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Scientist-journalist interaction: Investigating the relationship between the concept of objectivity and the constructed discourses on scientific knowledge, particularly on Arctic issues

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Declaration

I, Ekaterina Bero, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature……..

Date……

Acknowledgements

Every stage of working on my Master thesis has provoked a new feeling. The first ideas of the issues I wanted to research were associated with excitement; as a starting researcher, I was eager to contribute to scientific knowledge in a proper and meaningful way. Reading the existing literature to build up background knowledge, I started to feel engaged with the issues I was planning to research. At the stage of developing research questions, I realised how many intriguing questions I would like to raise, but how valuable it was to narrow down my focus. Data-collection stage made me frustrated at times, when I was unable to contact those interviewees whom I sampled. After collecting all the data, I experienced the most daunting stage - analysing the data. After the analysis, the next intriguing question arose - how to present the findings in a meaningful way not only for me, but for the readers of this thesis. The last stage - polishing the whole thesis - brings some frustration, because looking back at your work that took me a year of my life, I could discover the weaknesses of that study. Unfortunately, one can see those weaknesses only after all the experience one collected through the whole process. Finally, the day of submission brings the feeling of relief, followed by excitement about the day of my defence.

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Abstract

The Arctic represents a geographical region where political and economic interests of some countries conflict with global environmental concerns. However, the media are argued to misrepresent the complexity of Arctic issues. Journalists tend to frame the Arctic as a place of potential political conflicts, while the Arctic countries intend to preserve peace and cooperation, according to their official strategies. Covering scientifically complex issues, journalists might ignore scientific uncertainties, and frame scientific claims as uncertain. Media misrepresentation of scientific knowledge might happen for two reasons. First, contrasting values inherent to science, and journalism complicate scientist-journalist interaction. Second, both science and journalism experience intrusion of external interests, e.g. science might be forced to follow interests of stakeholders who fund scientific research, whereas journalism experience public expectations of discovering 'the truth'. To explore if scientists and journalists manage to remain objective in the changing conditions of their professions, this thesis analyses how constructed discourses on the Arctic influenced, and were influenced by, the norm of objectivity practiced among Norwegian scientists and journalists. This thesis combines Fairclough's (1992) three-dimensional framework, and Douglas' (2004) conceptual framework of objectivity. Fairclough's framework allows to conduct a comprehensive analysis of texts, text production, and social practice of journalistic reporting. Douglas' multifaceted understanding of objectivity helps this explorative study to accommodate diverse meanings of objectivity among scientists and journalists. This thesis analysed 26 newspaper articles published from 1 January 2018 to 31 October 2018 in four Norwegian newspapers. In addition, 5 individual semi-structured interviews with Norwegian scientists and journalists were conducted. This thesis concluded that the discourses emerging from the sampled articles, and the norm of objectivity have mutually influenced each other. Framing the scientific knowledge as well-established, and quoting only supporters of the global warming hypothesis allowed journalists to compromise *convergent* and *concordant* meanings of objectivity. However, a changing understanding of objectivity most likely developing among Norwegian journalists has also influenced the ways the discourses were constructed. If objectivity is traditionally understood as a balanced representation of proponents and opponents in one article, Norwegian journalists feel more comfortable with taking a stance on climate-change issues, believing that balance would be reached "over time".

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1. Introduction

1.1. Background

The Arctic represents a geographical region where political and economic interests of some countries conflict with global environmental concerns. To start with, all the eight Arctic countries - Iceland, Norway, Denmark, Sweden, Finland, Canada, Russia, the USA - aim to defend their national interests, with some Arctic member-countries being interested in economic benefits from opening the Northern Sea Route, and developing Arctic oil reserves (Keil, 2014). However, following those interests would contribute to intensifying climate-change effects in the Arctic, and globally, e.g. changing habitats of Arctic animals and plants, rising sea level, and release of fossil carbon if Arctic ice melts (IPCC, 2007; IPCC, 2014). The complexity of Arctic politico-economic, and environmental issues deserves an objective media representation, because the media significantly shape public opinion on diverse issues (Bell, 1994; De Vreese & Boomgaarden, 2006; Delshad & Raymond, 2013). Moreover, the media serve as a major source for the public to learn about scientifically complex issues, like climate change (Wilson, 1995; Nelkin, 1995).

Even though journalists are normatively expected to report in a neutral and balanced way, scholars have used discourse analysis to show how media discourses misrepresent Arctic issues. For example, while international newspapers framed the Arctic as a place of potential conflict (Pincus & Ali, 2016; Rowe, 2013), the Arctic member-states intended to preserve peace and cooperation, according to their official strategies (Jensen & Skedsmo, 2010; Grindheim, 2009; Khrushcheva & Poberezhskaya, 2016; Rowe, 2013). As for environmental issues, studies found dissonance between media and scientific discourses. Scientists reported research results to emphasise how climate-change are urgent and severe (Weingart, Engels & Pansegrau, 2000), whereas the media tended to ignore scientific uncertainties (Weingart, Engels & Pansegrau, 2000), and frame scientific claims as uncertain (Boykoff & Boykoff, 2004; Antilla, 2005). Using textual analysis, discourse studies provided valuable examples of distorted discourses, but did not explain *why* and *how* conflictual representation of Arctic issues got constructed. Thus, studying interactions between journalists and their informants can help explain resulting discourses.

Among all possible informants whom journalists contact, today's journalism is argued to increasingly depend on scientific experts (Albæk, Christiansen & Togeby, 2003; Andersen & Hornmoen, 2011). Up to the 1950s, journalists were expected to *describe* issues that newsmakers considered newsworthy. However, against the background of spreading television in the 1960s, and the Watergate scandal in the 1970s, journalists formed a camp of those who disagreed with a role of just 'disseminators', and who wanted to defend people's interests. Journalists started to *interpret*

diverse events, and *investigate* the 'truth' by questioning the authority. However, lacking expertise in diverse issues, journalists had to turn to scientists for help in interpreting and legitimising arguments developed in newspaper articles. The long tradition of descriptive reporting gave roots to journalists' particular attitude to science, i.e. that science was authoritative, and diligent enough that no questioning and verifying was needed (Meyer, 2006; Altschull, 1990). According to empirical research, journalists still uncritically accept scientific statements (Eide & Ottosen, 1994; Wien, 2014).

Similarly to news production, academic-knowledge production has gone through certain changes (Nowotny, Scott & Gibbons, 2003). First, global problems, like climate change, demand scientists to obtain inter-disciplinary expertise, contrasted to previous specialisation on just small parts of a single problem (Nowotny, 1981). Secondly, pressing global problems require faster scientific results. In the race for faster research results, science became commercialised, e.g. getting fundings from governments, and commercial companies. As soon as "science [has] gone societal" (Meyer, 2006, p.240), i.e. become guided by interests of politics and economics, the public started to question if science remained objective. Trying to rebuild public trust, scientists are motivated to interact with the media, because the media can disseminate scientific knowledge to the public (Wilson, 1995; Nelkin, 1995). External interests getting involved in the process of both knowledge, and news production may hinder scientists and journalists from remaining objective.

Besides *external* intrusion, scientists and journalists have to reconcile *internal* professional differences inherent to both professions. For example, scientists' partial expertise over a puzzle contrasts with journalists' need to present an overview of an issue; while scientific research takes time, journalists operate within pressing deadlines; unlike scientific jargon language, journalists have to explain abstract or complex events clearly to the public. Empirical studies confirm that scientist-journalist interactions are indeed conflictual, and discover cases of scientists' adapting to demands of the media (Ivanova et al., 2013), and journalists' misusing scientific statements in agenda-driven reporting.

Not only studies on science-journalism interaction describe how values enter the process of scientific and journalistic investigations. Scholars studying objectivity contest if the norm is desirable and attainable both in scientific research, and journalistic reporting, with empirical studies pointing that some practitioners of scientific and journalistic objectivity adapt the norm to their needs. Addressing the above-mentioned gaps, this thesis analyses how constructed discourses on the Arctic influenced, and were influenced by, the norm of objectivity practiced among Norwegian scientists and journalists.

To accomplish this purpose, this thesis adopts Fairclough's three-dimensional framework that devotes equal attention to textual analysis of Arctic discourses in the media, text-production resulting from scientist-journalist interactions, and social practice which is understood, in this thesis, as journalistic representation of scientific knowledge. To enhance analysis of the third dimension, this thesis operationalises Douglas' (2004) conceptual framework of the concept of objectivity. Objectivity can refer to capturing objective 'reality', applying objective methods, and refraining from subjective values. Douglas (2004) understands the concept of objectivity in a multifaceted way; the broad range of meanings suits to this explorative study that needs to accommodate diverse understandings among scientists and journalists.

1.2. Objectives and research questions

Since this study applies Fairclough's three-dimensional framework, three objectives are set separately for every dimension, followed by research questions to guide the analysis.

The first dimension is devoted to text analysis. This thesis sets the objective to analyse Arctic discourses constructed with reference to Norwegian scientists in four Norwegian newspapers from 1 January 2018 to 31 October 2018. To analyse the first dimension, this thesis sets the question '*how was scientific knowledge on the Arctic represented in news articles?*', and the following sub-questions, e.g.

1. What discourses on the Arctic were constructed by Norwegian journalists with reference to Norwegian scientists from 1 January 2018 to 31 October 2018?
2. What discursive, and textual features dominated in the Arctic discourses among the sampled articles?
3. What meanings of objectivity are present in the sampled articles?

To shed light on the second dimension, i.e. text production, this thesis explores how Norwegian scientists and journalists interacted during content production of the sampled articles on the Arctic. This thesis questions *how representations of scientific knowledge were produced through interactions between scientists and journalists*. To explore a complex process of scientist-journalist interaction, the following sub-questions were asked, e.g.

1. How did journalists choose information sources to get evidence from?
2. How did journalists evaluate the obtained evidence?
3. How did journalists decide on the storyline and scope of the article?

The third dimension focuses on the social practice. In Fairclough's framework, social practice refers to all kind of social phenomenon, activity, or context, and consist of "discursive and non-discursive elements" (Jørgensen & Phillips, 2002, p.65). Discursive elements are connected with language (e.g. published articles, interviews, visual images), whereas non-discursive are non-linguistic aspects (e.g. personal characteristics, and beliefs of journalists, norms of newspapers journalists work for). This thesis focuses on the norm of objectivity, and discusses understanding, and practicing of objectivity among the sampled Norwegian scientists and journalists. The research question for this dimension is *'how did the Norwegian scientists and journalists understand, and practice the concept of objectivity?'*.

