'targets', 'the agreement') and to geographical areas one associates with climate change ('Antarctica', 'the Antarctic', 'the oceans' and 'which', referring to 'the enclosed Arctic Ocean). The largest group possible to glean from the carriers in this part of the material, however, has to do with *time.* Fifteen of the 39 relational attributive clauses, or 38%, include a carrier that in some way refers to a point in time, often either a season or a year, or, as in example (5.51), a month.

(5.51) *[carrier]* August *[Pr: relational, attribute, intensive]* was *[attribute]* more of a washout *[cause]* because of the remnants of Hurricane Bertha, (…) (T5-31)

All but two carriers – 'success in building momentum at the Lima Climate talks towards a global climate deal' and the extraposed subject carrier 'to ask them to make commitments that could hamper their economic growth', shown in full in example (5.52) – are short noun phrases that do not include neither nominalisations nor down-ranked clauses.

(5.52) (…) *[carrier -]* it *[Pr: relational, attributive, intensive]* was *[attribute]* unfair *[- carrier]* to ask them to make commitments that could hamper their economic growth. (T6-8)

Example (5.52) is negatively evaluated by the attribute *unfair*. As regards the issue of evaluation in the clauses in general, the attributes given to the carriers often make this up to the reader. Especially the geographical locations and the time-carriers have factual attributes that speak to temperatures, using terms like 'warmer' 'cooler', 'drier', etc. (see example 5.53). From the perspective of someone climate conscious who sees warming as a negative sign, the clauses become negatively loaded. However, warming could also be seen as a positive change to the climate in certain parts of the western and northern hemispheres, depending on personal views.

(5.53) (…) *[carrier]* 2014 *[Pr: relational, attributive, intensive]* is also likely to be *[attribute]* the warmest on record globally, with temperatures about 0.57C above the average in a global data set stretching back to 1850 (T5-22)

The inclusion of the adjective 'extreme', which appears several times, gives the clauses with weather-attributes a more pronounced negative evaluation:

(5.54) *[carrier]* This year *[Pr: relational, attributive, intensive]* has been *[attribute]* extremely wet *[beneficiary]* for the UK (…) (T2-15)

However, most of the clauses are non-evaluative. Even clauses such as the one in example (5.55), where the attribute is limited to the neutral 'effect' without saying which kind, are not inherently evaluative.

(5.55) *[carrier]* The depletion of ozone *[location]* over the Antarctic *[Pr: relational, attributive, possessive]* is also having *[attribute]* an effect. (T3-21)

5.2.4 Verbal processes

There are 68 verbal clauses in this part of the material. I have grouped the sayers in these processes into the categories presented Figure 13.

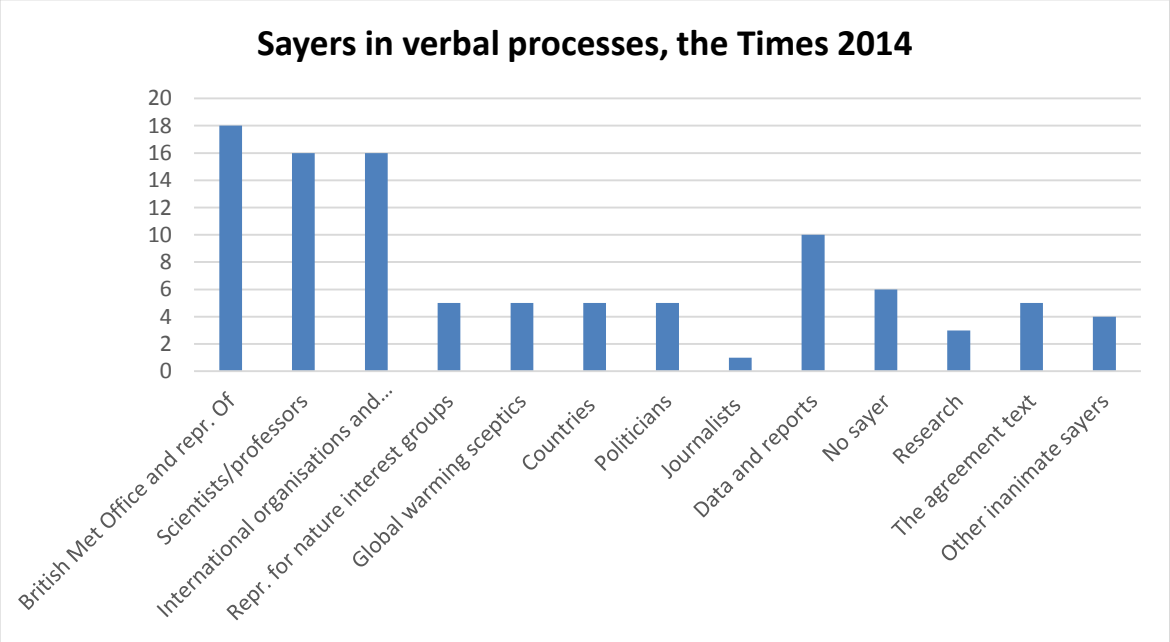

Figure 13: Groups of sayers in verbal processes, the Times 2014. In percentages.

As Figure 13 shows, the largest group of sayers represent the British Met office, either by direct reference to the Met Office, or through individuals representing the Met Office; more specifically, the individuals include 'Simon Partridge, a Met Office forecaster', two references to 'Mike Kendon, a climate information scientist', 'Colin Morice, a climate monitoring scientist', and three references to 'Professor Peter Stott, head of climate attribution'. As you can see, many of these are scientists, yet not placed in the group labelled 'scientists/professors'. In this group, only general references to scientists, or references to researchers whose role I deemed not to be representing of an organisation. A number of the scientists in this category do, however, come from specified research institutions. This is the second largest group of sayers, at 16%.

Most of the verbal clauses project, and thus mostly consist of sayer and a one-word verbal group. The clauses with another participant than sayer, often have this participant instead of the sayer. In six percent of the clauses, the sayer is not specified, neither in the clause nor in context. All these are passives, like in examples (5.56) and (5.57). In (5.56), the source of the criticism is not given, but in (5.57), the sayer is implied to be the author of the fact-sheet.

(5.56) *[target]* The annual conferences *[Pr: verbal]* have been criticised *[matter]* for achieving little but a large carbon footprint, *[accompaniment]* with more than 10 000 people flying to each one. (T6-22)

(5.57) *[verbiage]* The assumptions used by WHO *[Pr: verbal]* are not mentioned *[location]* in its fact sheet, (…) (T1-8)

Research and data – which I have placed into two categories because the data and reports are clearly presented as results/presentations of research, and research as the process – together make up 13%. 'Data and reports' is the largest of the two groups with 10%. Like I noted in 4.2.4, these are also metonyms, a way of referring to researchers as speaker, but with the research as the referent. With these sayers, the verb 'show' appears three times, which I analysed as verbal because they are presented as utterances: 'Satellite data showed', 'The CET records show', and example (5.58):

(5.58) *[sayer]* Figures gathered by the Met Office's Hadley Centre, *[location]* in Exeter *[Pr: verbal]* show | that *[carrier]* 2014 *[Pr: relational, attributive, intensive]* is also likely to be *[attribute]* the warmest on record globally (…) (T5-22)

'Show' also appears with 'we' as a sayer, here 'we' refers to a group of scientists led by Natalie Schaller of Oxford University.

There is no indication whether the sayers I have labelled 'climate sceptics' are scientists or not. These make up 5% of the sayers in the material, as do the categories 'politicians', 'countries' and the written document that came out of the IPCC conference ('the agreement text').

Also at 16% is the group labelled 'international organisations and representatives of'. The organisations are the WHO, the UN health agency, and representatives for WWF, the IPCC and WMO. This group includes seven references to Dr. Goklany (formerly with the IPCC), one of which where he accuses the WHO:

(5.59) *[sayer]* Dr. Goklany also *[Pr: verbal]* accuses *[target]* the organisation *[reason]* in its forecasting of future climate change *[matter]* of ignoring the slowdown in the rate of global warming since 1998. (T1-17)

The group labelled 'politicians' only includes references to 'Ed Davey, the energy and climate change secretary', and the group labelled 'countries' are only general references to 'countries', 'all countries' and 'many developing nations'.

5.2.5 Mental processes

The number of mental processes in *the Times* 2014 material is considerably lower than has been the case in the other sections of my material; only six percent of all processes are mental – which makes up only fourteen clauses. Of these, nine are cognitive, four perceptive, one emotive and one desiderative. The latter two are too few to appear in Table 13 below, because they make up less than 1% each.

Three of the fourteen processes are passive, coinciding with the three processes in this part of the material that do not specify a senser. The phenomena of these clauses all concern

whether or not people really understand the concept of climate change, or that we need new ways to research climate change (as in example (5.60)), mental process clause underlined):

(5.60) *[reason]* To explain why *[actor]* it *[Pr: material, involuntary]* has actually cooled, | *[phenomenon]* another mechanism *[Pr: mental]* is needed. (T3-15)

Six of the sensers, thus just under half, are actually capable of sensing: two are specific people 'she' (referring to Cecilia Bitz), and 'Dr Goklany'; and four are references to institutions or generic references where you infer that there are humans behind the reference who are doing the sensing: 'more than 190 countries' (see example (5.61)), 'scientists' and 'the health organisation', and 'British holiday makers'.

(5.61) *[senser]* More than 190 countries *[Pr: mental, cognitive]* agreed *[phenomenon]* a deal to tackle climate change, (…) (T6-2)

The remaining mental processes include geographical parts of the world experiencing warming or pollution: 'the Arctic', 'Britain' and 'the world as a whole':

(5.62) *[time]* In the past few decades, *[senser]* the Arctic *[Pr: mental, perceptive]* has seen *[phenomenon]* significant warming (…) (T3-3)

Weather ('a very wet last month of the year') and research ('most climate models') are also sensers, like we see in example (5.64).

(5.63) *[time]* Until recently, *[senser]* most climate models *[Pr: mental, cognitive]* assumed (…) (T3-23)

5.3 Comparison: changes seen after 24 years

In this section, I will compare the results from the analyses of *the Times* 1990 and 2014 material. Section 5.3.1 features the comparison of percentages, and in sections 5.3.2 and 5.3.3, I take a closer look at the process types that differed the most.

5.3.1 Frequency in use: types of processes

Table 13 shows the frequencies of process types from the 1990 and 2014 sections of this chapter, compared. Some process types were not frequent enough to register as even one percentage – these, and those not found in in the material at all, are marked by a dash in the table.

	***The Times* 1990**	***The Times* 2014**
Material: intentional	39%	31%
Material: involuntary	6%	7%
Relational: attributive	15%	16%
Relational: identifying	9%	11%
Mental: cognitive	11%	4%
Mental: perceptive	2%	2%
Mental: emotive	1%	-
Mental: desiderative	-	-
Verbal	15%	27%
Existential	2%	2%
Behavioural	-	-
Total	206 processes / 3483 words	247 processes / 3966 words

Table 13: A comparison of process type frequencies in the Times 1990 and 2014 material

Most categories, as we can see, remain stable. The two most notable differences are in the frequencies of mental and verbal processes. While the mental processes made up in total 14% of the 1990 processes, they only make up six percent of the 2014 processes – less than half. The frequency of verbal processes, however, has almost doubled: from 15% to 27%.

Again using Fishers exact test, the difference in frequency of verbal processes between 1990 and 2014 is deemed to be statistically significant, with a two-tailed P value at 0.0101. This is also true for the difference in frequencies between 1990 and 2014 in terms of mental processes, where the two-tailed P value equals 0.0065.[6] However, in 2014, the total number of mental processes is very low, so this might invalidate this significance.

Comparing these results to the numbers presented in 4.3.1, the differences are no more significant than they were for *the Guardian* results. Matthiessen (1999: 16) showed a distribution of process types with 51% material, 23% relational, 10% verbal, 9% mental, 5% behavioural and 2% existential. Studying a larger, but still general, spoken and written material corpus, Matthiessen (2006: 106-107, 124) reports 38.5% material processes, 37.5% relational processes, 10.8% mental processes, 8.7% verbal processes (and 5.8% behavioural

[6] Significance calculated with the tool found at http://graphpad.com/quickcalcs/contingency1/

and existential processes). The former study shows most notably a larger material category than I have seen in my material. The latter study shows markedly fewer verbal processes, as we saw for *the Guardian*, and this difference seems natural due to the nature of the press genre and its use of quotations.

