Article

Risk perceptions and public debates on climate change: a conceptualisation based on the theory of a functionally-differentiated society

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Mass media and its mechanisms of production and selection play a crucial role in the definition of climate change risks. Different form of logic in the political, scientific and media systems are vital aspects in the public debate on this issue. A theoretical analysis of these aspects needs a framework in terms of social theory: Luhmann's concept of a functionally-differentiated society and the mechanisms of structural couplings could help to understand the relations and interplay of these systems in the climate-debate. Based on this framework and various empirical studies, this paper suggests: different logics lead to different climate-definitions in science, politics and mass media. Climate change became interesting, but not until it was located in the political decision-making process. Climate issues become publicly interesting, when they are clear, contentious and can be linked to Elite-Persons. In contrast to scientific communication, news media make great efforts to be clear and definite in their communications.

Introduction

In the advent of the 21st century, climate change is one of the major challenges for modern society. Various interdependencies, constellations of actors and uncertainties manifest themselves in this particular issue. In this paper I will argue that different logics in the systems of politics, science and mass media are vital aspects in the debate on climate change. Media-logics and media-content represent crucial factors in the public's definition of the

risks of climate change. The aim of this paper is to conceptualise a theoretical framework for the analysis of the public debate on climate-change risks and to develop theoretical outlines for the processes in the systems of science, politics and mass media as well as their interplay – in forms of structural couplings – based on Luhmann's Theory of Functional Systems. Various empirical studies on news coverage regarding climate change, and its link to both the political and the scientific systems, will illustrate this conceptualisation.

Therefore, the paper is organised as follows. First, the thematic frame of the theoretical conceptualisation will be identified, defining the relevant aspects of Luhmann's theory and integrating therein the concept of Mediatization. Second, some system specifics within the triangle of politics, science and mass media will be revised on a macro level. Third, structural couplings regarding the issue of climate change will be discussed by analysing the evolution of the public's attitude towards the climate change issue and the different language games of science, politics and mass media.

Thematic frame

Today's daily life cannot be imagined without media and mass media in particular. They are omnipresent in politics, the economy, education and the arts, as well as in the public and private spheres. Besides sleeping and working, we spend most of our time using mass media (Kepplinger & Maurer, 2000). They represent the world in the society *for* the society and they are the significant source for our knowledge about the world in which we live (Luhmann, 2000a, p. 1). The concept of "Media Society" and its process of Mediatization argue that the media are a *societal phenomenon* penetrating all areas of modern, globalised societies (Saxer, 2007, p. 26; Hjarvard, 2008). Therefore, societies act more and more according to the logic of the mass media. Mass media have become important for politics and its actors as well as for the scientific community and its discourses. However, the mass-mediated picture of the world is not a *mirror*, mediating *real* climate events and debates; rather it is in particular a construction by the media and their mechanisms of selection and presentation styles. This fact is especially obvious for topics that are not part of our direct and primary experience. One of the paradigms of social science research, the social constructivist perspective, argues that the public defines the attributes of risks via a social construct (Berger & Luckmann, 1996).

Following that argumentation, Luhmann (2005, pp. 1, 33) proposes to understand risks broader than only in the sense of a technical decision tool: the particular appeal of risk is that it can be located, if a decision is made to avoid or to delay possible damage. A decision, made by an organisation or a subsystem, is made under the conditions of an unpredictable future. Modern risks are in many aspects neither visible nor directly sensed through our direct experience. Hence, these risks and their potential to threaten modern societies are constructed via the mass media (Beck, 1992, p. 46). In addition to the argument of construction, the social definition of risks depends on *scientific uncertainties*. In particu-

lar, the research on climate change and its findings are often preliminary and hypothetical (Weingart et al., 2002). And, the communication of risks does not follow merely scientific logic, but also the logic of the media. Public debates on the risks of climate change concern different societal fields, but mainly the systems of science, politics and mass media. They all operate using their own procedures and according to their individual rules, they set their own priorities and use their own language-games.