To sum up the findings of three dimensions, this thesis answers the main research question *'how did the identified discourses influence, and were influenced by, objectivity?'*. In that way, this thesis analyses mutual relationship between the identified discourses and the chosen non-discursive element of the social practice - objectivity.

1.3. Thesis structure

This thesis consists of 5 chapters. Chapter 2 reviews the existing literature on studies that deal with three main issues, i.e. Arctic discourses, interaction between scientists and journalists, and the concept of 'objectivity'. Chapter 3 describes both Fairclough's Critical Discourse Analysis (CDA), and Douglas' conceptualisation of the concept 'objectivity'. This chapter presents my understanding of CDA, current critique of this approach, and arguments for choosing Fairclough's three-dimensional framework for this study. Besides, this chapter describes the conceptual framework, operationalised from Douglas' (2004) understanding of the concept objectivity. Chapter 4 elaborates on methodology of this thesis, e.g. methodological choices of articles for discourse analysis, and informants among scientists and journalists for interviews. Chapter 5 presents and discusses findings, e.g. the discovered discourses and their discursive and textual features, together with understanding of 'objectivity' among the sampled Norwegian scientists and journalists. To sum up, the last chapter 6 will answer the main research question about the relationship between the discovered discourses and the concept of objectivity.

2. Literature review

Aiming to examine the relationship between the concept of objectivity, and Arctic discourses constructed by Norwegian scientists and journalists, this thesis dealt with three main issues - Arctic discourses, interaction between scientists and journalists, and the concept of objectivity. Since these three issues have not typically been analysed together in a single study, this chapter reviews studies dealing with each issue separately. Each section specifies what studies have been included, and what patterns have been found among the reviewed studies. This chapter ends with arguing why Arctic discourses, scientist-journalist interactions, and objectivity should be examined in a joint context.

2.1. Literature review of studies on Arctic discourses.

Among abundant studies on Arctic discourses, this thesis preliminary searched for studies concerning Norwegian-Arctic discourses. The literature search resulted in two studies devoted to discourses on the Norwegian Arctic (Jensen & Hønneland, 2011; Jensen, 2007), in addition to five studies that compared Norwegian-Arctic discourses with Russian (Jensen & Skedsmo, 2010; Hønneland, 2003), Canadian (Burke & Rahbek-Clemmensen, 2017), and European discourses (Grindheim, 2009; Rowe, 2013). Furthermore, this thesis reviewed studies devoted to Russian-Arctic discourses (Bērziņa, 2015; Gritsenko, 2016; Rowe & Blakkisrud, 2014; Khrushcheva & Poberezhskaya, 2016), and American media discourses (Pincus & Ali, 2016).

All the reviewed studies differed in terms of data-collection methods, discourse topics, and time frames. The reviewed studies analysed mass-media discourses by purposively sampling one (Pincus & Ali, 2016), ten (Rowe, 2013), or the largest number of 3043 newspaper articles (Jensen & Hønneland, 2011). The governmental discourses were analysed based on key policy documents (Grindheim, 2009; Jensen & Skedsmo, 2010; Rowe, 2013). To analyse discourses, the reviewed discourse-analysis studies conducted text analysis. By limiting their discourse analysis only to textual analysis, the reviewed studies could report only on what the discourses presented and excluded, but not how and why. Only two studies combined textual analysis with interviews (Hønneland, 2003; Rowe & Blakkisrud, 2014). By choosing mixed methods, these scholars aimed to highlight "not just what is said but what is done and how" (Rowe & Blakkisrud, 2014, p. 78).

The reviewed studies analysed various discourse topics. Some studies pre-chose certain issues of interest. For instance, Hønneland (2009) analysed environmental discourses, particularly, marine living resources, nuclear safety, and industrial pollution. Both Jensen and Skedsmo (2010),

and Grindheim (2009) focused on further Arctic development by examining the main official policy documents. By contrast, other studies sampled a sufficient number of articles, and policy documents to explore what topics dominated in the discourses. For example, Rowe and Blakkisrud (2014) identified newspaper articles covering issues on conflicts, cooperation, shipping, research, security, energy, and climate. The contrasting strategies - to pre-choose or leave discourse topics open - allowed the studies to explore the discourses either in depth, or in width, respectively.

The reviewed studies shared two features concerning time frames of sampling the data. The first feature is sampling over a short time frame. Most of the studies sampled their data over two or three years (e.g. Jensen, 2007; Benzina, 2015; Burke & Rahbek-Clemmensen, 2017; Gritsenko, 2016). By sampling their data over a short period of time, the studies could neither discover discourse shifts (Dunn & Newmann, 2016), nor present the complexity of the analysed issues (Carvalho, 2008). Contrasted with those studies, Jensen and Hønneland (2011) could identify two discourse shifts by sampling the data from 2000 till 2006. The second feature was lack of arguments for a certain time period. Most of the studies did not give any reasons to sample data from certain time frames (e.g. Jensen, 2007; Jensen & Hønneland, 2011), making the historical context unclear for their readers. Unlike those studies, some studies explicitly analysed the Arctic discourses connected with the Russia-Ukraine crisis of 2014, tracking discourse changes against the background of the political conflict (Burke & Rahbek-Clemmensen, 2017; Khrushcheva & Poberezhskaya, 2016).

Despite the methodological differences, the reviewed studies shared some similar findings. To start with, the media represented the Arctic as an area of potential conflict. Reviewing international newspaper headlines - like ‘Race for the Arctic’, ‘the New Cold War’ or ‘Scramble for the Arctic’ - Rowe (2013), and Pincus and Ali (2016) concluded that the media tended to represent the Arctic as a region with possible conflict and competition for natural resources. However, those conclusions should be scrutinised, because the studies were based on discourse analysis of one (Pincus & Ali, 2016) and ten newspaper articles (Rowe, 2013). Moreover, Rowe (2013) acknowledged a purposeful sampling of ten conflict-focused articles, making her findings of conflict-oriented headlines unsurprising. Whereas a physical conflict within the Arctic was questionable, representations of the Arctic in the media and official documents *did* conflict.

While the media tended to represent the Arctic as an arena with potential conflicts over natural resources, official strategies of the Arctic member-states expressed cooperative intentions.

For instance, the Norwegian High North strategy spoke about a mutually beneficial cooperation with Russia in developing oil fields (Jensen & Skedsmo, 2010; Grindheim, 2009), and the Russian government intended to respect international judicial norms, preserve the Arctic as a peace zone, and cooperate in natural-resource extraction (Jensen & Skedsmo, 2010; Khrushcheva & Poberezhskaya, 2016; Rowe, 2013). Moreover, analysing policy documents from Canada, Denmark, Norway, Russia, and the USA, Rowe (2013) concluded that all five strategies shared intentions for peaceful cooperation and sustainable Arctic future. Where did the media, then, get their information about conflicts from? Such a disparity between representations of the Arctic future from the media and governments made scholars wonder about the ongoing interaction between journalists and their informants. But before talking about the interaction among the involved actors (e.g. journalists, politicians, scientists, NGOs), let us look at an example of unbalanced reporting within the media discourses.

The dominant discourse in the Norwegian media was pro-oil, whereas opposing discourses got barely presented. Having analysed 1162 articles in four Norwegian newspapers from December 2003 to October 2005, Jensen (2007) identified that pro-oil production discourse dominated over anti-oil production discourse. However, having stated that arguments contrasting the dominant discourse rarely "made their way to the different newspapers", Jensen (2007) did not suggest any explanations to that observation (p. 251). Text analysis without analysing text production limited understanding of how article content was decided upon, and, as a result, how discourses were constructed.

Discourse-analysis studies were typically criticised for limiting analysis to the textual level (Rogers et al., 2005; Machin & Mayr, 2012). Text analysis was conducted by the majority of the reviewed studies, with two exceptions. Studies of Hønneland (2003), and Rowe and Blakkisrud (2014) combined discourse analysis with interviews. In the words of Rowe and Blakkisrud (2014), analysing "not just what is said but what is done and how" could explain how Arctic discourse impacted implementation of foreign policies (p. 78). Conducting interviews helped to shed light on 'discourse consumption', i.e. how discourses were accepted among the public, although how different actors constructed the discourses remained unclear (Dunn & Neumann, 2016).

Different actors did not construct Arctic discourses in isolation, but while interacting with each other. Politicians and civil servants, journalists and scientists, NGOs and international organisations (like, the Arctic Council) represent a subset of involved actors. Despite that, the

reviewed DA studies strikingly lacked analysis of scientific discourses on the Arctic, even though Arctic issues are scientifically complex. Besides, the studies neglected to analyse interactions between politicians and scientists, or between journalists and scientists. For instance, Rowe and Blakkisrud (2014) identified references to many actors in the analysed Russian newspaper (e.g. the government, different ministries and agencies), but none to scientists and researchers. Likewise, study of Jensen (2007) displayed examples of journalists referring to politicians and different ministerial employees, but not the scientific communities. Only the study of Weingart, Engels and Pansegrau (2000) analysed simultaneously scientific, political, and media discourses. These scholars discovered certain traits typical for each discourse, e.g. "[German] scientists politicized the issue, politicians reduced the scientific complexities and uncertainties to CO_2 emissions reduction targets, and the media ignored the uncertainties" (p. 280). The scholars attributed the discourse differences to risks the actors faced, e.g. scientists defended their credibility with a particular discourse, whereas the media competed for the audience (Weingart, Engels & Pansegrau, 2000).

Reviewing the above-mentioned studies, two main gaps were identified. First, the discourse studies on the Arctic failed to analyse discourses where scientists were included. Second, by conducting only text analysis, the discourse studies were unable to explain how the discourses were constructed. Thus, a more comprehensive approach would shed light not only of who, and how constructs Arctic discourses, but also of "the governance structures within which they [actors] operate" (Avango, Nilsson & Roberts, 2013, p.437).

2.2. Literature review of studies on interaction between scientists and journalists

The following section starts with shedding light on the concepts of 'scientist', 'journalist', before reviewing the studies on scientist-journalist interaction. The first two sections present certain features of scientists and journalists that affected their interaction. The section 2.2.3 highlights the main findings concerning scientist-journalist interaction to establish the scope of the existing knowledge, and identify gaps.