The example study by Thompson (2014: 135), using very limited size press material (50 clauses) shows a slightly different distribution from the one in Matthiessen's studies: 42% material, 24% relational (16% attributive and 8% identifying), 22% verbal and 8% mental (cognitive only). These numbers more closely correspond to my material from each year, suggesting perhaps that climate reportage does not differ too much from other reportage.

5.3.2 Actors and material processes

As we can see from Table 13, there is a slight decrease in the frequency of material processes from 1990 to 2014, but not enough that it carries significance.

In terms of the actors of these processes, the differences are much greater. In 1990, the sentient actors make up 40% of the material; in 2014, 22%. The amount of clauses without an explicit actor has increased from 16% to 20%. In 1990, 22% of the processes were passives, and in 2014 this percentage has decreased to 15%. The category 'politicians' appear for both years, decreasing from 18% to 2% from 1990 to 2014, as does variations on the category 'countries, decreasing from 9% to 6%, and 'research' and 'scientists', with frequencies decreasing from 11% to 9% and from 4% to 2%, respectively.

In the 1990 material, the category I have called 'natural phenomena and climate change' make up 9%. Corresponding categories (in 2014 they are separated because their numbers are greater) together make up 38%: 'weather' makes up 19%, 'pollution' 4%, 'ocean temperatures' 4% and 'the poles – ice and continents' make up 11%.

'People', carrying generic reference, appears in 4% of the clauses in the 2014 material. 'We', with generic reference, appears in 1% of the clauses in 1990.

What these numbers indicate, when seen together, is that the 2014 material has fewer specified human actors, and they are more removed, in terms of use of non-sentient actors and actors with generic reference. The most common type of actor has gone from being politicians, to being weather. However, in 2014 we see a larger percentage of active processes.

5.3.3 Sayers and verbal processes

As was the case in *the Guardian* material, one of the largest differences between 1990 and 2014 in *the Times* material was that the 2014 material included more verbal processes and more quotations, and as I said in section 5.3.1, this difference in frequency is statistically significant. In terms of raw frequencies, the amount of verbal processes has more than doubled – from 31 verbal process clauses and 20 clauses in quotations in 1990, to 68 verbal process clauses and 68 clauses in quotations in 2014.

In 1990, five specific categories of sayers - 'politicians', 'scientists', 'environmental organisations and representatives of', 'journalists', 'countries' - and two general categories, one of sentient sayers and one of non-sentient sayers, were sufficient to present the different types of actors. To properly represent the sayers in the 2014 material I needed 13 categories, one of which is general and the rest specific. Most of the categories for 1990 reappear in the 2014 material, like 'scientists/professors', 'journalists', 'countries', 'international organisations and representatives of'. One group new to the 2014-material is the appearance of participants sceptical to global warming, who make up 5% of the sayers in verbal clauses.

While we in 1990 saw 10% inanimate sayers, 22 percent of the verbal processes in 2014 have an inanimate sayer.

5.3.4 Summary

The fact that the participants identified in this part of the climate discourse are diversifying, both actors and sayers, could indicate that we have seen, and may still be seeing, an increasing plurality of contributions. However, the numbers for both verbal and material process participants show that while there is a greater diversity, the actors and sayers are to a greater degree incapable of volition. Using the terminology of ergativity, the participants are mediums rather than agents, because the external causation is left out of the equation.

Another large difference between the 1990 and 2014 material is the difference in frequencies of mental processes – 14% to 6%.

6 Ideology and discourse

In this chapter, I will attempt to interpret the results presented in chapters 4 and 5 in the light of the critical discourse analysis framework outlined in section 2.3.

In section 6.1, I will discuss and compare frequencies of selected participants, and examine what these can potentially tell us about the focus and ideology of the newspapers. Not all my findings are interesting in light of what I wish to discuss, so I have made a selection. Using results from my analysis, I will then discuss potential ideology shining through in the grammar of the material. In sections 6.2, 6.3 and 6.5, I will look at the following:

- Distancing devices such as passives, clauses where certain participants are left out completely, (non-)sentience and causation.
- The distancing properties of generic references like 'people', 'we' and 'they'.
- Borderline processes that could reflect a borrowing from scientific discourse.

I have actively looked for differences. This inevitably results in a degree of subjectivity, and in itself might cause some exaggeration of the differences; partially because I expect to find them. The differences I have found are statistical, though not always statistically significant, and I am careful in reading too much into them.

6.1 Providing a platform

While the content of the articles in my corpus is not the focus of this thesis, I would like to point out that the degree of certainty the matter is treated with has increased from 1990 to 2014. The following selected extracts serve to illustrate this. In one of the articles from the November 1990 section (T7), "Is this really a scientist speaking", we can read that "As a scientific hypothesis, man-made climate change is plausible but unproven. The scientists closest to the subject make clear their uncertainties at every opportunity, but in the dash towards international action doubts have been forgotten, caveats ignored, and a scientific theory given the status of an ideology." The article continues arguing against how the research cannot be trusted, and sowing disbelief; "Millions of people believed in the truth of Karl Marx' theories, but it did not make them true."

Hajer (1995: 53) points out that in environmental politics, the struggle is not only about positioning oneself in the debate, but to also position others. Thus the actors and sayers that appear in newspapers become interesting, as they are provided with a platform, and afforded an active role in the debate.

In 1990, Britain had a conservative government headed by Margaret Thatcher. As outlined in chapter 5.1.2, 18% of the actors in the material processes in *the Times* 1990 are politicians, and 74% of these are references to the then prime minister. In *the Times* 2014 material, only 2% of the actors are political; a dramatic decrease. The participants are 'Lord Lawson of Blaby, the chancellor in Margaret Thatcher's government', and 'they', referring to the governments' representatives at the UN talks. The first is not a current political actor, and the second is too general for political alignment to be known.

The actors reappear as sayers in *the Times* 1990. Nine of fourteen political sayers (64%) are references to Margaret Thatcher. The others refer to the opposition in equal measure; 'Sara Parkin, of the British Green party, 'Bryan Gould, the shadow environment secretary' (Labour), 'Simon Hughes, the Liberal Democrat spokesman', 'Chris Patten, the environment secretary' and 'ministers'. The last two are both references to Conservative party ministers. Sayers classified as politicians decrease from 45% to 5% from 1990 to 2014 in my material from *the Times*. In 2014, the only sayer who is a politician is Ed Davey, current energy and climate change secretary.

In *the Guardian* material from 1990, seven percent of the actors are politicians, and 22% of the sayers; notably less than in *the Times*. Also, the politicians in *the Times* 1990 were British politicians, which we do not see in *the Guardian*. Of the actors in *the Guardian* 1990 material, three references are to the then US president George H. Bush, one is a generic reference to politicians from 100 countries, and three are to 'Chis Patten, the environment secretary'. Only 1% of the actors in the 2014 material are politicians: 'the Peruvian environment minister'.

In *the Guardian* material, sayers grouped as 'politicians' decrease from 22% to 15%. The 1990 sayers mirror the 1990 actors; President Bush appears as sayer three times, as does Environment Secretary Chris Patten. There is one instance where 'they', referring to politicians from 100 countries, is sayer. The 2014 sayers are in large part foreign government officials: three references to 'Todd Stern, the US State Department's climate change envoy', one to 'Prakash Javadekar, India's environment minister' and one to 'President Barack Obama'.

In addition, there are two references to 'Ed Davey, the UK's energy and climate change secretary', and one reference to the politicians attending the conference.

As discussed in section 2.3.1, there is a general tendency in British media to favour current power-holders (Fairclough, 2001: 43), and while it is not given whether they write 'with' or 'against' sitting administrations, this still helps legitimise an elite. In my material from *the Times*, we see this predominance of giving the floor to domestic, current figures in power. The focus remains from 1990 to 2014, but as we have seen this attention decreases considerably. While *the Guardian* material does not contain the same amount of domestic references, we see a general decrease in political actors and sayers here, too. What this all can imply is a depoliticisation of the environmental debate, especially in *the Times*.

A notable dimension of the coverage is that the Conservative party was the governing party in 1990 (first led by Thatcher then Major), and in 2014 the Conservatives were the largest party in a governing coalition made up by the Conservatives and the Liberal Democrats. This means that in both years, when *the Times* includes domestic politicians, most of whom are Conservative, they are giving a platform to a party they have voiced support for. *The Guardian* includes fewer references to representatives for a party they have not voiced support for, and none to the party they did voice support for. Whether this difference between *the Guardian* and *the Times* comes down to singularities in my material, or whether this is due to journalistic and editorial choice, remains a question for further study.

There is extensive research on the knowledge-deficit in the general public on climate change, with a consensus that the more 'climate-literate' people are, the more likely they are to accept the reality of the situation (see Guy et al. (2014) for history and list of references); yet saying that a general knowledge-deficit is the reason the discourse is fractured is, perhaps, too simplistic. Guy points to several more factors that could influence the public discourse, both cultural and regulatory, but affords most attention to ideology. He refers to research on political ideology and climate change beliefs in the US and Australia which finds "that people who support free-market economics were less likely to accept that climate change is happening, that it is caused by human activities, and that its impacts are serious and negative" (Guy et al., 2014). In the US, the gap between Democrats and Republicans in terms of acceptance of climate change has grown from 10 to 41% from 2001-2010 (Guy et al., 2014). As previously mentioned, I have selected material from newspapers with different political alignments because it can be interesting to see whether there are linguistic differences that may be ideologically rooted. To a certain extent, in terms of providing a platform for

politicians, there seems to be a difference in my material, based on the arguments made in the previous sections.

This way of providing a platform is overtly ideological. However, because of the documented knowledge-deficit in climate issues, and the way this is tied to voting patterns, the scientific convictions of the participants becomes interesting. In chapter 2.4, I discussed Boykoff (2011) and his research on balanced reportage. The idea is that in general, balanced reportage is ideal, because hearing from all concerned parties in equal measure can help ensure fair coverage. However, when it comes to an issue where there is a general consensus that climate change is (at least partially) man-made and actually occurring, the "balanced" reportage becomes misleading to an audience that does not have insight into the academic field of climate research beyond the picture the media paints. In my material, when it comes to providing a platform to sceptics, it is difficult to read a pattern from the results. Of *the Times* material, only the 2014 sayers give overt reference to climate sceptics: 5% of sayers are defined as sceptical. In *the Guardian*, both in 1990 and 2014, climate sceptics appear as sayers: 10% of sayers in 1990, and in 2014, this decreases to 2% (keep in mind that there are almost twice as many sayers in 2014 than in 1990).

None of the four parts of my material featured explicit climate sceptics as actors. However, though the sceptics among the sayers might not be scientists, some of them likely are, and many of the references to scientists throughout my material are general. These might thus also include climate sceptics, and the newspapers could be reporting their findings and views without making explicit that their sources disagree with the consensus.

Scientists, perhaps not surprisingly, feature heavily in my material. Arguably, the scientists and representatives of larger organisations are a form of elite, as defined and discussed in section 2.3.1. Interestingly, both in *the Guardian* material and in *the Times* material, scientists as actors decrease in frequency over time. Of *the Times* 1990 material clause actors, 4% are scientists, none of them climate sceptical. There is a decrease to 2014, which sees 2% scientists. Of the sayers, 23% are scientists in the 1990 material, and in 2014 (bearing in mind the significantly higher frequency of verbal processes), we see 16% 'scientists/professors' (and 5% 'climate sceptics)'.

For *the Guardian* we see a similar development. In the 1990 material clauses, 11% are scientists; this decreases to 2% in the 2014 material, and the category for that year also includes scientific institutions (which one would think are made up of scientists). In 1990, 10% of the sayers are scientists, 10% are sceptical (as already mentioned), and 10% are

references to 'scientists of both camps'. In 2014, this decreases to 4% scientists, and 2% sceptics.

These numbers do not, however, tell the whole story about scientific representation in the material. Those actors categorised simply as 'scientists' are either general references (ex.: 'research scientists', 'the scientists closest to the subject') or references to scientists that are speaking on their own behalf, and not as representatives for organisations. Those who are spokespeople for organisations, such as scientists with British Meteorological Office, are categorised as representatives of these organisations. This means that there is more scientific input than what is recorded into the category of 'scientists'. This input consists of representatives speaking *for* the climate. The same goes for representatives for different nature interest groups in all parts of my material; these speak *for* the climate. This suggests that in terms of voices speaking for and against the climate, the balanced reportage Boykoff (2007) speaks of, does not hold true in my material.