The task of this paper is to conceptualise a theoretical framework in order to analyse the Mediatization of climate change risks. But the role of mass media in constructing the debate and defining the social construction of risks cannot be seen only from a media perspective, as it also entails, among others, a political and a scientific dimension. For this theoretical observation it is therefore essential to define a frame in terms of social theory and not only use micro-concepts, which are concentrated in mass media, the sciences or the political sphere. This paper argues from a system perspective in the tradition of Luhmann's theory of a functionally-differentiated society; thus the first task is to briefly introduce his theory.

Theory of functional systems

According to Luhmann, modern societies are functionally differentiated into various subsystems, with their own types of communication, such as, politics, the sciences, mass media, economics, the arts and so on. Each of these subsystems fulfils a special function for the whole society. Each system reproduces society from a certain outlook, with specific perspectives of themselves and their environment. All of the systems are specialised in particular forms of social communication, and, at the same time, their functions can only be performed by themselves, not by any other subsystem. Therefore, each system operates in a specific way, following a certain binary coding. Due to its coding, the system decides whether a certain communication can be associated with the system or not. The coding gives information about the societal function of the system. The political system is coded through the difference of *power/non-power*: political decisions can only be achieved by the parties in charge (Luhmann, 2000b, p. 192). The coding for the scientific system is *truth/non-truth* (Luhmann,1992, p. 167), and the coding for the mass media is *information/non-information* (Luhmann 2000a, p. 20). For this reason, a system only needs to deal with communications in its own coding, which enhances its capability to act since it saves time and activity. Systems are *operationally closed*; they operate autonomously and through self-reflecting. This division enhances the potential of each system and the capability of modern societies in a historically unique manner (Luhmann, 2002, pp. 91-93).

Observations of these codings can lead to the assumption that systems like politics, science and media are hardly able to interact: *power* has nothing to do with *truth*, while *information* and *truth* as well as *power* and *information* seem in many aspects not related to each other. Despite being operationally closed, each system scans its environment for communications, which are relevant to the system. Systems are also able to link themselves to their

environment through the form of *structural couplings* (Luhmann, 2002, p. 118). This means there is a form of reciprocal dependency for certain topics or programmes. For example, politics and mass media share a programme of election campaigns and media coverage of political decisions. In contrast, science and politics interact in programmes of funding and consultancy.

This paper focuses on politics, science and mass media. Therefore it is important to take a closer look at the mechanisms, coding, functions and specifics of these systems.

Political system

The political system is the place where processes of decision making are prepared and collectively binding decisions are made (Luhmann, 2000b, p. 72). This system decides on the allocation of competences, tasks, authorities and responsibilities. In order to fulfil these duties, it needs the following means. First, the political system must be equipped with *power* to reach decisions. The government and its power are legitimised by democratic elections. Second, this authority given by the people has to be demonstrated by continuous decision-making. Third, the political system has developed special mechanisms to scan its environment for communications, which can be associated with *power*, for example, agencies for observing public opinion by polls as well as by media coverage. Within these processes of political communications, the system itself becomes attentive for policy-relevant issues in its environment (Luhmann, 1981, p. 23). It fulfils this function by constituting structural couplings and by observing mass media coverage. For example, couplings to the sciences can be the funding of certain research projects as well as the scientific backing of political decisions.

Scientific system

The societal function of the scientific system is the creation of knowledge, in Luhmann's terms "assured knowledge" (1992, p. 634; my translation). Its coding is *truth/non-truth*; every time truth plays a role, science can provide advice. In its findings and publications, the scientific system uses very special language-games (Kabalak et al., 2008; Wittgenstein, 1970, p. 4). Luhmann (1992, p. 623) notes that these are incomprehensible for the common audience not only because of the use of special terms, but in particular because of the fact that each scientific argumentation is associated with certain prior knowledge, which is only established in expert-circles.