2.2.1. Scientists

Some of the reviewed studies freely interchanged three concepts, i.e. 'scientists', 'researchers', and 'experts', whereas other scholars claimed that the three concepts might point to practitioners of different scientific backgrounds. Peters (2013) suggested to use 'scientists' for those involved in natural sciences, and 'researchers' for those with the background in the humanities and

social sciences. By contrast, Friedman, Dunwoody, and Rogers (1986) defined 'scientists' as those involved both in natural and social disciplines. Weigold (2001) made the definition of 'scientists' even broader, combining under one category those who produce theoretical knowledge (e.g. natural and social scientists), and those working with applied sciences (e.g. technology, medicine). Some empirical studies failed to define the subject (scientific workers) and their scientific background, and thus might also have neglected different ontological and epistemological beliefs, inherent to natural and social sciences (Bryman, 2016).

In addition to 'scientists' and 'researchers', the word 'experts' might cause more misunderstanding. The word 'expert' might mean a scientist conducting research, as well as a specialist working in a particular field (e.g. politicians, economists, lawyers) (Albæk, Christiansen & Togeby, 2003). Besides, 'expert' may refer to one of the scientists' functions. Together with the function of researcher (who produces knowledge) and of teacher (who diffuses knowledge), experts function as those who have the expertise of how to apply knowledge (Nowotny, 1981). Even though Nowotny argued that functions of researcher and of teacher were superseded by that of expert in the 1980s, the same trend - that scientists were expected to provide their expert comments on daily events - was present in the 2010s (Wien, 2014; Albæk, 2011). For example, Wien (2014) found that "in 82 percent of the background stories and 86 percent of the hard news items, the role of the [Danish] researcher was that of the public expert commenting on day-to-day news events" (p. 432).

The reviewed studies discovered the relationship between scientists' background, and media attention. Bauer's longitudinal study (1995) showed that the British media covered hard science from the 1940s to the 1960s, while paying more attention to 'soft' disciplines from the 1970s to the 1990s. Another longitudinal study of Albæk et al. (2003) discovered a similar growing interest in 'soft' sciences in Denmark: 45% of the analysed articles referred to social-science researchers in 2001, contrasted to only 13% in 1961. Some studies gave more precise examples of certain disciplines experiencing more media attention. For example, Peters (2013) reported that German media contacted researchers with the background in "communication studies, law, history, archeology, [and] philosophy" more than scientists from "informatics, mathematics, chemistry, material science" (p. 14105). Similarly, Gascoigne and Metcalfe (1997) reported a higher media attention towards Australian researchers from "biological or ecological fields", contrasted to those involved in "mining, energy, construction, or manufacturing" (p. 275).

The reviewed studies explained the growing interest towards social disciplines by the nature of 'soft' disciplines. In dealing with everyday issues of the society, 'soft' disciplines imply closer contact with the public. 57% of social scientists considered their research as "part of general

education", contrasted to 33% of natural scientists (Peters, 2013, p. 14104). Natural scientists tended to demarcate science strictly from general knowledge. Whereas 55% of German natural scientists agreed to discuss only scientific findings with the press, 61% of social scientists did not mind to provide "general expertise on a certain topic" (ibid., p. 14104). In addition to a preference for contacting scientists from a particular background, the media also preferred to contact more experienced scientists.

More experienced scientists encountered more frequent contacts with the media than their less experienced counterparts (Gascoigne & Metcalfe, 1997; Dunwoody, Brossard & Dudo, 2009; Peters, 2013). The literature suggested two explanations for the discovered relationship between frequent media contact and scientists' experience. First, the media might be more interested in contacting more 'visible' scientists - those who are publishing in respectable journals, winning Nobel Prizes, and heading labs (Weigold, 2001). Undoubtably, more experienced scientists have a bigger overview of research than their research assistants. Second, more experienced scientists might have a more positive attitude towards the media, and therefore, be more open for communication with the media (Gascoigne and Metcalfe, 1997). Due to a higher number of media contacts and better understanding of how to interact with the media, experienced scientists learned to value more strategic gains from media, instead of criticising the media for inaccurate stories (ibid.).

While individual characteristics - like scientific background, and experience - can influence the frequency of science-media communication, institutional structures may also influence media interactions, both in terms of *how often*, and also *what* and *how* scientists communicate with the media. Scientists that are affiliated to research institutes or universities might have to communicate with the media according to the rules established between different institutional structures (Peters, 2007). For instance, commercial agreements signed between a research institution and a private company could prohibit any dissemination of research results before publication of an article. Gascoigne and Metcalfe (1997), and Peters (2013) discovered that scientists did not want to disclose their research results prematurely, because some scientific journals would only publish novel findings. By contrast, Bucci (1998), and Lowenstein (1995) found that scientists may "use the media as an additional, quicker outlet to publish results of their research before they appear in peer-reviewed scientific journals" (as cited in Ivanova et al., 2013, p. 630).

Like commercial agreements, media policies - or lack of them - also influenced the content of scientist-media interaction. Scholars reported that the lack of media policies provoked the lack of systematic messages from all researchers employed by a research institute (Gascoigne and

Metcalfe, 1997). Without media policies, scientists could have freely chosen what and how to say. Instead, Peters (2013) discovered that scientists preferred to be guided by media policy to avoid being blamed for miscommunication afterwards.

Sometimes, even the government can push scientists to communicate with the media. For instance, Danish scientists were obliged to disseminate their knowledge to the public by a regulatory act, saying that "[t]he University must, as a central knowledge and culture bearing institution exchange knowledge and competencies with society and encourage employees to participate in public debate" (Wien, 2014, p. 429). Unfortunately, no studies have yet discovered if this regulatory act of 2003 has provoked more frequent media contacts. Regulatory agreements, policies, and acts may vary, but, in the long run, they influenced *what*, and *how* scientists communicated with the media.

2.2.2. Journalists

Certain features of journalists influenced scientist-journalist interactions, particularly, the media journalists worked for, and their education. Communication of science to the public via the media is argued to dominate both over science communication at scientific lectures, exhibitions, and in museums (Peters, 2007), and over online communication via blogs, and social media. For example, 62% of the sampled German scientists reported being contacted at least once by newspaper, television, radio or online news portal, compared to around 20% contacted at least once by blogs, wikis, or any other online media (Ivanova et al., 2013). However, no empirical study have asked what media type - television, radio, the print or online press - dominates. Such studies could be lacking for two reasons. First, such data might be methodologically difficult to collect, especially if data collection would rely on self-report from scientists, because scientists might not recall precise number of contacts from each media type. Second, such data might not be required, because knowing what media contacted scientists the most might not bring any insight on science-media interaction.

Among the printed media, empirical studies have mainly researched national broadsheets. Scholars' preference to broadsheet newspapers is not groundless. Analysis of how frequently different print media contacted scientists showed that broadsheet newspapers contacted scientists the most. For instance, among 1130 German climate scientists in the most comprehensive study of Ivanova and colleagues (2013), 19% of scientists report being contacted by broadsheet newspapers, contrasted to 5% contacted by tabloids, and 12% by popular science magazines. Nevertheless,

Albæk (2011) considers exclusion of other types of newspapers (e.g. tabloids, popular science magazines, local newspapers) as a limitation for the existing literature.

Among three news genres - news, feature, and commentary newspaper articles (Roksvold, 1997, as cited in Andersen & Hornmoen, 2011), news articles referred to scientists and researchers the most. Around 90% of news articles in five Norwegian newspapers represented researchers from 1966 to 2006, compared to only 5% of feature and 5% of commentary articles (Andersen & Hornmoen, 2011). Similar findings of science representation were displayed in the study of Wien (2014), with 73% of the sampled Danish news articles referring to scientists. Based on the findings from separate studies, the printed media, national broadsheets, and news articles were argued to contact scientists frequently. However, a comparative study involving more news genres, newspapers and media types could show which ones used scientists as experts the most (Wien, 2014).

No matter what media types journalists worked for, their education helped journalists to understand process of scientific research. For instance, since the 1990s Danish journalists received Bachelor degrees that acquainted journalists with social research methods, journalistic objectivity, and interpretative reporting (Wien, 2014; Hallin & Mancini, 2004; Albæk, 2011). The same trend of increased educational level among journalists was reported in Norway (Eide & Ottosen, 1994). However, university degrees are worth differentiating from formal science-communication training.

Few journalists got professional training in communication with scientists. Wien (2014) discovered that only 6% among the sampled Danish journalists got the formal training in science communication. In the case of gained training, short time was devoted to training: 13% of international journalists attended less than one week of formal science-communication training from 2006 to 2009 (Besley & Tanner, 2011), whereas 73% did not devote any time. Science-communication courses primarily trained journalists how to understand scientific research process (ibid.). Low participation in science-communication courses can be explained with journalists being unwilling, or unable to learn about scientific process (Giannoulis et al., 2010; Reed, 2001). However, scholars believed that formal training contributing to journalists' understanding of scientific jargon might prevent journalists from accepting uncritically expert knowledge (Nelkin, 1995; Tanner, 2004).

Empirical studies reported that journalists uncritically accepted scientific knowledge, believing in the authority and diligence of scientists. Wien (2014) discovered that 63% of authors of Danish newspaper articles did not question the scientist's opinion. Moreover, 73% of the articles referred only to one scientific source (ibid.). In Norway, journalistic reporting was also

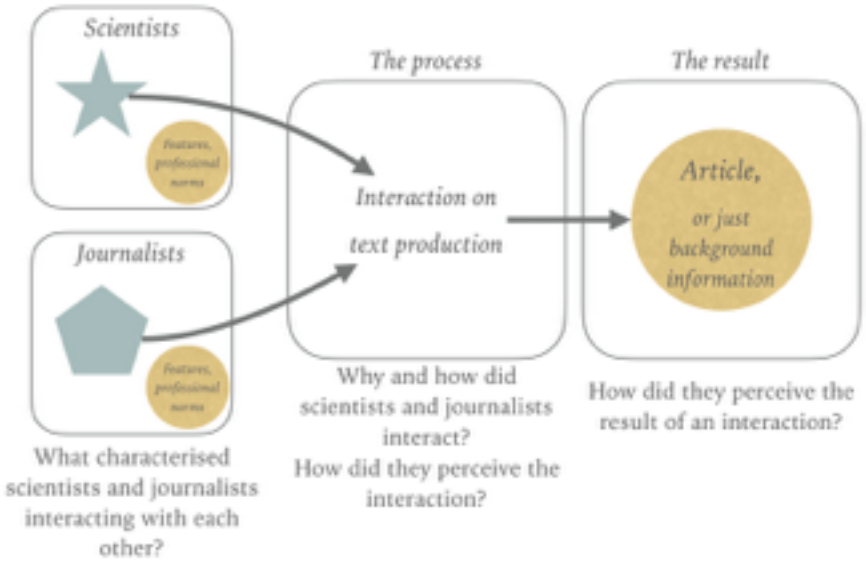
characterised by using the same sources repetitively, without confirming the evidence with different sources (Eide & Ottosen, 1994). Scholars explained such journalistic actions differently, e.g. journalists might be unable to check information in written sources, like research reports (Eide & Ottosen, 1994), or unable to find several relevant scientists (Friedman, Dunwoody & Rogers, 1986). Such findings raise the question about the compromised journalistic objectivity understood as balanced and impartial reporting (further discussed in section 3).