On their own, these numbers might suggest that in addition to what looks like a depoliticisation, we are seeing a drift away from the scientific aspects of the issue of global warming. However, for both newspapers, there seems to have been a shift from presenting the people doing the research as actor and sayer, to presenting the work itself as actor and sayer. While research as actor goes down from 11% to 9% between 1990 and 2014 in *the Times*, research as sayer increases from zero to 10% between 1990 and 2014, indicating an all-over increase in the material. In *the Guardian*, there is a reference to 'modern science' as actor in the 1990 material, but that is all. In 2014, 8% of the actors are in the category 'research results'. In terms of sayers, there are two occurrences of 'studies' in the 1990 material (categorised as 'other non-sentient sayers'). In 2014, 'research' makes up one of the largest categories with 24%. This is the referential strategy termed metonymy: associated work is used to refer to the actors and sayers behind the work, arguably distancing agency.

What this suggests is that, instead of a turn away from the scientific aspects of the issue, we are seeing a depersonalisation in the way climate change is presented in 2014 versus 1990. I will return to the concept of depersonalisation.

An interesting difference between the newspapers is that *the Guardian* has the conference or proceedings in connection with the conference as actor in 19% and 16% of the material processes in 1990 and 2014, respectively. *The Times* does not give this attention to the negotiation: in 1990 4% of the actors are tied to the conference, and in 2014 none of them are. This could be down to the selection of my material, but could indicate less attention paid

by *the Times* to the proceedings that are our only way of achieving resolutions that could bind all nations to counteract global warming.

6.2 Causation - sentience and agency

In the words of van Dijk (2008: 94), the point of using transitivity analysis when studying media discourse is "that events and actions may be described with syntactic variations that are a function of the underlying involvement of actors (e.g., their agency, responsibility and perspective)." This given-by-discourse view of causality may help perpetuate an idea of a state of affairs (Fairclough, 2001: 43). I compared parts of my results on explicit agency in section 6.1, but this framework is interesting also in that it can help uncover instances where agency and responsibility are hidden.

Passivising and nominalising are two ways of systematically de-emphasising and defocusing responsibility, and even disguising power, and I have tried to highlight examples of this where I have found them especially relevant.

The passives are, arguably, one of the most obvious gauges of the obfuscation of agency. In *the Guardian* sections of my material the percentage of passives in the material clauses is stable at 10-11%. In *the Times*, it decreases from 22% in 1990 to 15% in 2014. In the verbal processes, the percentage is very low in all sections (the highest percentage is in *the Times* 2014, in which 6% is passive). Thus, in my material, the use of passives has decreased or stayed stable over time, and does not suggest an increased distancing.

Nominalisations, claims Halliday (in Halliday and Martin, 1993: 78), are the main source of syntactic ambiguity in scientific texts in English, and as in the example Halliday gives – "the announcement of Mary's acceptance" – often a way of obscuring agency. We do not get all the semantic information; in this example, we cannot know who gave the announcement, and are left to assume or deduce. I have not quantified nominalisations in my material, but they seem to be prevalent and are an integrated part of language – we even see them in 'global warming' and 'climate change'. However, when nominalisations appear as participants, I have shown examples and discussed these in chapters 4 and 5. As shown in sections 4.1.3, 4.2.3, 5.1.3 and 5.2.3, especially the relational processes contain what I deem to be a considerable amount of nominalisation. The participants that include nominalisations or down-ranked clauses, for which I do have some numbers, do not increase or decrease notably from 1990 to 2014, not for either of the newspapers.

Another aspect of the burying of agency, are material processes with no actor at all, or verbal processes without a sayer. In *the Guardian* material, the percentage of material clauses with no explicit actor decrease from 14 to 11% from 1990 to 2014. The verbal clauses all have explicit sayers in the 1990 material, while 5% in 2014 do not.

In *the Times* material, the frequency of material clauses without an explicit actor increases from 16 to 20 percent from 1990 to 2014. As was the case in *the Guardian* material, all verbal process clauses in the 1990 material have an explicit sayer, and there is a slight increase to 6% in 2014. Both with *the Times* and *the Guardian* verbal processes, however, it is important to keep in mind the low frequency of verbal processes in the 1990 parts of the material.

As we can see, both newspapers show an increase in verbal processes without sayers, but we see opposing trends when it comes to clauses with no actor; the frequency decreases in *the Guardian*, and increases in *the Times*.

In terms of agency and causation, involuntary material processes are particularly interesting. In *the Guardian* material, the frequency of involuntary processes increases from 7% to 19% from 1990 to 2014. In *the Times*, we also see an increase: from 14% to 23%.

Not all involuntary processes contribute to hiding agency, because not all processes involve a wilful agent. Some do, however. In section 4.1.2, I compared involuntary processes denoting beginnings and ends, things that just are, with those involuntary processes that hide agency. In *the Times* material, involuntary process constructions concerning beginnings or ends are the most common in the involuntary processes, for both years but especially in 1990.

The processes of ends and beginnings are common in *the Guardian* material as well. What is interesting with *the Guardian* material, however, is that, for both years, the actor is frequently the planet or global warming/pollution, actors that seem to be results of processes enacted by humans, or of an industry that was created by humans. While the beginnings and endings of weather could be deemed to be neutral in terms of evaluation, and these do not hide agency to a large degree, the relatively high, and increasing, numbers, could suggest that these clauses help portray nature as actor in the same way we see with the intentional processes. After all, weather is the result of temperature fluctuations and pressure changes; natural phenomena, though phenomena that could be influenced by man made climate change. The involuntary processes, however, could create an even greater distance between agency and actor, because nature is not personified in the same way, and is not portrayed as actors with their own volition.

In section 2.2.1, I noted how the ergativity perspective might shed more light on these examples where we see a change of state (change, begin, end), but where agency is not with the actor. In those clauses where transitivity analysis identifies nature as the actor, the terminology of the ergativity framework would identify nature as the medium which hosts the process, and that the agency lies elsewhere. In example (6.1), the Antarctic is the actor according to the transitivity analysis, and the medium according to the ergativity analysis.

(6.1) *[goal]* Heat *[Pr: material, involuntary]* is being lost *[actor]* by the Antarctic (…) (T3-20)

The ergativity perspective would thus show that nature does not carry responsibility. The transitivity analysis I have performed, however, does not show this distinction.

Through all pie-charts detailing distribution of actor types in material processes, I drew a black line, showing sentient versus non-sentient actors. In my material the trend in both *the Times* and *the Guardian* is that the percentage of sentient actors decrease. From 40% to 22% in *the Times*, and from 51% to 42% in *the Guardian*. As we see, the decrease is considerable in *the Times*. What does it say about these texts when, at most, half the actors are in reality not capable of deliberate action, but are presented as such nevertheless?

As discussed, not all material processes must, or can, have a sentient actor. Interestingly, however, one of the main types of non-sentient participant, recurrent throughout my material, is nature. When the focus of environmental reportage is the environment as an active participant, the depersonification we also see over time could suggest a shift from human agency and responsibility, towards assigning responsibility to nature. The numbers for nature as participant support this tendency: both newspapers show an increase in nature as actor. In *the Times* material, nature as actor increases from 9% to 38%, and in *the Guardian*, the increase is smaller, from 12% to 20%, 1990-2014.[7]

This depersonification is seen also in the mental process clauses in three out of the four parts of my material. As outlined in the section on mental processes and participants in

[7] In the different sections, I have grouped nature-participants a little differently, because different aspects of nature was highlighted by the papers and between the years. I have included categories from all parts of my material that involve nature in this comparison – broadly speaking – also including pollution and food production.

section 2.2.1, mental processes are different from material processes in that they must have a human participant – the senser. My findings, however, do not agree with this. In *the Times* 1990 material, a little over a third of the 29 clauses either do not have sensers, or have sensers that physically cannot sense. And in *the Times* 2014 material, just under half of the sensers are capable of sensing. In *the Guardian* 1990 material, if we include the instances where there is no senser, almost a third of all senser are not innately capable of sensing. In 2014, in contrast to the three parts, all sensers are innately capable of sensing, disregarding the instances where there are no explicit sensers and counting 'wealthy countries' as a reference to the people in power in these countries.

As we see, there is no clear trend neither between years nor between newspapers, but for participants that are "supposed" to be human, the numbers of non-sentient sensers are high. While the mental processes make up a small percentage of my material, and thus this might not be representative for climate reportage in general, this is an interesting dimension to my argument of distancing; there is a duality in my findings, in that there seems to be a tendency of depersonalisation of actors, sayers and sensers. However, when inanimate objects are placed as senser this is a personification of sorts, attributing human traits to inanimate objects.

6.3 Generic references

The expression of ideology is an expression of subjectivity. By for example using 'we' instead of 'they', community and unity is brought to the fore. When discussing world view and climate change, Guy et al. (2014) present four world views, two opposing pairs: egalitarianism and hierarchism, communitarianism and individualism. These world views describe different ways of viewing allocation of resources, and emphasis on group versus individual in societal structures and government intervention. While, as previously mentioned, Guy et al. (2014) argue that a knowledge-deficit influences climate policy but that this is not the entire story; knowledge may interact with ideology, and while typically people with a hierarchical and individualist world view is climate sceptic or climate illiterate, Guy et al. (2014) findings suggest that more knowledge can help reduce the impact of ideology on public opinion. "Widespread understanding of the more fundamental aspects of climate change would inform climate change discourse and may shape policy and voting preferences" (Guy et al., 2014).

Most parts of my material included generic references to 'us' (through using 'we') but significantly less refer to 'them', thus leaning more towards communitarianism than individualism. This goes for both *the Times* and *the Guardian*.

In this section, it is important to note, I am not discussing references that have a specified referent, but rather the empty, generic references. When the references are empty, they serve no function but a placeholder, arguably one step away from not existing at all. Empty references can be another way to hide agency.

In *the Times* 1990 material, there were two generic references to 'we'. One of these references function as carrier, as in example (6.2); the relational clause is underlined. The other is an actor, as seen in (6.3).

(6.2) *[actor]* Industrialisation *[Pr: material, involuntary]* began *[time]* in the second half of the 18th century, | so *[carrier*] we *[time]* now *[Pr: relational, attributive, possessive]* have *[attribute]* at least 200 years' experience of pumping carbon dioxide and other greenhouse gases into the atmosphere. (T7-27)

(6.3) *[sayer]* The scientific working group of the IPCC *[Pr: verbal]* is now claiming *[verbiage]* only a 1C rise by 2025 | *[contingency]* if *[actor]* we *[Pr: material, intentional]* pursue *[scope]* business as usual (…) (T7-18)

Common for these generic references to 'we' is that, arguably, they encompass all humans, and in that way the reference is not exactly empty.

There is one generic reference to 'the world community', the referent here perhaps not too different from the referent to 'we':

(6.4) *[actor]* The world community *[time]* yesterday *[Pr: material, intentional]* launched *[goal]* its response to global warming. (T11-2)

In *the Times* 2014 material, there were no generic references to neither us nor them (the times the words were used they had a named referent in the co-text), but we see a use of 'people' (ex. (6.5)) and 'the whole world' (ex. (6.6)) that is similar to the use of 'we' and 'the world community'.

(6.5) *[sayer]* He *[Pr: verbal]* argues | that *[senser]* the health organization *[manner]* wrongly *[Pr: mental, cognitive]* assumed | that *[actor]* people *[Pr: material, intentional]* would not take *[goal]* practical steps to protect themselves. (T1-6)

(6.6) *[sayer]* He *[Pr: verbal]* said | *[actor]* the whole world *[Pr: material, intentional]* needed to act (…) (T2-30)

In *the Guardian* 1990 material, 'we' appears as carrier three times, as actor seven times and as senser once. In all instances, as was the case with the referents in *the Times* material, the referents all appear to be human. Example (6.7) shows both *we* as senser and *we* as carrier in an intensive attributive relational process.

(6.7) Because *[senser]* we *[Pr: mental, cognitive]* will only be sure | if *[carrier]* we *[Pr: relational, attributive, intensive]* were *[attribute]* right about global warming *[time]* after it has happened, (…) (G7-35)

There is also one generic reference to the world, encouraging cognitive effort:

(6.8) *[senser*] The world *[Pr: mental, cognitive]* should understand *[phenomenon]* the risks it is taking in continuing to rely on fossil fuels (G7-44)

In *the Guardian* 2014 material, generic 'we' appears as senser five times, and as actor three times, carrying similar reference to what we have seen so far.

This part of the material also has an instance of 'they' as actor, where the referent is not given, but it is possible to speculate if one has knowledge on who has the power to halt legislation in Australia.