Despite these language-games, scientists provide several benefits to the society and the political system, for example, by inventing technologies, by observing public opinion or by exploring the causes of climate change. As Carvalho (2007, p. 224) argues: "Policy-makers often expect scientists to provide answers to problems that are debated in the mass media and other public arenas, and make a variety of public uses of science to legitimise action or

inaction. Scientific knowledge is also utilised by a number of other social actors, including business and activists to justify particular programs." This suggests that the political system is not dependent on scientific findings. It only uses them to publicly justify decisions it has already taken. Politicians can always find an expertise and a contra-expertise that suit their interests (Grundmann, 1999). Consequently, the political system will not give up its *power* to make decisions, at least not for the public perception (Luhmann, 1992, 2000b, p. 274).

In his concept of risk society, Beck (1992)[1] reports that until the first half of the 20th century, scientists were engaged in inventions about nature, human beings and the society. But since that time, they are tied into a new frame: in a *reflexive* phase science has to deal with its prior findings and is confronted with its own products and limitations. This has also influenced the relationship between science and its environment: while in the former phase, science was celebrated by the public as a successful actor, in the latter, it was confronted by political actors, media and the public with its faults from the past, which became obvious as follow-up problems. Beck argues that as a consequence, science lost its monopoly as *the* key definer of scientific findings and risks. Reformulated in Luhmann's words, it is obvious that every scientific communication is selected and translated into media communication and so presented to its environment.

This creates ambivalence: on the one hand, a modern and complex society requires more research for its progress, but on the other hand, because of the public perception of uncertainty, science has lost its unique position to define social problems and risks. Other social actors, formerly the *receivers* of scientific findings, became active definers. As a consequence, new definitions are not any longer classified purely along a scientific coding, but are the result of social definition processes. Therefore, the quality of risks is based on two aspects, i.e., its scientific and its social construction: "Risks can thus be changed, magnified, dramatised or minimised within knowledge, and to that extent they are particularly open to social definition and construction. Hence the mass media and the scientific and legal professions in charge of defining risks become key social and political positions" (Beck, 1992, pp. 22-23). Risks have to be covered by journalists to become evident to the public (Cottle, 1998). Mass media are the gatekeepers for the selection of information; they decide whom to give speech, and to what extent: "The capacity to define potential risks and hazards is broadly aligned with the distribution of power among, 'credible', 'authoritative', and 'legitimate' definers of 'reality' across the media field" (Allan et al., 2000, p. 13).

Mass media

Taking a closer look at the mass media, one can observe that they are specialised in the distribution of information. In this way they represent the world in the society *for* the society and build perceptions of reality (Saxer, 2007, p. 26). They act upon the coding *information/non-information*. Everyone who uses news media gets information about the societal agenda.

At this point, we have to solidify some differences observable in the concept of Mediatization in contrast to Luhmann's understanding of a society, which is divided into equal and independent subsystems. His argument is based on two fundamental ideas. First, mass media form an operationally closed system. Second, the special function of mass media is to generate reality not only for themselves, but also for other subsystems and the society as a whole. In his book "Reality of the Mass Media", Luhmann (2000a, p. 1) notes: "Whatever we know about our society, or indeed about the world in which we live, we know through the mass media." Pointing out this special function provides us with the possibility of integrating the theory of a functionally-differentiated society and the Mediatization concept. Both comprehend a special media-function in the distribution of information for every social system and both point to the fact that observing society is only possible via mass media. They are the significant source for our knowledge about the society and the world in which we live. But the concept of Mediatization goes one step further and assumes that the media-coding is extended to other subsystems, for example, the political and the scientific systems.[2] These systems would attach the logic of the mass media as alternative coding to their own. Roughly, one could see some similarities between Mediatization and the concept of structural couplings in forms of shared programmes, as in the coupling of politics and media, which becomes obvious in the public opinion (Luhmann, 2000b, pp. 274-318).

Information broadens the knowledge of its consumer by minimising his ignorance. Information cannot be repeated. This leads to a constant pressure in the media system to generate (new) information: Journalists must always have something new to report and users have to be always prepared for information. Thus, mass media keep the society awake. Their societal duty is the creation of certain assumptions about the reality, which people draw on in social communication. This integration can be achieved by topics. After publishing, topics can be assumed as societally known. By doing this, mass media build perceptions of reality, which can be one of the fundaments of social action. However, they do not mirror reality, rather they create reality, which they daily present as news, reports or advertising. This reality is manufactured and constructed according to certain rules of selection.