2.2.3. Studies on scientist-journalist interaction

The sections 2.2.1 and 2.2.2 described the dominant features of scientists and journalists that were suggested to influence their interactions. This section discusses the definition of 'interaction', before reviewing studies dealing with the process, and results of interaction.

The reviewed studies did not explicitly state what type of interaction scholars research, interchanging the words 'interaction', 'contact', and 'communication'. However, some guesses can be made. 'Contact' might imply only an initiative from journalists or scientists to approach the other side via all means available, e.g. e-mails, phones, face-to-face meetings. 'Interaction' and 'communication' imply that a scientist, or a journalist has responded to the initiative, and entered the suggested domain. The word 'domain' is chosen on purpose. Indeed, the initiator of a contact - in most cases, a journalist - sets the 'boundaries' of the interaction, i.e. a pre-chosen topic (Wien, 2014), a medium, a time frame, sometimes even the preferred answer (Tavris, 1986).

The literature on science-media interaction mainly asked questions about *why*, and *how* scientists and journalists interacted, as well as how both perceived their interactions (see Graph 1). Studies dealing with results of interaction examined perceptions of results. This section proceeds with some remarks on the methodology of the reviewed studies, followed by their findings.



Graph 1. Three-block process of science-media interaction, with typical questions on each block raised by the literature

The reviewed studies on science-journalism interaction differed in their methodological choices, i.e. different sampling and research methods applied, time frames and countries covered. The majority of the reviewed studies started sampling of articles referring to researchers, followed by collecting names of researchers mentioned in the articles, and journalists who wrote the sampled articles (e.g. Albæk, 2011; Wien, 2014). Such a purposive sampling led to a bias - sampling of 'visible' scientists from particular fields of study, and with newsworthy research issues. Scientists from fields of study that experience less media attention - e.g. manufacturing, mining, construction - remain under-researched (Peters, 2013; Ivanova et al., 2013). Other studies that sampled scientists based on experience in media interaction (Reed, 2001), field of study (Eide & Ottosen, 1994; Tøsse, 2013), or a particular scientific topic (Peters, 1995; Tøsse, 2013) did not avoid a bias towards a certain group of scientists. Despite the bias, purposive sampling allowed the scholars to accumulate knowledge on media-communication strategies among certain groups of scientists.

Dominating research methods used in the reviewed studies were quantitative content analysis of the newspaper articles, standardised surveys conducted by phone or via e-mail, and qualitative interviews. After sampling, some scholars - typically those guided by research questions of *how*, and *what kind of,* scientists were presented in news articles - conducted quantitative content analysis (e.g. Andersen & Hornmoen, 2011; Eide & Ottosen, 1994). Other scholars contacted scientists and/or journalists for phone standardised surveys (e.g. Albæk, 2011; Wien, 2014), or semi-standardised interviews (e.g. Gascoigne & Metcalfe, 1997; Reed, 2001) to answer research questions of *why*, and *how* scientists and journalists interacted and perceived interactions. The choice between surveys and interviews was motivated by the desire either to have a bigger sample (i.e. surveys), or to analyse in depth (i.e. interviews).

As for time frames, the reviewed studies analysed science-media relationship within a short period of time, e.g. during a few months (Peters, 1995), a year (Albæk, 2011), or a couple of years (Wien, 2014). By contrast, some scholars conducted longitudinal studies, e.g. Albæk, Christiansen and Togeby (2003) analysed how Danish journalists used researchers as source from 1961 to 2001, whereas Bauer (1995) analysed interaction between British journalists and scientists from 1946 to 1986. Even though the mentioned longitudinal studies discovered trends over a long period of time, the authors have anyway sampled articles only within short time spans, e.g. a month per year every tenth year (Albæk, Christiansen & Togeby, 2003), or ten days per year every second year (Bauer, 1995).

The reviewed empirical studies were mainly mono-national, i.e. each study analysed science-media interaction within one country, e.g. Denmark (Albæk, 2011; Wien, 2014), Norway (Eide & Ottosen, 1994; Andersen & Hornmoen, 2011; Tøsse, 2013), Germany (Peters, 1995; Peters, 2007), Australia (Reed, 2001; Gascoigne & Metcalfe, 1997), the USA (Dunwoody, Brossard & Dudo, 2009). All these scholars warned against generalising based on their research findings, and some scholars (e.g. Albæk, 2011; Wien, 2014; Peters, 2007) suggested to conduct further multi-national research to cross-check the discovered trends. Indeed, multi-national studies might bring new insights, like the study of Peters et al. (2008). Having sampled scientists from the USA, Japan, Germany, Great Britain, and France, Peters et al. (2008) revealed scientists' positive attitude to media interaction, arguing against the belief consistent in many mono-national studies - that science-media interaction was dominantly conflictual.

Despite methodological differences, two main findings were consistent among the reviewed studies: (1) that journalists referred to scientists to legitimise the frame of an article, and scientists cooperated for personal and strategic reasons; (2) that journalists regarded the process of interacting as challenging, and the results of interaction as positive; whereas scientists evaluated the process of interaction as positive and beneficial, whereas the result of interaction as inaccurate and conflictual. The following paragraphs comments on each of the above-mentioned findings.

The studies on science-media interaction predominantly focused on the question of motivation, i.e. why scientists and journalists interacted. Being asked about the reasons to contact scientists, up to 60 % of Danish journalists stated the need for interpretation (Albæk, 2011; Wien, 2014). Heavy reliance on experts' opinions might make journalists seem objective, because journalists interpreted not themselves, but reported the opinions of independent authority - scientists. However, the same studies discovered that up to 50% of journalists chose frames of articles before contacting scientists (ibid.). The findings of journalists pre-determining articles let scholars question journalistic objectivity understood as balanced and impartial reporting (further discussed in section 3).

Not only journalists, but also scientists are argued to be compromising the norm of objectivity. Scientists are interested in communicating with journalists due to certain benefits from such communication (Dunwoody, Brossard & Dudo, 2009). Knowledge dissemination via the media allowed scientists to pay back their duty to the taxpayers, whereas media attention and professional acknowledgement were regarded as additional benefits (Gascoigne & Metcalfe, 1997). What benefits dominated was difficult to identify, especially when scientists stated both at the same time, e.g. "[knowledge dissemination] is my duty and it enhances my career" (Wien, 2014, p. 436).

Scientists seeking extra media attention might be argued to be compromising norms and values of the scientific community, e.g. the norm of scientific objectivity understood as being value-free (further discussed in section 3).

Besides the questions of motivation, the literature on scientist-journalist interaction explored how scientists and journalists perceived their interaction. Among Danish journalists, 99% shared "mostly positive" impression about the results of interactions with researchers, although half of them experienced difficulties "to some extent" with understanding how scientists expressed themselves (Wien, 2014, pp. 437-438). Journalists' positive perceptions of the final results do not surprise, because journalists usually got all they needed without any opposition or intrusion from scientists. The literature supported the latter statement with three examples. First, scientists did not oppose being contacted. In the study of Wien (2014), "60 percent [of journalists] did not report difficulties in reaching the researcher, and almost 90 percent reported that the researchers would return a call if a message was left" (p. 438). Secondly, scientists provided almost all information required by journalists. The only possible barriers for scientists to share information were commercial agreements, if signed between a research institute and a company ordering a study. By providing fundings, commercial companies owned research results before the publication (Gascoigne & Metcalfe, 1997). Thirdly, scientists did not have a say in correcting article drafts. Reed (2001) argues, that Australian scientists "tend to believe that their work should be presented as they would have written it even if not using their words" (p.288). Similar beliefs were spread among German scientists, who perceived the media as a mediator of communication between science and the public (Peters, 1995). Nevertheless, journalists had the last word, sometimes even denying to show last drafts before publishing (ibid.).

Unlike journalists, scientists viewed their contacts with the media as satisfactory. Up to 75% of the sampled researchers from 5 countries (the USA, Japan, Germany, Great Britain, and France) rated their interactions as "mainly good", and 46% regarded contacts with the media as beneficial for their career (Peters et al., 2008). However, the results of interaction - media coverage of scientific knowledge - were represented inaccurately, according to scientists from different countries. In the study of Wien (2014), 60% of Danish scientists "now and then" experience misleading and imprecise dissemination of results within their fields of study, and their own research results. Literature typically explained conflicts between science and the media with contrasting attitude towards accuracy, i.e. scientists valued - whereas journalists might have ignored - accuracy of news articles (Peters, 1995). By contrast, Peters et al. (2008) provided an unconventional explanation to conflictual situations: too much literature covered conflicts, whereas

positive experiences did not get documented in details. To fill that gap, Peters and his colleagues (2008) posed a different research question "[w]hy are the interactions so smooth given the well-known and empirically confirmed differences in expectations, quality criteria, and system logics?" (p. 270). However, the three answers provided by Peters and his colleagues (2008) were far from convincing. First, reporting "increased professionalism of science journalism" (Peters et al., 2008, p. 272) contrasted with numerous studies that discovered low professional training among journalists (e.g. Wien, 2014; Besley & Tanner, 2011; Giannoulis et al., 2010; Reed, 2001). The second claim that scientific institutions had "more efficient communication strategies" thanks to "support by public relations (PR) departments" (Peters et al., 2008, p. 271-272) seemed like an optimistic answer, taking into account that not all institutions had budget to open PR departments. The third answer that scientists tended to lower their quality criteria towards media coverage of science contradicted with the study of Ivanova et al. (2013), arguing that only less-experienced scientists tend to adapt to media interests and demands.

In general, the existing literature can be criticised for being focused too much on motivation and perception. Even though finding positive correlation between being motivated to communicate with the media, and higher number of media contacts, literature was unable to explain the causal relationship between these two variables (Peters, 2013). Instead, Peters (2013) suggested to research "readiness to interact with the media as a more general orientation" (p. 14105), and some studies accepted that suggestion. For example, "60 percent [of journalists] did not report difficulties in reaching the researcher, and almost 90 percent reported that the researchers would return a call if a message was left" (Wien, 2014, p. 438).