(6.9) *[location]* In Australia, *[actor]* they *[Pr: material, intentional]* stopped *[goal]* what were some very good carbon laws. (G1-16)

Additionally, 'the world' is actor in one instance, similar to what we have seen before.

What is clear from all this, is that in all parts of my material, the generic references that do occur bring communitarianism to the fore, presumably creating a sense that "we are all

in this together". However, for *the Times* material the frequency of occurrences is very low, and thus might not really say anything of the newspaper beyond my material. For *the Guardian* material (1990 in particular), it might be possible to suggest a tendency of stressing unity.

Another type of actor appearing with varying degrees of specificity in my material, is those that go into the category of 'countries'. As previously stated, I have operated with an idea that there are people behind these noun phrases – that by portraying a country as an actor the writers are referring to whoever is in power in that state. But this raises the point that not all countries are created equal, and that executive power and degree of democracy differ between countries. There is obviously a difference between a dictator and a democratically elected prime minister, but how about between a chancellor and a president? Another interesting dimension is, when a government is democratically elected, whether there also is some agency with the people who gave the governments their mandate.

Of *the Guardian* actors, the category 'countries' makes up 18% in 1990 and 19% in 2014. In *the Times*, they make up 9% in 1990 and 6% in 2014. In other words, the frequencies stay relatively stable. What is common with these actors is that the most specific references are to industrialised countries. When developing countries are actor, they figure only as variations on 'developing countries'. However, on several occasions, 'countries' refer to a series of countries, none named, and in these cases the human volition behind the reference is even further buried. This could betray a western focus in the material, which is not surprising, but could be problematic given that climate change will (and does) affect countries south of and around the equator both earlier and with greater effect than the parts of the world we call 'the western world'.

6.4 Evaluation

As detailed in chapter 2.2.1, relational clauses do not take participants in the same way other processes do. Instead they set up relationships: Identifying processes set up a relationship where a value is used to describe a token; while the relationship is one of sameness, their experiential meaning is not exactly equal (Thompson, 2014: 122). As the name of the one participant type alludes to, there is the possibility of ascribing a value to a participant – a possibility to package evaluation in a way that to a lesser extent is challenged by the reader. Although difficult to systematise in a way that would give hard and reliable numbers, in

chapters 4 and 5, I noted that, especially in *the Guardian* material, values tended to appear as evaluative labels (as defined by Francis (1994)). These labels present implicit interpretations of the tokens, arguably as given information, difficult to challenge. In *the Times* 1990 material, around half of the values were down-ranked clauses, also less likely to be challenged than ranking clauses. In *the Times* 2014 material, the values were largely not overtly evaluative; interestingly, as a large number of tokens concern the weather or the attempted climate deal at the 2014 conference.

In all parts of the material, I attempted to say something about the evaluative nature of the relational attributive clauses, either the attributes or the clauses as a whole. However, the clauses were generally either ambiguously evaluative (see section on attributive processes in 5.2.3), or had a relatively even distribution of negative, positive and neutral evaluation, and no clear patterns emerged. This does not mean that readers will not be influenced by the values, but that there is no discernible pattern as to in which direction.

Another way to insert evaluation into writing is through the selection of whom to afford a platform. I discussed this, as well as the associated notion of positioning, in section 6.1. Positioning of actors can be interpreted as an evaluative action, in the way that they are ascribed a value, and their status as an elite is cemented. Many of the heavily featured actors are elites in their domains; scientists, industrialised countries, politicians and COP negotiators are some examples. By featuring these, their value and position as an elite, is confirmed. Indeed, as van Dijk (2008: 55) argues, events and people included and given publicity (by another elite; the press), is based on who is already an elite, affording the already powerful with recognition and legitimization.

To investigate further the aspect of evaluation, the appraisal framework – a framework tailor-made to such investigations of evaluation – could be useful. However, within the scope of this study, I could not employ this framework.

6.5 Scientific writing

Reflecting on the emergence of writing as a tool to record and store information/knowledge, Halliday (in Halliday and Martin, 1993: 118) argues that written communication has different potential that spoken, and as it removes one potentiality it brings other potential. The very fact that knowledge is written down, allows the possibility of the production of more knowledge, because it changes the way the discourse works. Those participating in the discourse no

longer need to be in the same location at the same time, ready to pick up where another ends. Written discourse has the potential of structure, categories and discipline. "It creates a new kind of knowledge: scientific knowledge; and a new way of learning, called education" (Halliday and Martin, 1993: 118). In this way, writing led to documentation, the possibility to save records of experiences, making it possible to revisit and look up. Furthermore, writing systematised experience, defining it, creating taxonomies and constructions. "The world of written language is a nominalised world, with a high lexical density and packed grammatical metaphors" (Halliday and Martin, 1993: 118). Written discourse allows participants to take certain bits of knowledge and background for granted.

In this chapter I will present some features of scientific language found in my material, drawing mainly upon Halliday and Martin (1993). I present my findings from the different newspapers separately for the sake of readability, and I will say something more general about the findings in 6.6, as part of rounding off the whole chapter.

6.5.1 The Guardian

I have briefly discussed some aspects of scientific language, and argued that news articles handling matters of a scientific nature naturally will adopt some traits from the more scientific genres. As I have shown, and discussed in some detail, many participants of all process types appear as down-ranked clauses or nominalisations, and in particular this is true for the relational process participants, which is part of the reason why categorising these proved challenging.

In discussing relational processes and scientific English, (Halliday and Martin, 1993: 64) write: "The verbal group signals that the process takes place; or, more substantively, sets up the logical relationship of one process to another, either externally (*a* causes *x*), or internally (*b* proves *y*)." In relation to these external and internal logical relationships, Halliday discusses verbal groups that I initially found challenging to analyse because of the nature of the relation they set up, such as *indicate, mean, show, prove,* and *cause,* and verb groups similar to for example *make clear, give pause* and *be based on*.

Halliday postulates that the (internally relational) *show, prove* and *suggest* are relational in cases where both nominal groups defined by their relation to the other are abstractions, yet in cases where these verbs project, they are often mental or verbal. In the examples "A new paper shows" (G2-2), "As a spoiler, we show…" (G2-16), "Our paper

shows…" (G2-43), "…studies showed…" (G11-7), *show* mostly appears to project a kind of utterance rather than define the surrounding nominal groups in relation to each other and thus I have analysed them as verbal. However, in example (6.10) the projecting is less clear-cut. The continued heating is part of the information from NOAA, and thus this indicates a relational possessive identifying relationship.

(6.10) *[sayer]* which (updated information from NOAA) *[manner]* clearly *[Pr: relational, identifying, possessive]* shows *[verbiage]* a continued heating of the world's oceans (…), (G2-18).

Indicate, cause, make clear and *be based on* can be either circumstantial/intensive relational processes or material processes. In scientific texts, the usage of these kinds of verbs is predominantly relational, because over time, scientific discourse has become depersonalised, and projections have become hedged to the point where they have become nominal groups surrounding a relational process (Halliday and Martin, 1993: 64-66). This, and the verbs mentioned (among many others listed in Halliday and Martin, 1993), is central in "constructing the internal steps in the argument whereby a process is paired with one that is evidence for it rather than with the one that is its cause" (Halliday and Martin, 1993: 66). This backgrounding of causation is interesting, because it can serve as yet another way of obscuring agency.

Mean is, according Halliday and Martin (1993: 65), along with verbs like *reflect* and *represent*, externally relational; either intensive, or, as we see in example (6.11), circumstantial. 'Mean' carries the potential to be mental, but here the two participants are defined by their relation of sameness.

(6.11) (…) *[token]* the scrapping of Australia's carbon price *[Pr: relational, identifying, intensive]* meant *[value]* the country was no longer on track to meet its target to cut emissions by 5% by 2020. (G1-25)

In both the 1990 and 2014 material, these processes that I have mentioned, and semantically linked iterations, appear, albeit not frequently.

Verbs like 'ranked' and 'named' also blur the line between material and relational processes. In one text, I encountered two processes where 'ranked' was the main verb, but in

one of these, the inclusion of "was" created a slight difference in meaning, see examples (6.12) and (6.13). In (6.13), Germany is given an attribute that defines it, and because it is passive, we do not know where this is sourced. In (6.12), 'the climate change performance index' performs an action that affects Denmark, the goal, and gives this goal an attribute.

(6.12) *[actor]* The climate change performance index *[Pr: material, intentional]* ranked *[goal]* Denmark *[manner, quality]* as the best-performing country in the world. (G1-4)

(6.13) *[contingency]* Among the world's top 10 emitters, *[carrier]* Germany *[Pr: relational, attributive, intensive]* was ranked *[attribute]* the highest at 22. (G1-5)

The argument could be made that as journalists today have greater access to scientific documents, their style can have been affected. However, I cannot say anything definite on the degree of scientific style of the material, partly because I lack a proper comparison: the numbers for comparison, presented in chapters 4.3.1 and 5.3.1, include more text types than newspaper texts.

6.5.2 The Times

In *the Times* 1990 material, there are two instances of 'be based on' as identifying relational; I discussed these in the section on identifying processes in chapter 5.1.3.

As discussed in 6.5.1, 'show', 'prove' and 'suggest' can be relational, mental or verbal depending on the type of relational they establish. All instances of 'suggest' in both sections of the material are clearly verbal.

While it does not appear in the 1990-material, in *the Times* 2014 material, 'show' appears in verbal groups a total of six times (twice in quotations), and every instance but one, these are verbal projections similar to utterances, only uttered by scientific texts. I discussed these in section 6.5.1. In one instance in the 2014 material, the meaning/function of 'show' is more debatable. Halliday, in Halliday and Martin (1993: 65), writes that 'show' may be interpreted as relational if the participants are both abstract nominal elements. While *that*-clauses often project, it could nevertheless be argued that in example (6.14), we see a part-whole relationship, and the content of the *that*-clause is not presented by a sayer in the same way a report presents something.

(6.14) *[token]* History *[Pr: relational, identifying, circumstantial]* showed *[value]* that people adapt to such threats. (T1-13)

In 1990, there are no instances of 'mean' appearing in a verbal group. In 2014, however, there are seven, two of which appear within quotations, and all of which set up a relationship that led me to analyse them as relational identifying circumstantial. In example (6.15), *mean* seems to describe a relation of causation between the participants on either side of the verb:

(6.15) *[value]* Increased snowfall on the Antarctic continent *[Pr: relational, identifying, circumstantial]* means *[token]* the great ice shelves that ring the continent are extending further north into warmer seas. (T3-16)

The participants are identified in relation to each other, and causation makes it circumstantial (Halliday and Martin, 1993: 65).

We see a similar relation established in example (6.16):

(6.16) (…) and *[token]* less of it (ozone) *[Pr: relational, identifying, circumstantial]* means *[value]* that Antarctica will cool. (T3-22)

(6.17) *[token]* Rising levels of greenhouse gases *[Pr: relational, identifying, circumstantial]* mean *[value]* the atmosphere and oceans retain more heat. (T4-11)

There is a relationship of causation, and the participants are identified in relation to the other. These types of verb (show/mean/indicate/points to) seems to be blurring the division between verbal, material and relational processes. In the same way the mental 'mean' is used relationally in (6.16) and (6.17), and the material 'show' is used verbally in the examples in the beginning of section 6.5.1, in example (6.18), *points to* is more of a material action, but used metaphorically it becomes a way to convey a verbal process.

(6.18) *[sayer]* He *[Pr: verbal]* points to *[verbiage]* Met Office data showing that the climate has warmed at a rate of 0.04C per decade, a third of the 0.14C assumed by the WHO. (T1-18)

6.6 Summary

According to Fairclough (2001) and Martin and Rose (2007: 314), there is no meaning without power, and there is no expression without ideology. As I have reiterated at several points throughout this thesis, a direct link between discourse and cognition may be difficult to draw. While none of the concepts and changes I have mentioned and discussed by themselves paint a complete picture, writing from the perspectives of the aforementioned researchers, the results from my analyses can all point to a few general tentative tendencies. They all can be said to distance the reader from the matter of climate change: through increased focus on non-human, non-sentient participants; through nominalisation and passivisation; through empty or generic references or the exclusion of a participant altogether.

We are, through the use of certain actors, sayers and sensers, conditioned to see causation and responsibility a certain way, or interpret the information we are given in a certain way. And if this (and the burying of responsibility in nominalisations, as we saw with relational processes) positions readers to understand and conceptualise climate change as 'something that just happened', and something that is impossible to counteract, language is effectively harmful.