But how do these mechanisms work? For this task, Luhmann (2000a, p. 131) makes reference to Galtung and Ruge's theory of "news values"[3] and formulates the following: Surprise; Conflicts; Quantities; Local relevance; Norm violations (Scandals); Norm violations accompanied by moral judgments; Attributions to actors; Topicality; Expression of opinions. Galtung and Ruge (1965) argue that the more news factors one event entails, the higher the probability is that the event will be covered by the news media. These factors have been empirically tested and further developed (e.g., Eilders, 1997).

By amplifying our theoretical framework in terms of a functionally-differentiated society, all these mechanisms refer to different structures and operations, for example, their relationship to *time* and the *language* they use. A particular connection to *time* is especially obvious for mass media: time is a significant factor in their production routine. Although the political routines are aligned with broader time horizons and political decision-making

processes are usually constrained to legislation periods or the date of the next election, in a mediatised society, politics is more and more trying to imitate the speed of the media (Marcinkowski, 2005, pp. 363-364). In contrast, the operation mechanisms of science in general still depend on indirect and only barely qualifying time restrictions, such as the approval of funding. But there are also certain situations in which the publications of scientific findings are synchronised with mass media production routines: these mechanisms are observable in the forefront of the Copenhagen Climate Summit 2009.

Additionally, one can detect another similarity in the concept of *novelty*: mass media must report something new every day, because news from yesterday is already known and does not qualify as news any more. The pressure for novelty is characteristic of politics and science as well: the political system has to permanently demonstrate its power through decision-making, while science is always on the track for new findings.

Structural couplings in the climate debate:
issue-evolution and language games

The described systems also have further forms of permanent dependencies through common topics or shared programmes. Such *structural couplings* are forms of reciprocal dependency because of certain topics or programmes (Luhmann, 2002, p. 118). To identify these couplings, we first have to identify topics that attract the common interest of several systems. Topics constitute structural couplings to other spheres of society. Structural couplings become evident in the climate debate when we take a closer look at the historical evolution of the climate issue in the public perception and at specifics of different language games.

For a long time, debates on climate change were nearly exclusively located in the scientific community. Merely at certain events the political system became aware of this issue and got involved for a short time. Such brief *structural couplings* are observable at certain summits, for example the IPCC sessions and the World Climate Summits, where scientists and politicians, respectively only politicians, had to struggle for coordinated declarations (Palfreman, 2006). Climate change attracted genuine media attention for first time when the political system turned it into its very own issue. Wilkins and Patterson (1991) propose the shift from a scientific to a political perspective occurred in the years 1987-1988. Empirical studies have examined this for the U.K. and France (Brossard et al., 2004). For the U.K., Carvalho (2005, p. 19) shows that climate change evolved from a "strictly scientific problem" in the 1980s to a political issue at the end of the 1980s.

This effect is not limited to climate change rather it is the rule. In general, issues benefit from the publicity and the power-demonstration possibilities of politicians. This effect can also be seen regarding the *Empowerment* of parties and politicians: issues become interesting for the media when they are located in a decision-making phase and the duty is to establish clarity. Journalists foremost tend to ask those persons for statements who posses the power to reach decisions. At this point, the similarities between the coding of politics

(*power*) and mass media's mechanisms of selecting an issue (*clearness of a situation, action by an Elite Person*) become obvious.

On the contrary, science makes no decisions: scientists merely present the fundamentals for political decisions or rather the basics for justifying a decision. Usually, scientific statements are not interesting for the media (Trumbo, 1996). Only if researchers are accepted by political leaders, for example, as participants in political consultation circles, certain experts and scientists are asked for statements (Grundmann, 2006). By their position, these experts are assigned to the political system associated with *power* and therefore get covered. Finally, they get noticed by the public, cited, invited to media events and asked for their opinion. The spiral of attention starts to rotate: by working with the media, they learn to use the media mechanisms. This situation is good for both the media and the expert: media can better work with a person who understands their wishes and researchers can profit from their fame and media-professionality in further funding allocations, as Peters and colleagues (2008) as well as Weingart (2005) point out.