Even though not opposing media contact, scientists did not initiate it, whereas journalists did. Around 90% of Danish journalists stated that they initiated contact with researchers (Albæk, 2011; Wien, 2014), whereas almost 62% of German scientists reported never to contact a journalist themselves (Ivanova et al. 2013). Initiative journalists are not a surprising phenomenon, because getting information is the main task of journalists. As for scientists, combining the tasks of conducting research, and communicating with the media seemed time-consuming (Tosse, 2013), and scientists stated to be reluctant to approach the media first, even if some institutes tried to encourage researchers to communicate with the media (Gascoigne & Metcalfe, 1997). Moreover, scientists wanted to avoid the blame for causing a bad corporate image of the institutions in case of a 'bad' article (Gascoigne & Metcalfe, 1997).

After getting a rough overview over the existing knowledge on science-media interaction, some conclusions about the gaps can be made. First, more clear definitions of 'scientist',

'researcher', 'expert', and 'interaction' would help the future studies be clearer. Secondly, social scientists are argued to be referred to the most by journalists, although their disciplines, if specified, would help identify what issues social scientists comment on the most, e.g. from their own field of study or beyond their expertise. Thirdly, the printed media, particularly national broadsheets, have been prioritised by scholars, giving many insights on the interaction between scientists with the media of that particular type. Checking presence of similar trends among other types of the media, e.g. television, online newspapers, or tabloids, could also be insightful. Fourthly, methodologically, multi-national studies, with collecting data over longer periods, and with representative sampling, could also show presence - or absence - of the findings consistent over the large body of literature. The last gap originates from the findings of scientists' media adaptation, and journalists' one-source reporting of pre-chosen article frames: both undermine the very basic norm of both professions - scientific and journalistic objectivity.

2.3. Literature review of studies on objectivity.

The concept of objectivity is relevant for both science and journalism. Normatively, both scientists and journalists should aim to describe objective reality, collect evidence with objective methods, and refrain from being influenced by subjective values. However, in practice, both concepts of scientific and journalistic objectivity are disputed, because objectivity is argued to be unattainable, and undesirable. This chapter reviews what the concepts of scientific and journalistic objectivity can refer to, how they have evolved over time, how scientists and journalists perceive the norm of objectivity, and what the concept objectivity is criticised for. Scientific and journalistic objectivity have been discussed together, because both concepts share possible meanings, historical development, and critique.

2.3.1. What the concepts of scientific and journalistic objectivity can refer to

Scholars studying scientific objectivity can be divided into two groups. The first group highlights a single dominant meaning of objectivity, e.g. Nagel's 'view-from-nowhere' defined objectivity as consciously excluding values from research. The second group argues that objectivity cannot be reduced to one meaning, e.g. Douglas (2004) argued for eight meanings of objectivity. The contrasting views make both groups criticise each other. Those focusing on one meaning criticise the second group for broad definitions that "makes shooting down its pretensions easier" (Brewin, 2003). Even though broad definitions are easy to criticise, they provide the *breadth*

of meanings, i.e. explorative studies adopting broad definitions can remain open for diverse understanding of objectivity among scientists or journalists (e.g. Post, 2015). Those arguing for multi-meaning of objectivity criticise the first group for overlooking many other possible meanings (Douglas, 2004). Even though some scholars can be criticised for overlooking some meanings, their focused analysis contribute to the *depth* of understanding of a certain meaning.

Similarly to scholars focusing on one meaning of objectivity, scholars who suggest multilayered understanding of scientific objectivity might be criticised for overlooking one more aspect - basic assumptions. Indeed, a label of 'objective' can be applied to research processes (i.e. if the applied methods are objective), to research findings (i.e. if 'truth' has been approached), or to reasons and values (i.e. if researchers study an issue for objective - but not personal - reasons) (Daston, 1992). By itself, though, the label 'objective' does not mean anything, if scholars do not specify what they speak about (i.e. methods, results, values), and what criteria they use to evaluate objectivity. Therefore, in the debate about objectivity, scholars need to specify not only what the label 'objective' is applied to, but also what underlying basic assumptions made scholars accept certain quality criteria. Scholars might endlessly argue about what can be considered objective, and empirical researchers might endlessly persuade that their study can be trusted, if basic assumptions are not explicitly stated. Basic assumptions guide not only the choice of theories, methods, and evidence, but also justification, and evaluation of research (see Figure 1).

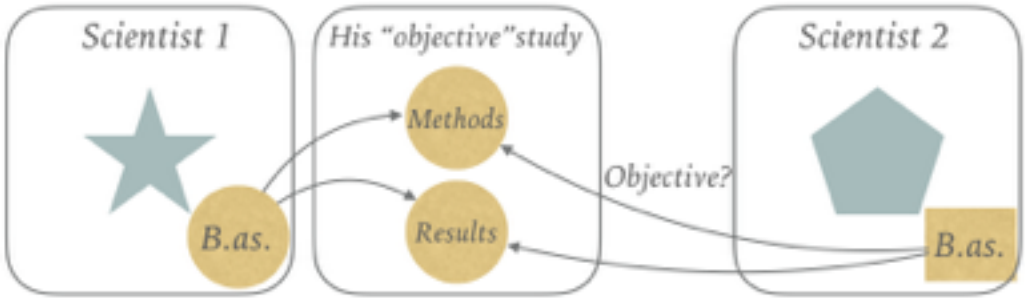


Figure 1. Basic assumptions affect what is considered 'objective'

Scholars dealing with scientific objectivity can be contrasted to scholars studying journalistic objectivity. Scholars might give different names to scientific objectivity (for the overview, see Table 1), but the different names refer to the same understanding of objectivity. In other words, Daston's (1992) 'ontological objectivity' refers to objective results, similar to Hanna's (2003) 'external objectivity', or Galison's (2010) 'true-to-nature ideal'. Among the common names of journalistic objectivity are detachment, facticity, balance, weight-of-evidence, non-bias,

neutrality, and impartiality (Hellmueller, Vos & Poepsel, 2013). However, the meanings of journalistic objectivity are so entangled that scholars cannot categorise them into objectivity of methods, results, or values. For example, 'neutrality' can refer to refraining from personal values, but also to neutral selection of sources, or neutrally described events. Or another example - 'weight-of-evidence' - refers to how journalists "find out where the bulk of evidence and expert thought lies on the truth continuum and then communicate that to audiences" (Dunwoody, 2005, as cited in Hiles & Hinnant, 2014, p.432), representing simultaneously objectivity of method, and result.

Table 1. The overview of what scientific objectivity can refer to, and names given by the reviewed authors

Authors/ meanings	**Metaphysical/ ontological**	**Methodological/ epistemic**	**Moral**	**Basic assumptions**
The meaning refer to =>	**Objective truth/ product/results**	**Objective methods/ process**	**Objective values**	**Criteria to establish what is considered objective**
Daston	Ontological	Mechanical	Aperspectival	
Hanna	External/ representative	Internal/ methodological		
Nagel			View-from-nowhere	
Nozick	Invarience			
Douglas	Objectivity1	Objectivity1	Objectivity2	Objectivity3 (Concordant + Interactive)
Galison	True-to-nature	Mechanical	Trained judgement	

Sources: adopted from Daston (1992); Hanna (2003); Nagel (1989); Nozick (1998); Douglas (2004); Galison (2010)

Among scholars defining objectivity with multiple meanings, Douglas (2004) is worth highlighting, because she suggested two unconventional meanings - 'concordant' and 'interactive' objectivity. The *concordant* objectivity is supposed to assess features, and basic assumptions of group members involved in knowledge, or news production, and how they were chosen. The *interactive* objectivity aims to evaluate discussions, and an agreement of the group. These meanings of objectivity are highly relevant for analysing science-journalist interactions. The *concordant* objectivity would help to evaluate whom journalists chose as sources (i.e. features of scientists involved, like expertise, background, beliefs). The *interactive* objectivity would focus on how journalists presented scientific claims (e.g. if contrasting evidence was presented in a newspaper article), and how journalists handled contrasting evidence (e.g. if enough evidence was given). Douglas' suggestion can be viewed as unconventional, because Douglas suggests to look at

dynamics within a group, whereas objectivity traditionally refers to values and work of one person.

2.3.2. How the concepts of objectivity has evolved over time

Both historians of science, and journalism explore how understanding of scientific and journalistic objectivity has shifted over time, depending on social, political, economic, and technological contexts of a particular time period. Typically, historical development of two concepts of scientific and journalistic objectivity was studied separately. However, comparing historical development of both concepts displayed that scientific and journalistic objectivity evolved similarly (Ryan, 2001), and even merged after the World War II (Galison, 2015).

Drawing upon historians studying scientific and journalistic objectivity, this section presents four stages that both concepts have gone thought (see Table 2). Historians suggested approximate years when the meanings shifted, and warned that old meanings did not disappear completely after shifts (Galison, 2010; Daston, 1992). Moreover, based on the argument of Schudson (2001), both concepts of scientific and journalistic objectivity depended on the political, economic, and social context of every nation, and thus, may differ among the countries. Thus, the discussed four stages are suggested as an overview, based on examples from scientific communities of Western countries, and from American journalism.

Table 2. Stages of historical development of the concepts of scientific and journalistic objectivity

Stages	Science		American journalism	
First usage	1637/1644		1920s	
Values are not condemned	'True-to-nature' ideal based on ontological objectivity	1630s - 1850s	1700s - 1890s or 1920s	Partisan press, no objectivity yet
	No one criticised intervention of values = objectivity is not connected to values			
Values are excluded, full detachment	Mechanical objectivity, restraint	1850s - 1950s	1920s - 1960s	Penny press, descriptive reporting
	Objectivity is questioned, because facts are considered socially constructed			
Trained interpretation	Judgemental objectivity	1950s - 1980	1960s - 1970s	Interpretative reporting
	Previous meanings of objectivity did not help to reach 'truth' => search for a new meaning			
Hybrid roles, and meanings of objectivity	Objectivity contested, alternatives offered	1980s - 2010s	1980s - 1990s	Investigative reporting

Sources: adopted from Galison (2010); Galison (2015); Brewin (2013); Schudson and Tifft (2005); Daston (1992); Albæk (2011)

During the assumed first stage in the history of objectivity, both scientists and journalists approved of the presence of values in research and reporting. From the 1630s, scientists adhered to the 'true-to-nature' ideal. To understand the 'true-to-nature' ideal, Galison (2010) suggested to imagine a scientist drawing an image of body organs, botanical species, or neurons. A task of drawing an objective image required from a scientist to rely on the available tools (e.g. paper and pencils to capture an object), available artists (in case if a scientist could not draw himself), and available objects (for limited time, because, for instance, a human liver taken from a dead body could be used only for a few hours). Following the 'true-to-nature' ideal, scientists would select average features from different sample objects - i.e. objects varying in size, colour, texture - based on scientists' perceptions. The idealised image was considered the closest to objective reality, while all the deviating samples "were but imperfect realizations" (Galison, 2010, p.11).