The connection between discourse and shared political and social cognition is neither direct nor explicit. The texts and discourses we encounter in socialisation, education, our exposure to the media and the conversations that we have, all help produce and shape our mental representations (van Dijk, 2008: 155). The tendencies I have pointed to, can be possibly harmful for the climate discourse as a whole; a discourse that has accompanied negotiations that have not produced anything tangible in a decade.

In section 2.1, I discussed the circularity of discourse production, where media output is dependent on input that is partially shaped by other media output. This input may also come from other discourses, such as scientific discourses. Because we also see a significant increase in verbal processes, most of which project, and a corresponding increase in the amount of sayers heard from, it may be possible to argue that as the number of available platforms for utterances has grown, there might be a greater degree of input into today's discourse. This might suggest an increased degree of what Hajer (1995) terms inter-discursivity, and what others have called intertextuality. Scientific discourse may also be contributing to the increased input into the media discourse on the climate. If this is the case, the inclusion of

complicated scientific issues may be increasing the distance between discourse producer and reader.

In *Writing Science*, Halliday and Martin (1993) argue that relational processes make up a larger part of scientific texts than most other text types. Without very similar types of material (albeit on a different topic) to compare with, it is difficult to say anything about whether the frequency of relational processes for these environmental texts are different from other press texts. My results show that the percentage of relational processes has remained stable from 1990 to 2014 in both *the Times* and *the Guardian*, indicating no apparent change in style. In all parts of my material there are instances of processes highlighted by Halliday and Martin as typical of scientific discourse (see chapter 6.5), but in terms of frequencies it is difficult to say anything conclusive.

Whether or not the tendencies I have pointed out say anything about societal structures is unclear. According to Norman Fairclough, a discourse study "ought to stress both the determination of discourse by social structures, and the effects of discourse upon society through its reproduction of social structures" (Fairclough, 2001: 34). Because the majority of people are not conscious of how the discourse around them, and discourse they themselves produce, can contribute to this, one aim of critical language studies becomes increasing awareness (Fairclough, 2001: 34). This study has brushed upon some aspects of how the press handles responsibility and agency, which does have the potential to influence the reader. The power of the press is a cumulative power – on its own, one text is just about insignificant. Positioning, and patterns of causality and agency are only solidified as shared cognition through constant reiteration (Fairclough, 2001: 45). My material is too small to say that the patterns I have pointed to can say something about the patterns of the discourse as a whole.

It is not a given that journalists or editors are aware of why they are passivising or nominalizing, or why they have shifted away from sentient participants, and what effect this can have. It is, in other words, impossible to say whether media power is manipulative in the way that it sets out to influence people (Fairclough, 2001: 45). Nevertheless, the patterns suggested are interesting to keep in mind, both for producers and consumers of environmental news.

7 Concluding remarks

If there is no one true interpretation of anything, and "[t]he text is a limited field of possible constructions" (Ricoeur, 1981: 213), how is it possible to conclude a thesis which builds on the interpretation of text?

In his essay on text interpretation, Ricoeur (1981) deals with how to validate results within what he terms 'human sciences', under which discourse studies fall. He argues for a process of validation where probability is preferable to empirical verification, which when put like this might seem backwards, but it entails that "to show that an interpretation is more probable *in the light of what is known* is something other than showing that a conclusion is true" (Ricoeur, 1981: 212, my emphasis). Because of the highly subjective nature of text interpretation, verification of results becomes problematic (not to mention the hornet's nest that is the concept of 'truth'). Building on research done before, and my own results, I have simply aimed to suggest tendencies. However, a problem I encountered was to find results from other transitivity analyses done solely on press texts, so the comparison done in chapters 4.3.1 and 5.3.1 cannot be said to hold much validity. What the numbers I have compared my results to suggest, is that they do not deviate markedly from other studies in ways that cannot be explained by the media's propensity for quotations.

"It is always possible to argue for or against an interpretation, to confront interpretations, to arbitrate between them, and to seek for agreement, even if this agreement remains beyond our reach" (Ricoeur, 1981: 213). I have tried to confront my own interpretations throughout the thesis, holding my results up to consider them from a variety of angles, but I reiterate: in this type of discourse studies, it is important to acknowledge an element of subjectivity.

As mentioned in the introduction to this thesis, Paul Ricoeur theorises that authorial meaning does not necessarily carry into written discourse. I have not been able to prove or disprove this, because the tendencies I have found do not point in one single direction. What I have found is a tendency towards depersonalisation over time (from scientists to research, for example), because fewer actors in 2014 are human or sentient. There is also a surprising amount of non-sentient sensers given the nature of the mental process category. Furthermore, I saw a general increase of clauses with no sayer, and an increase in *the Times* of clauses with no actor (*the Guardian* here saw this percentage decreased). We also see an increase in

involuntary processes, in both newspapers over time. Importantly, I also found a considerable increase in nature as actor in both papers, over time.

I have also seen a general depoliticisation in both papers, with fewer political participants in the recent parts of the material. There is also a tendency for *the Times* to favour domestic politicians, which we do not see to that extent in *the Guardian*.

However, the amount of nominalisation, down-ranked clauses, and passivisation has not changed much over time, nor have I been able to describe a pattern of change in evaluation in relational clauses. In addition, all indicators point towards the reportage not carrying the "bias of balanced reportage", as most participants speak *for* the climate. This is not to say that there might not be a bias elsewhere than in the linguistic structure.

My hypothesis was that the language used is closely tied to the state of environmental politics, but the scope of this thesis proved too limited for me to either prove or dispel this hypothesis. My findings are inconclusive, and some of what I expected to find, I did not. For example, the expectation of ideological differences between the ways *the Guardian* and *the Times* address climate change was not fulfilled. What is more, some of the differences I have seen, can be attributed to traits of the individual texts I analysed. For one, one of the articles in *the Guardian* 2014 material heavily featured the Pope as both sayer and actor, because the article concerned his role in the climate change debate. While more prominent singularities like this is possible to correct for when comparing, as I have tried to do, I have likely not been able to correct for all such idiosyncrasies. The size of my material is limited, so pervasive features of one article will colour the results.

Over the years, we have seen a stagnation in the debate and a lacking political will to commit to curbing emissions and little international momentum; as recent years have shown, the yearly UN-convened meetings fail to unify nations around a plan to slow climate change, and no new agreement on the scale of the Kyoto Agreement has been agreed upon. Political will is influenced by public will (voter satisfaction and re-election), which in turn is influenced by the press. What can be seen as a shift in the placement of responsibility (depoliticisation, depersonification and increased focus on nature as actor) has likely not been helpful to forward the climate debate. However, drawing this line of causation is tentative, at best.

One of the aims of this study was to see whether the ideologies or political outlooks of the two papers from which my samples were taken (*the Guardian* and *the Times*) carries through to the text. In my material, from two years with the conservatives or a conservative-

led coalition in government, *the Times*, the more conservative newspaper of the two, affords most place to the sitting government. It thus seems that political alignments seem to guide the inclusion of actors in *the Times* material. This does not hold for *the Guardian* material.

As indicated, the media play an important role politically, for example in informing voters and setting an agenda that politicians will often have to adhere to or respond to. As I have shown, my material shows a depoliticisation and depersonalisation of causation, with an increase in active roles given to nature. Keeping in mind Hajer's view on the constitutional role of discourse and the line between linguistic structures and cognitive processes (Hajer, 1995: 59), this could help present an image of climate change as something "that just happened" until it is commonly accepted as truth. Hajer (1995) sees political discourse "as a struggle for discursive hegemony in which actors try to secure support for their definition of reality" (Hajer, 1995:59). When the politicians perpetuate a status quo, the media can as well; when the media perpetuate a status quo, political actors can as well. The depersonalisation of the actors through time is perhaps the most tangible way that the climate discourse of my material helps disguise causation. The power here – hiding human agency – is "the power to disguise power" (Fairclough, 2001: 43); whether the media are aware they hold this power or not is another matter.

The SFG framework uncovered actors that tell us something about the focus of the reportage, such as continuing to legitimise elites. Interestingly, the countries that appear as actors – their numbers stable over time – are largely either industrialised countries or generic references such as 'countries'. Reading these results from a CDA perspective, this western bias could help perpetuate the situation where industrialised countries, who bear most of the responsibility for anthropogenic climate change, will not necessarily bear most of the cost of topping or reversing it. Whether or not you can call one part dominant and the other dominated, is, however, uncertain, though one part is stronger than the other in several ways. Yet, if these texts could be said to reaffirm a kind of hegemony, this would be how.

In terms of uncovering agency, my framework left something to be desired, in that the participant categories are not directly aimed at uncovering this. The ergativity framework would perhaps have provided an interesting perspective to this aspect, and had time and space allowed for it, I could have pursued this line of investigation. Furthermore, my study did not provide me with results that show tendencies as clear as I had originally hoped. Whether this is due to the framework or the size of my material is unclear. Because of the scope of a master thesis, I have had to limit myself with regard to size of material, and my results are largely not

statistically significant. It would, of course, be ideal if further studies could add verification to, or disprove, the sketch that I have provided with this thesis.

The scope of the thesis also implied some methodological limitations. I had, for example, not enough time to be able to analyse the down-ranked clauses separately and present the results from these. Because of the nature of these clauses, it would be interesting to see if there are patterns of participants and processes in these clauses that the writers have "downgraded" in terms of significance, and thus, arguably, made more difficult to challenge.

Another aspect I would have liked to look at in more detail is reader orientation – for example model readers (implicit audiences) and framing – combining a linguistic approach with media studies and rhetoric. This could enable us to say more about how language is used to sway public opinion.

Because my 1990 material is taken from print news, and my 2014 material from the online versions of the same newspapers (the articles may have appeared in print as well, but I have not verified this), my margin of error when comparing diachronically is bigger than it might have been. Given the possibility, it would be interesting to look at differences between texts written for print and online, using material from today. Increasingly, we go online for news and new knowledge, and looking at possible differences in processes here, could perhaps tell us something new about the differences in online/print-genres.

However, though it had its short-comings, the framework proved useful to a certain point. It served to systematise the language of the texts analysed, showcasing elements for further investigation, shown, for example, in how I isolated the actors in the material clauses and looked at these in more detail. Distinguishing between sentient/non-sentient actors (and to a degree also sayers), is my own idea, and this made it possible to see a diachronic difference when building on the results from the transitivity analysis. The framework also highlighted a few interesting differences, such as the increased degree of depersonalisation from 1990 to 2014.

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Appendices

The Guardian-material December 2014

Article	Author, headline and URL	Date	Word count
G1	Graham Readfearn: *Australia named worst-performing industrial country on climate change* http://www.theguardian.com/environment/2014/dec/08/australia-named-worst-performing-industrial-country-on-climate-change	Dec 8, 2014	558
G2	John Abraham: *Global warming continues despite continuous denial* http://www.theguardian.com/environment/climate-consensus-97-per-cent/2014/dec/11/global-warming-continues-despite-continuous-denial	Dec 11, 2014	895
G3	Suzanne Goldenberg: *Lima climate change talks end in agreement – but who won?* http://www.theguardian.com/environment/2014/dec/14/lima-climate-change-talks-who-won	Dec 14, 2014	588
G4	Suzanne Goldenberg: *Lima climate change talks reach global warming agreement* http://www.theguardian.com/environment/2014/dec/14/lima-climate-change-talks-reach-agreement	Dec 14, 2014	898
G5	Fiona Harvey: *Global warming will cut wheat yields, research shows* http://www.theguardian.com/environment/2014/dec/23/global-warming-cut-wheat-yields-research-shows	Dec 23, 2014	493
G6	John Vidal: *Pope Francis' edict on climate change will anger denier and US churches* http://www.theguardian.com/world/2014/dec/27/pope-francis-edict-climate-change-us-rightwing	Dec 27, 2014	899

The Guardian-material November 1990

No time for dead certs
Myles Allan
The Guardian (1959-2003); Nov 9, 1990;
pg. 29

As the Geneva conference on global warming ends, **Myles Allan** argues that the issue is too important to get sidetracked by mud-slinging or calls for facts that no one can provide

No time for dead certs

JUST as we were beginning to get a little tired of the problem of global warming, along come articles and TV documentaries telling us that it's all been blown vastly out of proportion. Is this a coincidence?

Probably not. After all, scientists are only really entertaining when they're arguing with each other, and we all tend to sympathise with dissidents. So as soon as there seems to be a consensus on a matter of general interest, any remaining mavericks find themselves in high demand, to provide the dissident view.