Science and media act reciprocally: for the German case, Post (2008) reports that in particular those scientists who hold radical positions get actively in contact with the media and the media select mostly those scientists with extreme opinions. The climate debate is dominated only by a few publicly known experts, *Elite Persons* according to Galtung and Ruge (1965), as well as by radical positions (Krauss & Von Storch, 2005).

In its communications within the system, science tries to manage certainties and identify risks for modern societies. On the contrary, these processes are foremost characterised by uncertainties, balancing arguments as well as preliminary and hypothetical statements. This is also imperative for climate change (Weingart et al., 2002). In contrast to scientific communication, mass media make great efforts to be clear and definite.

Mass media and journalists have developed several strategies to expose these specific scientific language games and the communication of uncertainties:

(a) To start, journalists try to translate scientific communication into media communication by noting uncertainties as a usual and regular part of the scientific process. This happens in particular when journalists get their information directly from scientists, so researchers can explain their findings and clearly show the boundaries. Often these kinds of journalists are guided by an interest in science for themselves. Wilson (2000) shows that reporters who primarily use scientists as sources have the most accurate knowledge on climate change. But there are only a few of them. Generally, journalists lack the necessary interest in scientific topics and therefore lack the professional exposure with uncertainties (Palfreman, 2006). This mis-translation is systematic and rooted in journalistic norms and values (Boykoff & Boykoff, 2007). For example, Bell (1994) argues that media coverage on climate change in New Zealand did not adequately reflect the causes of climate conditions, therefore the public may not have been equipped to understand the postulates of climate change. In addition, most of the journalistic sources are not primary sources, but rather information from news agencies, second-hand news of leading newspapers or public rela-

tions announcements from the scientific system or the politicians. Scientific issues are often already translated into different language games before they even reach media attention (Gazlig, 1999). Uncertainties get lost on this trail of code conformity.

(b) Furthermore, the styles of journalistic presentation are usually not feasible for scientific topics and uncertainties: journalists try to frame topics into stories. But scientists often disqualify these presenting styles as too *concrete* for *abstract* findings; they complain that mass media simplify a complex topic and therefore do not *mirror* scientific findings (Post, 2008).

(c) An additional alternative for media exposure is the direct addressing of uncertainties in journalistic products. This often happens in the form of accentuating a conflict between two opposing scientific opinions. Uncertainties are both salient and important topics in media coverage. They are constructed mostly as *conflict* between two opposing sides. Conflict holds a high news value, but also supports the audience's impression of media's *objectivity* by presenting different perspectives on one topic. In an analysis on news coverage in the U.S. popular press, Zehr (2000) shows that scientific uncertainty is highly salient in climate change articles. The debate is structured by including representations of controversy. But he also assumes that these conflicts were managed in a way that science remained a significant knowledge provider. In contrast, Atwood and Major (2004) conclude in their studies on environmental news that the U.S. media, on the one hand, tend to be dramatic, but on the other, articles provide limited information that would facilitate public understanding of environmental risks. One could operationalise the news-value of conflict also with another facet: there is no doubt that social movements also had influence on discourses about environmental issues. NGOs like Greenpeace triggered broad public attention by using media as an amplifier for their actions and by imitating the media-logic, especially the news value of conflict: "Greenpeace is the most media savvy of environmental groups, and their communication strategies have garnered a significant visibility around the world. In some cases, this has produced successful outcomes for the organization" (Carvalho, 2010, p. 175).

Mass media tend to personalise and dramatise stories: in an analysis of news coverage on global warming, Mazur and Lee (1993) indicate that human dramas are systematically overemphasised and scientific research is downplayed. Critics also often suggest that journalists over-report positions from scientific outsiders to indicate conflict in the community and to signal objectivity in their own reporting.