Such a tolerance to personal values can be explained by the understanding of objectivity typical for that time. From objectivity's first usage in 1637 or 1644 till the 1850s, 'objective' referred to intrinsic, perceived, mental, whereas 'subjective' described the external reality, and the material world (Daston, 1992). Therefore, approaching the objective reality would demand from scientists to rely on their perceptions. Up till the 1850s, objectivity was not associated with values, contrasted to today's dominant understanding of objectivity as 'value-free' (ibid.).

Similar to scientific research up till the 1850s, American journalistic reporting was also intervened by opinions, values, and choices, although not because of the concept of objectivity. Throughout the 18th and the 19th centuries, the American press never could report objectively. In the first half of the 18th century, the press tried to avoid local political news to give local audience "no grounds for grumbling" (Schudson & Tifft, 2005, p. 19). From the 1760s, the American press had to advocate against the British government in the context of the American War for Independence. After America gained independence, the Sedition acts forbade the American press to criticise the American government. And even after the First Amendment guaranteeing the freedom of the press in 1791, the American press was largely functioning as a means of communication between political parties and voters.

Advocacy after the freedom of the press is explained by financial dependence of the press on political parties. Through the 19th century, the press tried to reduce dependence by increasing newspapers profitability. Newspapers increased their audience thanks to reduced price for a newspaper (from six cent to a penny), and spreading newspapers with the help of newsboys instead of luxury subscription (Schudson & Tifft, 2005). Still, the press depended financially on political parties till the 1920s, and journalistic reporting remained largely partisan (ibid.). Even though the

American journalism started its history as occupation, and journalists aspired for journalistic objectivity from the 1920s, the historical events of the 18th and the 19th centuries are worth mentioning, because they led to the establishment of journalistic objectivity as the occupational norm (Schudson, 2001).

The second stage in the history of scientific and journalistic objectivities is characterised by scientists and journalists detaching from their values and personal interests. From the mid 19th century, scientists consciously attempted to exclude their subjective viewpoints for two possible reasons. First, communication among scientists changed around the 1850s from communication based on lifelong friendship to formal exchanges among numerous scientists with different backgrounds (Daston, 1992). That shift provoked scientists to focus communication on scientific questions, and exclude their individual opinions to share scientific results "across barriers of distance and distrust" (Daston, 1992, p.609). The second reason, suggested by Galison (2010), is related to technological advances. New technologies were considered to provide the closest access to objective reality, because automatic machines could draw reliably over a long time, contrasted to artists' "muscles, will, and skill" subject to exhaustion (Galison, 2010, p.18). That is why scientists "quieted" their perceptions to prevent mistakes and let nature actually speak for itself "without intervention or interpretation" (Galison, 2010. p.8). Even though presenting different explanations, both Daston, and Galison agree, that scientists lost "the precision, the color, the sharpness, the depth of field, even the research and pedagogical usefulness" (Galison, 2010, p.8) for the sake of avoiding interpretation, and "averaging" communication (Daston, 1992, p. 607).

By presenting social context of that time, both historians argued for the next shift in the meaning of objectivity. From the 1850s the term 'objectivity' consisted of three meanings - ontological, mechanical, aperspectival (Daston, 1992). The ontological meaning referring to something perceived and intrinsic dominated from the mid 17th till the mid 19th century. However, in the 1850s, the meaning changed from 'objective' referring to intrinsic to 'objective' referring to external reality. Moreover, two new meanings were added, i.e. the 'mechanical' meaning arose thanks to reliable tools which made interpretation unnecassary, whereas the 'aperspectival' meaning referred to exclusion of personal interests. However, Daston (1992) admitted her inability to explain "how it became possible to lodge such originally disparate meanings [ontological, mechanical, and aperspectival meanings of objectivity] and associations under the same linguistic roof" (p.601). Nevertheless, some assumptions can be made, e.g. that new technology provided new methodological opportunities, whereas communication across borders raised moral concerns about counterparts' reliability.

Although later than in scientific research, similar epistemic and moral concerns were raised within journalism, resulting in detached fact-seeking. After two centuries of forced advocacy for political parties, but also the gradual development of journalists' occupational culture (with its distinct methods, i.e. interviewing, note-taking, direct quoting of sources, and reporting instead of commenting), journalists shifted towards descriptive reporting. This shift is most commonly explained with economic and technological reasons, i.e. that factual reporting increased profitability of newspapers, because such reporting could attract readers from both American Democrats and Republicans, and that the telegraph required concise reporting (e.g. Carey, 1969, as cited in Brewin, 2013). Schudson (2001) criticised such explanations, arguing that a new moral norm, like objectivity, could not be explained by new social practices, e.g. new technologies or new voting systems. Instead, the scholar suggested to explore cultural and sociological contexts that made journalists differ, e.g. journalists' new desire to differ from their opponents - press agents - who advocated particular interests. Although Schudson (2001) pointed to alternative factors that might have influenced adoption of objectivity, his critique of using social practices as an explanatory factor is weak, since his alternative examples are just new social practices.

Besides contested explanations of *why* journalists began to strive for journalistic objectivity, historians also argued about *when* it happened. Some historians argued for the 1890s, using the spread of independent newspapers as their main arguments. Mindich (1998) said, that

> "[t]he 1890s is a good place to end a history of 'objectivity' because it is one of the first decades when 'objectivity' was a recognised ethic norm in journalism, but also one of the last in which 'objectivity' goes basically unquestioned" (as cited in Galison, 2015, p. 59).

Other historians argued for the 1920s, because factual reporting, and independence from political parties were achieved only by the 1920s (Schudson, 2001). Moreover, official exclusion of values happened in 1922, when the first journalists' association adopted "Canons of Journalism" with a clear statement that "[n]ews reports should be free from opinion or bias of any kind" (Pratte, 1995, as cited in Schudson, 2001, p.162).

Even though the concepts of scientific and journalistic objectivity were used for the first time with 300 years difference, which is typically explained by a later establishment of journalist as occupation (Schudson & Tifft, 2005), both concepts shared some traits at the first two stages. Further, the concepts merged together at the third stage of their development, when both concepts changed their meaning again - from detachment to 'trained judgement' (Galison, 2010).

During the third stage, both scientists and journalists confidently welcomed judgement back, although for different reasons. After having accumulated expertise, scientists approved subjective judgement, because "the expertly trained eye can often sort phenomena more quickly and effectively than the rote application of a mechanical protocol" (Galison, 2010, p. 9). Galison explained the warm welcoming of judgement with more complicated tasks faced by scientists. Whereas scientists mainly had to draw and observe in the end of 19th century, they required to sort and analyse in the beginning of the 20th. However, such an explanation for the changed meaning of objectivity seems like an over-simplification, because scientists needed to sort and analyse in any century. Other explanations are difficult to find, because the history of scientific objectivity in the 20th century is under-studied.

A similar shift from detachment to informed judgement happened in journalism. Against the background of American civil rights movements in the 1960s, social constructionism theories, and historical events like the spread of television, journalists turned away from factual description, and turned towards interpretive reporting (Schudson, 2001; Brewin, 2003; Schudson and Tifft, 2005). Since journalists could not interpret themselves due to lack of knowledge, and need to legitimise article frame (Schudson, 2001), interpretive reporting demanded from journalists only one kind of judgement - choosing sources that could be trustfully quoted (Schultz, 1998). Thus, journalists addressed to authoritative sources, e.g. scientists, and politicians (Albæk, 2011).

Questioning of interpretive reporting got fuelled by two iconic events in American journalism. The first event was the disclosure of the Pentagon Papers connected with governmental decisions to continue the Vietnam war. This case represented "the first time in the [American] nation's history that a newspaper was prevented in advance by a court from publishing a specific article", under the argument of threatened national security, and despite the First Amendment's guarantee of the freedom of the press (Schudson & Tifft, 2005, p. 31). The second event was the Watergate scandal - "an iconic example of modern investigative reporting" - that made journalists realise that facts can be manipulated, and that claims of the American government should be double-checked (Schudson & Tifft, 2005, p. 31).

The history of scientific and journalistic objectivity proceeds to the forth stage, characterised by the multiple roles scientists and journalists had to play after the end of the Cold War. Galison (2010) identifies three roles scientists had to juggle after the Cold War. Besides their traditional role of 'scientist', they also have to become entrepreneurial. "Presenting one day to a professional colloquium and the next to a group of venture capitalists", scientists have to find new ways to attract fundings during the times of reduced financial support from the governments (Galison, 2010,

p.29). In addition, the times of "massive digitized images" require scientists to advance their artistic skills (Galison, 2010, p.28). Nowotny (1981) presented similar views on the multiple roles of scientists, especially agreeing upon scientists' need to convince different audiences that the results of scientific activities are "indispensible contribution towards human welfare" (p. 236). As a result, scientists might have to juggle their understanding of objectivity depending on the audience which scientists face. This might also be the case for journalists.

After journalists realised that previously adopted journalistic objectivity did not help to access 'truth', investigative journalism started to spread. On the one hand, investigative journalism is thought to share the same norms and ideals with other types of journalism, just being "a strong expression of those norms and ideals" (Meyer, 2006, p.245). But on the other hand, investigative journalism dictates journalists to carry out an unconventional role. Besides a traditional - passive - role of disseminator of information, an investigative journalist has to carry out an active role of a 'watchdog', or 'fourth power' (Johnstone et al, 1972-1973; Schultz, 1998). Since these two roles are contradictory (i.e. one cannot be active and passive at the same time), journalists might be forced to carry out one role more or better than the other. In any case, the contradiction between the two roles might explain the emergence of partisan reporting, and alternatives to journalistic objectivity (e.g. transparency).

The above-mentioned stages were supposed to show how objectivity - as a concept and a norm - was fluid, and dependent on the political, economic, and social contexts. The two professions - journalists and scientists - have contrasting routines, e.g. demand for sensational news versus availability of tentative results, clear versus jargon language, overview of the issue versus knowledge about a specific part of a puzzle, pressing deadlines versus a long scientific research process. Despite that, the meanings of scientific and journalistic objectivity evolved historically similarly up till the end of the 20th century.