What the global warming argument boils down to is this: Will rising levels of CO_2 translate directly into an increase in temperatures at the earth's surface, or will atmospheric circulation patterns and the amount of cloud around change enough to absorb most of the shock, rather like the crumple zones on a car? The answer is that no one really knows, so no one really knows how much of a temperature rise to expect.

Meanwhile the climate warming debate seems to have become entirely, and unhealthily, preoccupied with the question of whether it's going to be a 1°C or a 4°C rise. But for practical purposes, the world's average surface temperature is irrelevant: we have trouble enough even measuring it. What matters for the Indian farmer is whether the rains are strong enough to irrigate the rice without washing away the farm. It would be small compensation, during floods or a famine, to know that changes in tropical circulation patterns had prevented the world's average surface temperature from rising as much as it might have done.

One way to find out if car crumple zones work is to drive in to the nearest wall

The essential point is that changes in greenhouse gas concentrations over the coming 50 years are going to administer a shock to the atmosphere's energy budget, comparable in size to the changes which seem to have thrown the climate in and out of the ice ages. It is not at all clear, as the sceptics claim, that the climate system is equipped with adequate crumple zones which will absorb the shock, and which we can make do without.

One way to find out if crumple zones work is to drive as fast as possible in to the nearest wall. This seems to be the plan at the moment.

Sceptics point out how difficult it will be to make any difference to the final outcome, since past emissions have already committed us to a significant warming, and the more carbon dioxide we pump out, the less difference it will make whether or not we produce that extra tonne. As well as being defeatist, this is grossly misleading. The "final outcome" which the sceptics are referring to here is the eventual temperature rise once the atmosphere has finally stabilised again. Even if we stopped emissions tomorrow, this would not be for several hundred years.

For practical purposes, what matters is the *rate* of warming. The world's ecosystems and societies could probably cope with a warming of 0.5°C per century: they appear to have done so in the past. But a warming of 3°C per century may be the greatest shock the climate system has experienced since the end of the dinosaurs. Perfectly feasible reductions in emission rates will make a significate difference here, so the "it's too late so why bother?" argument is just plain wrong.

The global warming debate is bringing out the worst in the scientific community. Sceptics claim their careers are being jeopardised for stepping out of line. They in turn are accused of soliciting cheap publicity. The whole spectacle is unedifying. Why are scientists finding it so hard to cope?

If it wasn't for the fact that decisions must be taken now (since the decision to delay any decision may be the worst choice of all), most scientists would prefer not to pronouce on long-term climate change at all. We have trouble enough predicting the weather beyond the next couple of days, and forecasting into the next century requires stretching current knowledge, arguments and models to their limits.

Scientists in both the mainstream and sceptics' "greenhouse camps" seem embarrassed at having to admit that they believe climate change is a significant threat, but that they don't fully understand it. Some react by exaggerating their confidence in their models, others by pointing out the models' all-too-obvious flaws. Both lines are misleading.

In the past, physical scientists could stick to presenting results they were sure about and inventions they'd tested in the privacy of their own labs. By doing so, they could maintain a comfortable distance from the policy implications of their work. Because we will only be sure if we were right about global warming after it has happened, climatologists are having to develop the infant science in the full glare of publicity. It is hardly surprising they find it uncomfortable.

Given that, on present form, we are not going to have a cut-and-dried result on global warming before it really is too late to do much about it, climate scientists may have to admit that they cannot tell the world what to do, without really needing to explain why, as scientists have tended to do in the past. Instead, they will have to expend far more effort on responsible communication. Non-scientists, in turn, need a more realistic view of what science can offer on this issue.

President Bush demanded "facts, the stuff that science is made of," at the White House Conference on the Environment last April. This is 19th-century science. Modern science deals with risks and probabilities, which are no less real or dangerous for being uncertain. Taunting scientists into presenting facts they don't fully believe in helps nobody.

The world should understand the risks it is taking in continuing to rely on fossil fuels. Climatologists have a key role in helping it to understand. They will not help by claiming to know more than they do, nor by suggesting we can ignore dangers because there is a chance they won't materialise. You, in turn (and President Bush) need to work on understanding: this is too important an issue to take your favourite expert's word on it. Good luck.

Myles Allan is researching climate modelling in the Department of Atmospheric Physics, Oxford University.

Europe turns 'greenhouse' heat on US
Paul Brown Environment Correspondent
The Guardian (1959-2003); Nov 6, 1990;
pg. 6

Europe turns 'greenhouse' heat on US

Paul Brown
Environment Correspondent

EUROPE put heavy pressure on the United States yesterday at the World Climate Conference in Geneva to reach agreement on stabilising greenhouse gas emissions and to slow the threat of global warming.

The 18 countries in the European Community and the European Free Trade Area agreed a joint statement pledging to peg the continent's emissions at 1990 levels by the year 2000.

Politicians from 100 countries, including Mrs Thatcher, arrived yesterday to be met by a declaration from 600 scientists, who delivered the sternest warning so far of the danger of global warming and called on governments for immediate reduction of carbon dioxide emissions.

They warned that many plant and animal species would be wiped out and large human populations would be forced to migrate because of drought if action was not taken.

The conference is trying to agree on a declaration that will allow negotiation to begin on a world climate convention to tie every country into a programme of reducing greenhouse gases.

So far the United States and the Soviet Union, the two largest producers of carbon dioxide, have refused to agree to targets to stabilise emission.

Speaking after the European stabilisation deal, the EC's environment commissioner, Carlo Ripa de Meana, said: "Europe is now at the heart of the matter of the environment and leading the battle to stop global warming.

"The question is to convince the US and USSR to move to their position."

He said Europe produced 750 million tonnes of carbon dioxide a year, but the United States produced nearly twice as much. The deterioration of the environment made it important to reverse the trend of ever-increasing emissions. The large American delegation was, unusually, not talking to the press.

It was trying hard to hammer out a form of words for a final declaration that should allow them to fix a target when it became more politically acceptable at home.

Chris Patten, the Environment Secretary, hopes that possibly as early as February, when the first round of negotiation on the proposed climate convention is due to take place in Washington.

After his experience a week ago, when Britain was allowed to lag behind Europe with a 2005 target, Mr Patten was trying to stitch together a deal that should allow all countries at the conference to sign some form of declaration.

He said: "The Americans are vital to any agreement because they produce 25 per cent of the world's emissions. I am sure they will soon have a programme to stabilise them.

"We have to find agreement at this conference so that all countries can go forward to the next round in February and begin serious negotiation on a convention."

The object was to have a complete convention negotiated by 1992, with as many national programmes as possible established and agreement for aid and technology transfer to Third World countries to cut their emissions.

Mrs Thatcher is due to make a keynote environmental speech to the conference today. Nations such as India and China will be listening for promises of aid from the West, as they believe that action and aid rather than lectures are needed.

The Prime Minister is credited with putting issues like global warming on the international agenda with her speeches to the United Nations but in practical policies she is now seen as slowing progress for domestic political reasons — particularly electricity privatisation.

Accord paves way for limits on warming gases
Paul Brown
The Guardian (1959-2003); Nov 8, 1990;
pg. 11

Accord paves way for limits on warming gases

Paul Brown in Geneva

AN AGREEMENT aimed at limiting global warming before its effects become catastrophic was signed yesterday by ministers from 137 countries at the end of the World Climate Conference.

The accord lays the foundation for a world convention with legally binding protocols, which would mean advanced countries cutting carbon dioxide emissions and providing financial and technical aid to developing countries to do the same.

For the first time the scientific case that the rate of climate change is unprecedented and threatens the social and economic development of some areas in the world, was accepted by all governments.

The United States and the Soviet Union, which had resisted setting targets for stabilising carbon dioxide, signed the statement and agreed to take part in negotiations beginning in Washington in February to outline a legal convention.

The aim is to produce the convention by 1992, when an environment conference sponsored by the United Nations is to be held in Brazil.

Dr John Knauss, head of the US delegation, said that yesterday's agreement was a watershed which acknowledged that the whole world was "all in this together."

Chris Patten, the Environment Secretary, said it was "a helpful step forward".

"We have constructed the foundations. We now have to finish the building and the architectural work on the problems we still have to resolve," Mr Patten added.

Britain's leading scientist at the talks, Dr John Houghton, chief executive of the Meteorological Office said: "With population growth, global warming is the biggest problem that human society has ever had to face and today we set out on the long road to attempt to solve it.

"This is a process that is going to go right into the next century and is not going to be settled easily, but the scientific community has clearly got its message across that the climate is changing because of the emissions of greenhouse gases."

The conference, however, failed to set targets for stabilising or cutting carbon dioxide emissions, and the issue was fudged in the final document.

Despite the general political welcome, the hundreds of environmental groups lobbying the meeting were not happy.

Dr Jeremy Leggett, scientific adviser for Greenpeace said: "There is a chasm between what the scientists have been saying and what the politicians are prepared to do about it. We have seen hundreds of the world's best climate scientists urge immediate cuts in carbon dioxide emissions, but politicians hesitate to even advocate freezing such emissions.

"They have treated the interests of future generations in a cavalier fashion and not guaranteed their environmental security."

Rewriting the rules
Phillipe Sands; Elliot Richardson; Paul Brown
The Guardian (1959-2003); Nov 2, 1990;
pg. 29

Negotiating a climate convention will be tortuous. As the talking starts in Geneva, **Phillipe Sands** and **Elliot Richardson** outline the problems and **Paul Brown**, below, reports on the progress made

Rewriting the rules

MINISTERS from over 100 countries meet in Geneva on Tuesday to prepare a mandate for the negotiation of a framework convention on climate change. Their task is daunting. Formal negotiations will begin in February 1991, hopefully to be completed in time for a convention to be signed at the UN Conference on Environment and Development in Rio de Janeiro in June 1992.

Negotiators will have to overcome dismaying difficulties. Despite the consensus of the scientific community reflected in the final Intergovernmental Panel on Climate Change (IPCC) report last August, the reality of global warming is both distant in time and uncertain in its consequences.

The negotiating process is further complicated by the enormous variety of activities that generate the greenhouse effect: electricity generation, deforestation, transportation, agriculture, and so on. These go to the very heart of developed and developing societies, and their regulation will have profound economic, political and social consequences for the international community.

It is inevitable, therefore, that some industrial countries will resist constraints which impair their competitiveness and that some developing countries will resist constraints which impair their growth.

Additionally, unlike the Law of the Sea Convention, negotiators will not be assisted by the existence of a well-developed body of rules of customary international law. The existing international legal rules and the system for the protection of the global atmosphere from the effects of greenhouse gases suffer from at least four major weaknesses.

The traditional system of international law is ill-equipped

The legal obligations of states are based principally upon rules of customary international law which are unclear, ill-defined, and ill-suited to deal with the scientifically documented degradation of the environment.

The traditional system of international law, founded upon the notion of sovereign and equal states, is ill-equipped to deal with pollution on a global scale and the protection of areas beyond national jurisdiction.

The procedures for ensuring compliance and enforcement, are virtually non-existent.

The institutional basis for law-making (including monitoring and standard-setting) is spread between competing international institutions which have overlapping jurisdictions, inadequate cooperative procedures, and limited powers.

So the negotiation of a framework convention on climate change can only be the first step in a continuing process of remedying these very significant deficiencies.

Nevertheless it presents a tremendous opportunity to begin the process, particularly since the contemplated negotiating arrangements envisage the possibility of adopting one or more protocols, on energy and on forestry, at the same time as the framework convention.

What should the essential elements of a framework convention be? Clearly, there exist three minimum elements. The first is a statement of goals, principles and general obligations, including an explicit recognition that the earth's atmosphere is an integral part of the environment and cannot be treated as a limitless dumping ground and a commitment to reduce global emissions of carbon dioxide, the single largest contributor to global warming, and other greenhouse gases. The second is language establishing effective procedures for the negotiation and adoption of supplementary protocols. The third is specific provision for a series of measures designed to encourage the immediate adoption of national commitments, establish effective reporting requirements, permit the independent monitoring of compliance with those commitments, and mobilise public opinion.

But, if the framework convention is to be effective, a number of other principles and provisions should also be set out in the convention. It should be designed to attract the necessary participation of developing countries. The experience of the 1985 Vienna Ozone Convention and the subsequent Montreal Protocol, makes it clear that to do this a framework climate convention must contain language providing for the effective transfer of "clean" technologies and for equitable and appropriate funding mechanisms to compensate these countries for the fiscal consequences of "signing on."

It must also commit governments to take a precautionary approach, requiring them to anticipate and prevent damage rather than respond reactively to damage after it has occurred. This requires activities and practices likely to have a detrimental effect on the atmosphere to be controlled, and those already causing damage to be limited or prohibited.