However, news coverage is constructed differently in various countries (Hanitzsch, 2007): U.S. media hold a stronger impulse for balance than do German media. This leads to the situation that in the U.S. coverage, the dominant consensus within the science on the dangers of climate change is broken up by the media, while contrary opinions, which compose a scientific minority, get the same media attention. The debate is typically presented as "a conflict between two opposing schools of thought" (Krauss & Von Storch, 2005, p. 99). For that reason, the dominant positions warning on the dangers are underreported, while minority positions are over reported (Boykoff & Boykoff, 2007; Palfreman, 2006). German

researchers note a clear difference between the scientific findings on climate change and the coverage on this topic in German news media: mass media in particular select dramatic findings, which can be presented in an alarming style. Furthermore, they identify a bias concerning clarity, polarisation and conflict. But in contrast to the U.S. findings, German scientists complain that the news coverage tends to dramatise and simplify climate change: they have the impression that the coverage implies rather a scientific consensus in the climate debate (Post, 2008).

But what could be the consequences of this balanced reporting in the media? The over reporting of minority positions and the mediated construction of science as an area with preliminary and conflicting expertises as well as the sceptical media framing of the scientific process, could lead to a public perception of scientific uncertainty in general and especially on this topic. The political system has its problems to deal with scientific uncertainties, too. The public expects clear decisions and strategies to face these risks. Uncertainties about risks can damage political trust (Beck, 2007). Actually, politicians are used to making decisions under uncertain conditions, because decisions about the future must always be made in absence of certainty. One can conclude that it is the original duty of the political system to reach decisions especially in uncertain situations. In such cases, the political system usually refers to scientific expertises, its own ideological views and in particular on public acceptance to justify decisions (Jacobs & Shapiro, 2002).

Conclusions

Mass media and its rules are crucial factors in the definition of the risks of climate change. Different coding and rules in the systems of politics, science and mass media are vital aspects in the misunderstandings of climate change and the public debate on this issue. The characteristics of risks are based on a scientific and a social construction: The social construction is the result of a public debate that is principally structured by the mass media. Modern societies notice risks and their definitions through a media's lens. Especially risks that are not observable in our direct cognition are in particular based on the scientific and social construction. By analysing the climate debate, the aim of this paper was to theoretically develop some outlines to describe the processes in the systems of science, politics and mass media as well as their interplay, based on Luhmann's Theory of Functional Systems.

Our examination of the climate issue leads us to the following assumptions: the issue-evolution follows the regular track of scientific topics, from science into the political system, from politics via mass media into the public debate.

By analysing scientific findings through their media coverage of climate change, this paper illustrates that science and media act reciprocally: journalists over-report positions from scientific outsiders to indicate conflict in the community and to signal objectivity in their own reporting. At the same time, scientists benefit from media citations, for example in funding processes.

As a general conclusion, one can detect clear evidences for the Mediatization of the scientific system. Science adds media coding in its communications, and political language games are transformed into media language.

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Notes

1. By referring to Beck, one could also incorporate Anthony Giddens and his structuration theory in describing the social construction and risks of climate change. Interestingly, Giddens himself makes very little use of his own theory in his recent book "The Politics of Climate Change" (2009). Rather, he applies theoretical tools from political science (such as the notion of policy entrepreneurs) and public policy (institutional decision rules and incentives).

2. The "Reality of the Mass Media" was first published in 1996. The English translation of the "Reality of the Mass Media" (2000a) and his work on the political system "Die Politik der Gesellschaft" (2000b) were published after his death in 1998. Therefore, he did not have the opportunity to integrate the Mediatization concept in his theory on the mass media.

3. In their research on news coverage of conflicts, Galtung and Ruge (1965) could identify twelve filters: (1) Frequency; (2) Amplitude; (3) Clarity; (4) Meaningfulness; (5) Expectation; (6) Surprise; (7) Continuity; (8) Variation; (9) Elite Nation; (10) Elite Person; (11) Personalization; and (12) Negativism.

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