2.3.3. How scientists and journalists perceive objectivity

While historians preoccupied themselves with the evolution of objectivity, empirical researchers of objectivity try to assess if scientist and journalists apply objectivity in news articles and in scientific research as a desirable and attainable occupational norm. This section reviews eight empirical studies that explicitly dealt with the concept of objectivity.

The reviewed studies shared their methodological choices. Among the applied data-collection methods, surveys were considered the most suitable to study how journalists and

scientists defined, and applied the norm of objectivity (e.g Donsbach & Klett, 1993; Post, 2015; Skovsgaard et al., 2013). Only one of the reviewed studies chose interviews to study perceptions of journalists on their occupational norm (e.g. Hiles & Hinnant, 2014; Ytterstad, 2011). When assessing if objectivity was present in newspaper articles, researchers applied quantitative content analysis that allowed them to assess numerous articles, e.g. 335 articles in Karlsson's (2010) study, and 636 articles in the study of Boykoff and Boykoff (2004).

As for sampling methods, the majority of studies applied random sampling methods, although still warning against generalisations based on their findings (Boykoff & Boykoff, 2004; Donsbach & Klett, 1993; Hellmueller, Vos & Poepsel, 2013). The purposive sampling was chosen only when studies were interested in approaching scientists and journalists with a certain experience level (e.g. Hiles & Hinnant, 2014; Post, 2015), or researching a certain topic, e.g. global warming, and climate change (Hiles & Hinnant, 2014; Ytterstad, 2011). Methodologically, some of the studies can be criticised for not collecting data systematically over years, especially if the aim is to discover if objectivity was used more or less over time (e.g. Karlsson, 2010; Hellmueller, Vos & Poepsel, 2013).

Even though varying in their methods, the reviewed empirical studies pointed to two findings. First, scientists and journalists understood objectivity differently. Whereas journalists largely understood objectivity as balance and impartial reporting, objectivity for scientists referred to application of valid methods, and explicit reporting of involved values (Post, 2015). Trying to explain the disparity of understanding, Post (2015) pointed to different professional routines. Whereas scientists can have some control over knowledge production, journalists can only learn about, and disseminate the established 'facts'.

Second, even though journalists remained inclined to the norm of objectivity, they might adapt their understanding of the norm to their needs. For example, Ytterstad (2011) reported that journalists covering climate-change issues shifted from the traditional understanding of balanced reporting within one article to "balance *over time*[1]" (Ytterstad, 2011, p. 330). In other words, climate journalists justified their taking stances within one newspaper article, based on the assumption that a wide range of newspapers present in the Norwegian society would present other contrasting opinions. Similarly, Hiles and Hinnant (2014) reported a shifted understanding of journalistic objectivity from balance to "weight of balance" (p. 446). Journalists applying that norm of objectivity quoted scientists who shared widely accepted scientific beliefs, and excluded sceptics.

[1] *"balanse over tid"*

Indeed, balanced reporting might misrepresent the actual state of scientific knowledge. By giving equal space to proponents and opponents of the climate-change hypothesis, journalists might present both sides as equally large, and their arguments as equally strong (Boykoff & Boykoff, 2004).

Indeed, the examples of shifted meaning of objectivity provoke two further questions. First, how will less-experienced journalists establish what scientific arguments belong to the mainstream? Unlike their highly experienced counterparts with experience over 10 years, less-experienced journalists might experience difficulties with judging what arguments are valid, taking into account the evidence that journalists with up to 10 years of experience sometimes hardly understand scientific claims (Wien, 2014). Secondly, how would the public know that journalists do not misuse the concepts of weight-of-balance, or balance-over-time to cover up their vested interests, or to preserve the status quo of the powerful? Scholars have already questioned the conventional understanding of objectivity as balanced and neutral reporting, typically being criticised as journalists' 'strategic ritual' (Tuchman, 1972), and 'ideology' (Friedman, 1998, as cited in Ryan, 2001). Surprisingly, scholars justified the presence of vested interests correlating with those of the public. For instance, Ryan (2001) justified that 'strategic ritual', if journalists needed to protect their job against criticism from the government for the sake of the public. Similarly, Ryan (2001), and Douglas (2000) defended values within journalism and science, arguing that being aware of own values helps capture truth more precisely, and avoid 'inductive error' - an incorrect decision to accept or reject a hypothesis. In any case, the ongoing contestation of objectivity might allow journalists to argue for escaping the 'objectivity' norm.

2.3.4. Why Arctic discourses, scientist-journalist interactions, and objectivity should be examined in a joint context

Having reviewed the studies concerning Arctic discourses, scientist-journalist interactions, and objectivity, some gaps have been identified that justify analysing these issues in a comprehensive approach. The first gap refers to the lack of studies on media discourses where scientists are involved. Such gap deserves to be filled, taking into account that journalists increasingly contact scientists to get expert interpretations of diverse events. At the same time, the studies on scientist-journalist interaction provided examples of scientists adapting to media needs, and journalists uncritically accepting scientific claims without cross-checking the claims with other scientific sources. Such examples raise doubts if scientists and journalists are able to adhere to their

occupational norm, i.e. objectivity. The studies on objectivity, especially among journalists, provided examples supporting that journalists might adapt their understanding, and application of objectivity to their needs. Thus, by looking at Arctic discourses - an example of scientifically complex issues, this study would be able to observe if journalists applied the norm of objectivity. By combing discourse analysis, and how the discourses were produced, this study would address the gap identified among the discourse studies, i.e. the studies were unable to explain how conflictual discourses had been constructed. Besides, by discovering what understanding of objectivity dominates among Norwegian journalists, this study would contribute to the existing literature. By looking at Arctic discourses, scientist-journalist interactions, and objectivity, this study would shed light not only on who, and how constructs Arctic discourses, but also on what values guide scientist-journalist interactions.

3. Theory and conceptual framework

3.1. Critical discourse analysis as a research approach

To study journalistic discourses, researchers can choose from many discourse-analysis approaches, including (but not limited to) conversation analysis, discursive psychology, discourse theory, critical discourse analysis (Wetherell, Taylor, & Yates, 2001; Jørgensen & Phillips, 2002). Discourse-analysis approaches differ greatly, but, according to Widdowson (1995), they can, largely, be differentiated by being critical or not. Non-critical approaches provide only descriptive text-analysis, whereas critical discourse analysis (CDA) aims at revealing hegemony and ideology (Widdowson, 1995), and causing a social change (Jørgensen & Phillips, 2002). The previous studies on Norwegian Arctic discourse have claimed to apply the CDA framework, but conducted only text-analysis (as discussed in chapter 2.1). The previous studies did not fill the gap on what happened during text production process, and if the discovered discourses affected social context. This thesis applies CDA framework to conduct a broader analysis of texts, text-production process, and social context.

Even though CDA offers a broader analysis, this approach is criticised along the whole inquiry process. To review the ongoing discussion about critical discourse analysis as an approach, the following chapter starts with presenting the fundamental principles of CDA. The fundamental principles function as a framework of what the CDA approach aims for, and how a CDA study should be conducted. Since CDA is criticised largely, this chapter presents and addresses the critique towards every principle. By discussing the critique towards the CDA approach, this thesis enhances further application of the approach. Further, this chapter presents Fairclough's CDA framework, and its operationalisation within this thesis, taking into account the methodological critique towards CDA studies. This chapter ends with discussing Douglas' (2004) conceptual framework on objectivity that guides the partial analysis of the social context (further explained in section 3.2).

3.1.1. CDA theoretical principles and critique directed against them

Despite possible diversity of theories and methodologies, CDA studies share theoretical principles that guide their inquiry. This section presents five principles that are relevant for this thesis, by explaining how each principle contributes to analysis of complex issues, like journalistic discourses on the Arctic (for the overview of principles, see Table 3). Critique of each principle

follows to stay aware not only of contributions, but also of difficulties connected with implementing each principle in a study.

Table 3. Theoretical principles of CDA and critique directed to each of the principle

CDA principles	Contribution	Critique
Complex view on discourse and social practices	Enable analysis of complex issues	Extra theory needed to guide analysis of non-discursive elements
Interdisciplinary	Enable analysis of complex issues	Incompatible methodologies of disciplines
Flexible	Enable inclusion of different factors relevant to a context	Vague guidelines
Critical	Enable discovery of hidden discourses	Agenda-driven inquiry & biased researcher
Reflexive	Enable revealing of underlying values and opinions	No factual knowledge, only multiple interpretations

Sources: adapted from Jørgensen and Phillips (2002); Wodak (2002); Toolan (1997); Carvalho (2008); Flowerdew (1999)

CDA analyses the relationship between discourse and social practices. In CDA, discourse is understood as "a practice not just of representing the world, but of signifying the world, constituting and constructing the world in meaning" (Fairclough, 1992, as cited in Dunn & Neumann, 2016, p. 18). In other words, discourse influences, and is influenced by, social practices. This complex view on discourse contrasts the CDA approach from other discourse-analysis approaches that understand discourse as only influencing social practices (Jørgensen & Phillips, 2002). Implications of such a limited view on discourse will be shown by an example of journalistic discourse.

Journalistic discourses indeed influence social context, e.g. journalistic discourses influence how the public thinks about issues. At the same time, journalistic discourses are influenced by the social contexts journalists are embedded in, institutions journalists work for, sources they contact, as well as financial and temporal constraints they have to manage. Thus, non-critical approaches - which view discourse as only influencing - overlook many factors, whereas CDA suggests a comprehensive analysis of texts, text production process, and social practices.

CDA also views social practices in a complex way, but it does not offer a complex analysis. In CDA, social practices imply all kind of social phenomenon, activity, or context, and consist of "discursive and non-discursive elements" (Jørgensen & Phillips, 2002, p.65). To understand the difference, consider an example of a social practice - journalism. Within that social practice, discursive elements are connected with language (e.g. published articles, interviews, visual images),

whereas non-discursive are non-linguistic aspects (e.g. personal characteristics, and beliefs of journalists, norms of newspapers journalists work for, private or public funding of newspapers). Thanks to a broad range of linguistic tools, CDA analyses discursive elements, but requires an extra theory to guide analysis of non-linguistic aspects of social practices (Jørgensen & Phillips, 2002).

This requirement is advantageous, but analytically difficult. An extra theory can contribute to analysis of complex issues, like discourses on the Arctic. Discourses on the Arctic require a multifaceted analysis, because the Arctic is an interplay of many issues raised (environmental changes, new economic opportunities, and political frontiers), and many parties involved (scientists, politicians, the public, journalists, flora, and fauna). However, one extra theory cannot cover all non-discursive elements involved, making this requirement analytically difficult. A researcher would either have to narrow down non-discursive elements to analyse, reducing complexity to a chosen issue, or to integrate a few theories, increasing the complexity of a theoretical framework. In any case, the complex question of how Arctic discourses got constructed in a particular way would benefit from interdisciplinary analysis.