Third, the framework convention should recognise that imposing obligations on governments is insufficient. Additional procedural mechanisms are required to determine the compatibility of activities with the convention and with protocols. These include appropriate International legal mechanisms for environmental impact assessment, for public access to relevant information, and for review of activities.

Finally, the framework convention must establish an appropriate institutional body, or agency, to oversee the application of the convention and protocols. The agency should have a role in many if not all of the mechanisms necessary to carry out the purposes of the framework convention, including — the definition of targets; the adoption of country-by-country strategies ; progress reports; monitoring of national performance; verification of national emissions and assistance to developing countries.

The outcome of the negotiations will inevitably turn on the political will of the international community. Dismal as the prospects for an effective convention may seem, history tells us that where such will exists international law does allow for the negotiation of new treaties and the establishment of new institutions in remarkably short periods of time. After all, the IMF articles of agreement were negotiated in less than four weeks and the post Chernobyl convention on assistance following a nuclear accident in just four months.

● *Elliot Richardson is a former Ambassador to the Court of St James and head of the US delegation to the UN conference on the Law of the Sea.Phillippe Sands is director of the Centre for Environmental Law, King's College, London.*

Scientists warn of climatic disaster
Geoffrey Lean Environment Correspondent
The Observer (1901 - 2003); Nov 4, 1990;
pg. 12

Scientists warn of climatic disaster

Geneva

Geoffrey Lean
Environment Correspondent

MORE than 600 scientists last night urged the world's governments to cut emissions of carbon dioxide by at least half to save the world from disastrous climatic change.

The call, by the United Nations World Climate Conference, which has been meeting here for a week, will now be submitted formally to Ministers and government officials from more than 100 countries — including Mrs Thatcher — who will join the conference on Tuesday to launch negotiations on a world treaty to tackle the greenhouse effect.

The scientists are pressing for far more drastic changes than almost any government is yet willing to consider. Most developed countries plan merely to stabilise emissions of carbon dioxide — the main cause of global warming — at present levels.

The two biggest polluters, the United States and the Soviet Union, which account for 40 per cent of emissions, are not ready even to do this.

Despite vigorous last-minute objections from representatives of the US, Soviet Union and Saudi Arabia, the scientists last night concluded that studies showed that many industrialised countries could cut their emissions by at least 20 per cent over the next 15 years using technologies that are already available and cost-effective.

And they added that emissions would have to go on being reduced by about 1 per cent a year if levels of carbon dioxide in the atmosphere were not to rise by more than 50 per cent above natural levels. Higher concentrations would threaten to produce catastrophic warming.

John Houghton, director of the Meteorological Office, who led a UN study of 400 scientists on climatic change, told *The Observer* yesterday that if emissions continued to rise at present rates, the world 'may become hotter than it has ever been'.

Mostafa Tolba, executive director of the UN Environment Programme, which helped to convene the conference, said: 'The world faces a threat potentially more catastrophic than any other in human history. The available evidence suggests that global warming may already have begun.' Science makes it clear that nothing less than dramatic reductions in emissions of greenhouse gases will stop the inexorable warming.

Officials are meeting over the weekend to work out how world leaders will respond to the scientists' challenge. They are haggling over a draft statement for the Ministers to announce at the end of the conference.

Most Western countries are pressing, against opposition from the US, for the Ministers to agree targets for controlling emissions. But there is no chance that these will go as far as the scientists want. In fact, last night the United States was succeeding in watering down even the mild proposals originally contained in the draft statement.

But one nation is already well on the way to meeting the scientists' targets. A West German all-party parliamentary commission last week agreed that emissions for the whole of the new unified Germany should be cut by 30 per cent by the year 2005 and 80 per cent by 2050. Because of its all-party support this is likely to become German policy early next year.

Stewart Boyle, of the Association for the Conservation of Energy, said: 'The scientists are clearly telling the world's politicians that uncertainty is no excuse for inaction. Mrs Thatcher must now commit Britain to real cuts in carbon emissions, otherwise she will lose credibility and the country will fall rapidly behind other members of the world carbon club.'

■ US Interior Department officials may have to decide whether flatulent sheep, cattle and buffalo are causing climatic change if they lose the 'cow-pie case', a lawsuit accusing them of failing to measure methane gas — a possible factor in global warming — released by livestock. If the lawsuit by the Foundation on Economic Trends is successful, the Interior Department's bureau of land management would have to determine how much methane is generated by livestock.

The foundation alleges that flatulent livestock could be producing up to 15 per cent of atmospheric methane.

The Times-material December 2014

Article	Author, headline and URL	Date	Word count
T1	Ben Webster: *Climate death forecast 'exaggerated'* http://www.thetimes.co.uk/tto/environment/article4283656.ece	Dec 1, 2014	545
T2	Ben Webster: *Hottest year on record blamed on global warming* http://www.thetimes.co.uk/tto/news/uk/article4286108.ece	Dec 3, 2014	940
T3	Michael Hanlon and Jonathan Leake: *Science defrosts Antarctic's deep freeze mystery* http://www.thesundaytimes.co.uk/sto/news/uk_news/Science/article1492770.ece	Dec 7, 2014	632
T4	Jonathan Leake: *CO2 behind Britain's winter deluges* http://www.thesundaytimes.co.uk/sto/news/uk_news/National/article1496035.ece	Dec 14, 2014	436
T5	Jonathan Leake: Ice caps year that burnt and drenched record books http://www.thesundaytimes.co.uk/sto/news/uk_news/Science/article1500664.ece	Dec 28, 2014	815
T6	Ben Webster: *Climate change deal doesn't force countries to set targets* http://www.thetimes.co.uk/tto/environment/article4297120.ece	Dec 15, 2014	550

The Times-material November 1990

T7

Nigel Hawkes, science editor, accuses Mrs Thatcher of accepting cant on global warming

Is this really a scientist speaking?

In her address to the World Climate Conference on Tuesday, Mrs Thatcher made a remark that chills the blood. "We must not waste time and energy disputing the report of the Inter-Governmental Panel on Climatic Change," she said, "or debating the right machinery for making progress." Instead, sacrifices in people's lives were essential, and precautionary action should begin at once to counter the threat of global warming.

Is this a scientist speaking? The prime minister makes much of her background in chemistry, and enjoys long seminars in Downing Street at which some of Britain's brighter brains are called in to brief her on issues like genetic engineering. Somewhere along the way she seems to have abandoned her scientific scepticism and adopted the simple clichés of the environmental activists.

The truth is that there are many things in the IPCC report that must be disputed, energetically. As a scientific hypothesis, man-made global warming is plausible but unproven. The scientists closest to the subject make clear their uncertainties at every opportunity, but in the dash towards international action doubts have been forgotten, caveats ignored, and a scientific theory given the status of an ideology.

The development of the science of global warming has followed a familiar pattern, seen before in the limits-to-growth debate of the early Seventies and the nuclear-winter brouhaha in the Eighties. All three are based on predictions made by computer models, a notoriously slippery branch of lower mathematics.

In the two earlier cases, the models first produced a really frightening scenario. As time passed and the models were refined, the predictions diminished until they disappeared or were forgotten in the rush of a new controversy. Very much the same has been happening to the global warming models. The dogmatic statements which set the whole caravan on the move have been trimmed and toned down as further work has been done. The scientific working group of the IPCC is now claiming only a 1C rise by 2025 if we pursue business as usual – far less than was predicted even two years ago. The group now forecasts a rise in sea-level of 20 cm by 2030, again much lower than earlier estimates.

Remarkably, the IPCC's working group two, whose job was to assess the potential impacts of climatic change, has not taken these second thoughts into account. Its report is based on 1988 figures, and talks glibly of sea-level rises between half a metre and two metres. The only document that many politicians at Geneva this week will read is the policymakers' summary of working group three (which was set up to discuss responses). This concentrates on the effects of sea level rises of a metre or more, although the latest figures suggest this will not come about until well into the century after next.

More important, perhaps, is the question of whether even the lower estimates can be trusted. Much is made of the fact that they are agreed by 190 scientists, or 300, or as many as you like; but that is irrelevant, for science is not a democracy which advances by weight of numbers. Millions of people believed in the truth of Karl Marx's theories, but it did not make them true.

The acid test of any model is whether it can mimic reality. Industrialisation began in the second half of the 18th century, so we now have at least 200 years' experience of pumping carbon dioxide and other greenhouse gases into the atmosphere. Can the computer models match the actual experience of those 200 years? They cannot. They predict a much higher rate of warming than has been observed, clearly indicating that there is some complicating factor absent from the models.

In particular, they fail to account for a prolonged period of cooling running from the Twenties to the Sixties, just when industrial activity was getting into full swing around the world. This was the trend that led many climatologists in the Seventies to forecast an ice age; in some cases, the very same men who now claim the world is heating up uncontrollably.

The situation, then, is this. Computer models predicting temperature rises very much smaller than their proven margins of error are being used by a prime ministe who claims to be a scientist a grounds for imposing economic sacrifices on the entire world. Millions agree with her or urg even greater sacrifices. It fair take the breath away.

Global warming has turned into an inverted pyramid of implications resting on a handful of facts. A former American presidential science adviser, Eugene Skolnikoff, now professor of politica science at Massachusetts Institute of Technology, puts it this way: "In essence, elements of the scientific community have reached a judgment based on limited evidence and imperfect models that has massive implications for the health of the economic system and for the fate of peoples and of nations."

Fortunately, the human appetite for sacrifices is limited and its attention-span is short. A couple of cold winters will take the froth off the debate, and allow us the time we need to discover whether or not the earth is really warming up. Meanwhile, the overheated rhetoric in Geneva is premature and potentially very damaging.

T8

Scientists agree on greenhouse danger

Geneva – More than 700 scientists at the Second World Climate Conference agreed on the inevitability of global warming, with consequences "unprecedented in the past 10,000 years", unless nations move now to reduce greenhouse-gas emissions (Alan McGregor writes).

Their recommendations immediately went before government officials drafting a declaration for approval by heads of state and ministers in the final stage of the conference ending on Wednesday.

The scientists said that if measures to curb emissions of greenhouse gases were not started at once, climate change and rising sea levels would threaten low-lying areas, water resources, agriculture, forests and fisheries.

● **Heated criticism:** Mrs Thatcher, President Bush and President Gorbachev are "climate criminals" who have refused to counter the threat of global warming, Greenpeace, said yesterday.

Thatcher calls for sacrifice to hold back global warming

From MICHAEL MCCARTHY IN GENEVA

THE unseen danger of global warming makes changes and sacrifices in people's lives essential, Margaret Thatcher told environment ministers from nearly 100 countries at the World Climate Conference in Geneva yesterday.

The prime minister, emphasising her support for the warnings of the United Nations' global warming task force, the Intergovernmental Panel on Climate Change (IPCC), said there was already a clear case for precautionary action to be taken internationally to counter the threat of the greenhouse effect.

She called on all countries to join in negotiations beginning in February for a world atmosphere treaty, to be signed in Brazil in 1992, which it is hoped will set up the first framework for international control of emissions of the principal greenhouse gas, carbon dioxide, from coal-fired power stations and vehicles.

"We must not waste time and energy disputing the IPCC's report or debating the right machinery for making progress," she said.

The conference, whose final declaration today will set the pace and tone for February's talks, has been thinly attended by senior world leaders, with Michel Rocard, the French prime minister, the only other head of government from a leading industrialised nation present. For the third time in a year, Mrs Thatcher produced a ringing call to the international community.

"In recent years, we have been playing with the conditions of the life we know on the surface of our planet," she said. "We have cared too little for our seas, our forests and our land. We have treated the air and the oceans like a dustbin." The greatest test of how far the world community could act together would be its ability to stop or limit damage to the environment. "No one should underestimate the imagination that will be required, nor the scientific effort, nor the unprecedented co-operation. We shall have to show statesmanship of a rare order."

However, the speech contained no new policy initiatives and she repeated her defence of Britain's national target for control of CO_2 emissions, with stabilisation at present levels by 2005, which has been criticised by other European countries.

Sara Parkin, of the British Green Party, said: "It was a great speech, but it's not backed up by any action at home. I don't know how long she can get away with being a keynote speaker at these gatherings, without taking domestic action at home to justify what she's saying." Fiona Weir, air pollution campaigner for Friends of the Earth, said: "It was a green garnish on an empty plate."

Labour dismissed the prime minister's speech as a "hypocritical blast of hot air". Bryan Gould, the shadow environment secretary, said it was "brazen cheek" for Margaret Thatcher to lecture other governments. EC states such as Germany and the Netherlands were having to make a bigger effort to compensate for her refusal to join them in making the year 2000 the target date for stabilising emissions.

Simon Hughes, the Liberal Democrat spokesman, said that it was a "disgrace" that the government and Labour were happy to see no carbon dioxide cuts this century.

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Diary, page 12

Freedom hope for Baltic

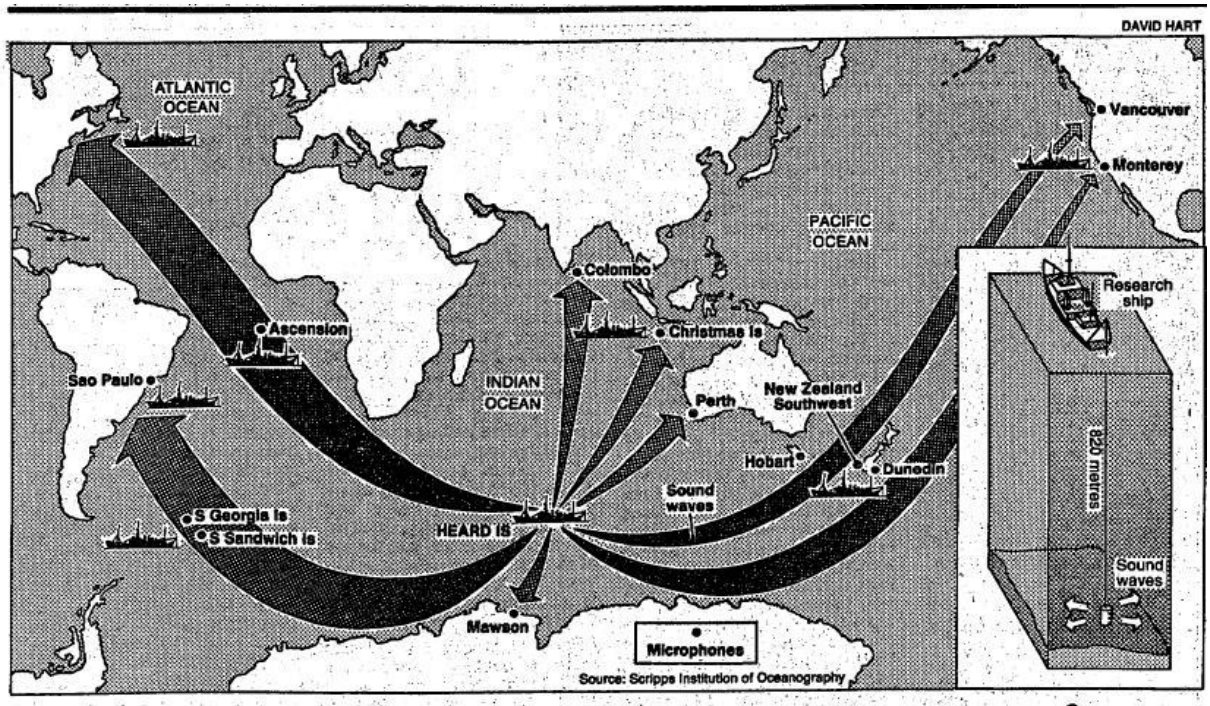
Continued from page 1

were contingency plans for an economic union, which even the Baltic republics and possibly Georgia might find more palatable. Boris Yeltsin, the leader of the Russian Federation, spoke approvingly of such a concept in the summer.

The Kremlin also appears to be offering the more independent-minded republics a compromise on the question of troops. Mr Revenko said that while the republics would be expected to contribute to a federal army and central defence budget, they would maintain and administer their own interior troops. This would solve two problems currently facing the Soviet military: the pressure from conscripts to serve only in their home republic, and the unpopularity of service in the Interior Ministry force which has been used to suppress ethnic violence.

Other plans under the proposed treaty include the abolition of the Soviet government and its replacement by a far smaller Cabinet of Ministers. This might involve the transformation of the prime minister's post into that of vice-president. In this way Nikolai Ryzhkov, the prime minister, could be removed with dignity, so meeting the chief condition set by Mr Yeltsin for joining a leadership coalition.

Although Mr Gorbachev and his team are trying to rush through a new structure in an attempt to preserve a semblance of a federation, they may be too late. The US State Department is lobbying for money to set up consulates in as many Soviet republics as possible.



Sound of global warming

Scientists and ships from 12 countries are to unite in a £2 million project to blast a sound, almost as loud as a jet taking off, through the oceans to discover whether the Earth is heating up. Nigel Hawkes tests the water

Research scientists are planning to measure whether the Earth is warming by making a noise deep in the Indian Ocean, and timing how long the sound takes to travel around the world.

The higher the ocean temperature, the faster the sound will reach detectors thousands of miles away. A rise of even a fraction of a degree should be detectable and, within ten years, if the experiment works, unequivocal evidence should be available of any warming or cooling trend in the oceans. Since ocean and atmosphere are closely linked, that would be proof of global warming or cooling.

The sounds, almost as loud as a jet taking off, will be made by loudspeakers lowered from a United States navy ship, Corey Chouest, moored off Heard Island, a volcanic island, covered in ice, between Australia and Antarctica. This inhospitable spot was chosen because there are direct "paths" from it for the sound to travel each one of the world's five oceans.

Microphones in the sea off Bermuda, San Francisco, Colombo, South Georgia, Hobart and Perth and at Mawson, the Australian base in Antarctica, will listen for the sound, which will take several hours to reach the most distant points. The oceanographers behind the experiment are sure it will be audible. Twenty years ago, a sound made in the ocean off Western Australia was picked up without difficulty in Bermuda, half way around the world.

Sound waves are trapped in a layer of ocean water about a kilometre below the surface and this acts as a wave guide. Sounds cannot dissipate upwards because of a boundary between warm water at the surface and colder water beneath. Sounds do not travel downwards because of the increasing pressure at greater depths. As a result, Dr Walter Munk, the experiment's originator, of the Scripps Institution of Oceanography in La Jolla, California, says the sound has no choice but to travel horizontally along this wave guide, rather like the sound in a doctor's stethoscope.

Some naturalists believe that whales use the wave guide as a way of sending messages to one another. If so, they are likely to get a few crossed lines when the Corey Chouest starts operations at the end of January next year. The ship will lower an electrically powered acoustic source, originally designed for the US navy, 820 metres down to get it into the wave guide region. The source will then emit pulses of sound.

The frequency of the sounds will be 60 cycles a second, which to the human ear would be audible as low booms, and its loudness, at 209 decibels, will be just less than the effect of standing next to a jet airliner taking off. Three-and-a-half hours later, if all goes well, the sounds will be heard by hydrophones off Bermuda and San Francisco.

The time they take to get there will be influenced by ocean currents and by salinity as well as water temperature. Dr Munk believes these other factors will cancel each other out over long distances. If predictions of global warming are true, he expects the time taken for sound to travel from Heard Island to San Francisco will increase by as much as a quarter of a second a year. Since the sounds will also be detected by other hydrophones located in all the world's oceans, it should be possible to detect regional variations in warming as well.

The first experiments are intended simply to prove that the concept works, and are expected to take ten days. They will cost about $2 million and will involve co-operation with 12 countries, which are putting ships to sea to listen for the sounds. Dr Munk and colleagues at Scripps hope to repeat the experiment annually until the global warming concept is proved or abandoned.

Some oceanographers doubt whether the experiments will prove anything worthwhile, because of the uncertainties introduced by currents and eddies. Marine biologists are worried about the effects of the noises on whales, but Dr Munk thinks their fears are exaggerated.

He believes that the scheme could contribute to the development of a new science of ocean tomography, in which sound signals would be used to analyse the ocean in the same way as x-rays are used in whole-body scanning. This also helps to explain the interest of the US navy, which has contributed part of the cost of the experiment and provided the sound sources.

Dr Munk believes it would take 100 years to prove the reality of global warming by measurements of the air. Accurate air temperatures exist for the past century, but they have not eliminated arguments. If the ocean sound experiment can provide clear evidence in less than a decade, it will be worthwhile, he says.

T11

World agreement to fight warming

From MICHAEL MCCARTHY
IN GENEVA

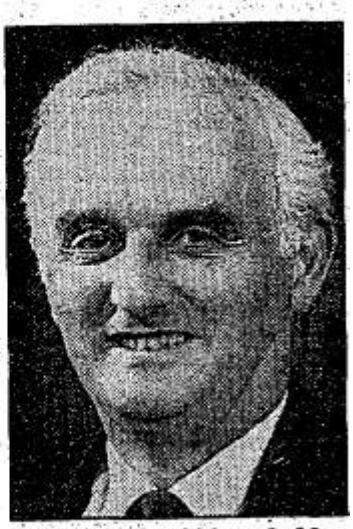
THE world community yesterday launched its response to global warming when 137 countries committed themselves to negotiating a treaty protecting the atmosphere by June 1992.

Barely two years after the problem of climate change came to widespread public attention, nations assembled at the World Climate Conference in Geneva unanimously accepted the warning by United Nations scientists that the threat to humanity from the greenhouse effect is unprecedented.

They agreed to draw up a convention on atmosphere, of which the ultimate aim will be to restrict emissions of greenhouse gases, chiefly carbon dioxide, from coal-fired power stations and motor vehicles in every country in the world. Chris Patten, the environment secretary, who was representing Britain at the meeting, said yesterday that it was going to "make the conventional round of disarmament negotiations look straightforward by comparison".

However, the need to take action was accepted on all sides, and ministers said in their final declaration: "Recognising that climate change is a global problem of unique character, we consider that a global response must be decided and implemented without further delay."

All countries agreed that a basic-framework convention on the atmosphere should be ready for signature at the UN conference on environment and development to be held in Brazil in June 1992. It will be accompanied, perhaps at a later stage, by binding protocols on greenhouse gas emissions and possibly the destruction of tropical forests.



Houghton: 1990 probably hottest year on record

John Houghton, chief executive of Britain's Meteorological Office, who headed the science assessment team of the UN's Intergovernmental Panel on Climate Change, said yesterday that 1990 would probably prove to have been the hottest year, globally, ever recorded. "With population growth, global warming is the biggest problem human society has ever had to face, and today we have set out on the long road to attempt to solve it," he said.

● **BONN:** The German cabinet agreed yesterday to work for a reduction by 2005 of 25 per cent in carbon dioxide emissions, equivalent to 300 million tonnes a year (Ian Murray writes). This was just one of a package of "green" measures decided by the cabinet.

Nigel Hawkes, page 16

World's seabirds at risk

By JOHN YOUNG

A LARGE proportion of the world's seabirds could be wiped out by an ecological disaster off the coasts of Britain or Ireland such as a large oil spill, according to a report published yesterday by the Nature Conservancy Council.

A three-year survey found that the three million seabirds in the Irish Sea and off the west coast of Scotland included more than half the total breeding numbers of Manx shearwater, puffin, black guillemot and gannet.

The survey, the third in the Seabirds at Sea project, was initiated because of concern at the threat to marine life posed by the North Sea oil industry.

☐ The Royal Society for the Protection of Birds has launched a £150,000 appeal to create a nature reserve in the Arun valley in West Sussex.

Global warming, page 16

T13

Thatcher takes the environmental stage

From MICHAEL MCCARTHY IN GENEVA

MARGARET Thatcher will this morning briefly cast aside her domestic difficulties and attempt to display instead her international stature by making the keynote speech at the World Climate Conference in Geneva.

The Prime Minister has interrupted her preparations for tomorrow's crucial debate on the Queen's Speech and has travelled to Switzerland to reclaim her role as the world leader most prepared to speak out on the dangers of global warming. Few of the more than 100 countries present at the ministerial session of the conference, opening today, are represented by heads of government or heads of state.

Mrs Thatcher's excursion from a beleaguered Downing Street may be seen as a renewed show of leadership when her policies and management style are under fierce attack.

This morning she will defend Britain's global warning target of stabilisation of carbon dioxide emissions by 2005 from charges of inadequacy. Mrs Thatcher will emphasise her belief that the British target is both realistic and achievable. She will also press for all governments attending the conference to achieve consensus on the need to begin action to counter climate change, and will avoid spotlighting the differences between the European Community, which has signed up to a general target of stabilisation by the year 2000, and the United States, which has hitherto steadfastly refused to countenance any target at all.

Last night the six Efta countries – Norway, Sweden, Finland, Iceland, Austria and Switzerland – joined the EC in its target of CO_2 stabilisation 2000.