As an interdisciplinary approach (Wodak, 2002), CDA is capable of bringing insights on how discourses are constructed, thanks to combining linguistic analysis with theories from other disciplines. Instead of just descriptive linguistic analysis of news articles, text-production process can be analysed by science-communication theories explaining, for instance, how journalists choose their sources, whereas historians can show how journalistic norms evolved influencing social practice of journalistic reporting. Combining three different approaches would shed more light on how Arctic discourse is constructed, although not without its difficulties.

Theoretically, CDA invites a dialog between disciplines, but disciplines themselves might not welcome interdisciplinarity. Toolan (1997) gives examples of linguists criticising CDA for too much focus on power and hegemony, and social scientists criticising CDA for too much text analysis. These examples point to difficulties with integrating theories, concepts, and methodologies. Interdisciplinarity causes challenges for a researcher to implement, but does not cause problems for results. Neither does the next principle - theoretical and methodological flexibility.

Theoretical and methodological flexibility of the CDA approach allows for freedom needed to analyse discourse-construction. Discourse-construction is influenced during text-production phase, e.g. personal features and values of journalists, availability of sources, and by wider social context, e.g. media systems (Hallin & Mancini, 2004), and norms of journalistic reporting (Schudson, 2001). For example, European journalists experienced less dependence on political

parties than their American counterparts (Schudson, 2001), and, thus, might strive less for the norm of objectivity (Donsbach & Klett, 1993). Moreover, some factors might have a bigger "discursive effect" in different social contexts (Carvalho, 2008, p.165). As a result, a combination of factors under investigation would differ among studies, requiring diverse combinations of theories and methodologies.

Such flexibility is welcomed by CDA, although lack of more concrete guidance complicates operationalisation of CDA. Scholars suggest very basic guidance, e.g. that theory and methodology should contribute to "understanding and explanation of the object under investigation" (Wodak, 2002, p.14), and that both should "fruitfully cross-fertilise one another" (Jørgensen & Phillips, 2002, p.86). Such vague guidelines lead to methodological weaknesses of studies employing CDA (further discussed in section 3.1.2). Without guidelines and methodological diversity, CDA studies lose their power to provoke social change that CDA aims for.

Even though this thesis does not aspire to provoke a social change, the CDA principle of being critical would fruitfully guide inquiry of this thesis. Instead of just discovering and describing a social problem, CDA aims to reveal how a particular social practice has become an established ideology. Likewise, this thesis does not aim to describe Norwegian Arctic discourse, like other studies have done (e.g. Jensen & Hønneland, 2011; Jensen, 2007; Jensen & Skedsmo, 2010). Instead of looking just at outcomes, this thesis aspires to shed light on causes, e.g. how the dominating discourses got produced by journalists, and how alternative discourses got excluded. However, aiming to discover what is excluded from discourses might get criticised, because such a goal raises suspicions about agenda-driven inquiry, and "preconceived" findings (Flowerdew, 1999, p. 1093). CDA proponents respond to such critique with another CDA principle - keeping inquiry transparent and researchers reflexive.

The principle of reflexivity helps CDA studies to rebut accusation of agenda-driven inquiry. By keeping "spirit of scepticism" and "distance to the data" (Gill, 2000, as cited in Carvalho, 2008, p.166; Wodak, 2002, p. 9), researchers avoid taking anything for granted, and ask critical questions along the whole research process. Remaining reflexive through the whole research process is especially vital in cases, as Machin and Mayr (2012) warns, if researchers analyse texts that "are in accord with our own ideological viewpoint" (p.47). In such a case, focus on reflexivity will help to avoid overlooking some established "normalised" discourses (Dunn & Neumann, 2016, p.5). Besides, researchers secure transparency of their inquiry, by reflecting on their own position, and stating explicitly underlying values. In this study, reflecting on the my position as a researcher is important, because this thesis aims to analyse interaction between journalists and scientists. Being

involved in social science myself, I must be aware of possible bias towards scientists. Stating explicitly underlying values would help the researcher to stay aware of them.

Despite transparent research process, CDA is still criticised for providing just interpretations, but not factual knowledge. Flowerdew (1999) defends CDA by reminding that CDA findings cannot be evaluated according to "positivistic criteria", because CDA has accepted the criteria of "ambiguity, imprecision, probabilistic interpretation and diversity of opinion" (Flowerdew, 1999, p. 1091). Findings of CDA studies are also criticised for being "preconceived", i.e. that a researcher chooses evidence supporting a pre-chosen view (Flowerdew, 1999, p. 1093). Flowerdew (1999) rebuts that critique by reminding that, first, biased data-collection can happen in any study, because researchers are internalised in particular cultural, social, and/or institutional settings. Second, CDA researchers expose themselves to discourses for a long time, and, thus, some interpretations of data would inevitably emerge, and researchers would collect more data to support a merging finding.

CDA is widely criticised, e.g. for vague theoretical guidelines, ideology-driven inquiry, preconceived findings, and no social changes. Some critique, like vague theoretical guidelines, is understandable, because CDA indeed does not prescribe any 'fixed' theory or methodology (Wodak, 2002). However, other critique, like ideology-driven inquiry, or preconceived findings, can be directed both to theoretical principles guiding CDA inquiry, and to methodological choices, e.g. how researchers conceptualise and operationalise the approach. Due to numerous possible combinations of theories and methodologies, critique of underlying theoretical principles should be differentiated from methodological critique, if a study aspires to employ CDA. Thus, CDA study would be able to overcome methodological limitations, while being aware of theoretical weaknesses.

3.1.2. Methodological critique towards empirical studies

The above-discussed critique of the CDA principles was directed to theoretical principles within CDA, whereas empirical studies operationalising CDA approach are criticised for other limitations, e.g. neglecting social context, sampling data over short time frames, and analysing a limited number of sources.

Studies that employ CDA are criticised for conducting only text-analysis, while neglecting social context. This imbalance between linguistic analysis and social theory prevented empirical studies from providing fruitful insights on text-production process, and on "discursive effect" on

other discourses and social issues (Carvalho, 2008, p.165). Moreover, the predominance of linguistic analysis does not lead to social change that CDA aims for (Toolan, 1997).

The text-analysis of empirical studies employing CDA is criticised itself for selecting data from narrow time frames, and sources. Empirical studies limit their text-analysis to short "snapshots" (Carvalho, 2008, p. 164). That means, that discourses on complex issues, e.g. climate change, or a war, evolve over a long time, whereas empirical studies tend to sample texts over a short time. This limitation can be explained by difficulties with identifying the 'beginning' of discourse, and time periods which texts should be sampled from, since discourses are interconnected (i.e. intertextuality) (Carvalho, 2008).

In terms of sources, empirical studies employing CDA provided data on participants who construct and reconstruct discourses, e.g. journalists. By analysing news articles, CDA researchers limit their analysis to journalistic discourses. Since journalists depend on primary sources who experience directly events, discourses coming from news articles should be compared to discourses constructed by other participants in "speeches, press releases, reports, websites and a number of other forms of communication" (Carvalho, 2008, p.170). Moreover, by showing what arguments are excluded from dominating discourses, CDA studies would improve their "evidential base" (Philo, 2007, p. 186).

Taking into account the above-mentioned critique of the previous CDA studies, this thesis aims to give a balanced attention towards texts, text production and social context, and to include other participants involved in discourse-construction process, particularly, scientists (further discussed in chapter 4 on methodology).

3.1.3. Fairclough's CDA framework, and its operationalisation

Fairclough's framework consists of three inter-related dimensions - textual, text-production, and social-practice dimensions (see Figure 2). Unlike other discourse-analysis approaches starting their analysis with texts, a study employing the framework starts with identifying a problem within a social practice (Chouliaraki & Fairclough, 1999; Fairclough, 2001). To choose a problem suitable for CDA, Fairclough (2001) suggests to consider discourse-related problems connected to the social practice itself, or representation of the social practice. This thesis started by looking at interaction between scientists and journalists as a social practice, and misrepresentation of scientific knowledge as a discourse-related problem connected to the social practice. Being the main disseminator of scientific knowledge to the public, journalists are argued to misrepresent the scientific findings,

especially on climate change (e.g. Boykoff & Boykoff, 2004; Carvalho, 2007). However, who decides if there is a problem within the social practice or not?

Figure 2. Fairclough's three-dimensional framework (reprinted from Jørgensen & Phillips, 2002, p. 68)

Viewing an assumed issue as a problem can be suggested by a researcher noticing "a mismatch between reality" and discourse (Jørgensen & Phillips, 2002, p.77). To notice a mismatch, a researcher has to be exposed to a different "description of reality" (Jørgensen & Phillips, 2002, p. 77). In this study, getting concerned with journalistic possible "misrepresentation" of scientific knowledge was provoked by being myself exposed to scientific and journalistic discourses on climate change, and noticing that journalistic discourses tend to present scientific arguments, excluding scientific uncertainties.

After identifying a problem, some scholars advise to formulate a research question (Chouliaraki & Fairclough, 1999; Jørgensen & Phillips, 2002), whereas Fairclough (2001) suggests to consider the context. The context consists of possible factors provoking the problem, and obstacles preventing the problem from being solved. Defining the context before setting a research question sounds reasonable, although deciding what belongs to the context is empirically difficult (Carvalho, 2008; Fairclough, 2001). To keep a research project manageable, a researcher can either narrow down the context to a few significant issues, reducing the complexity of the issue, or analyse a broader range of factors, reducing details (Dunn & Neumann, 2016).

Many possible factors might make journalists report on scientific knowledge in a particular way, including (but not limited to) journalists' values, like objectivity, editors, competition for newspaper audience, availability of objective sources and their willingness to interact. However, this study will concentrate its analysis of the social context around one factor that normatively should guide journalistic representation of any topic in any context - journalistic objectivity. In

CDA, journalistic objectivity is understood as non-discursive element of the social context, because objectivity is related to norms and values of journalists, but not language. Thus, CDA framework will be supplemented by conceptual framework of Douglas (2004), suggesting multilayered understanding of the concept objectivity, and its operationalisation (further discussed in section 3.2).

After defining the problem and the context, a research question can be formulated. Dunn and Neumann (2016) argue for 'how' questions instead of 'why' for two reasons. First, CDA cannot answer why-questions, because answers on why-questions may depend on non-discursive elements of social practices that CDA cannot shed light on (as discussed in section 3.1.1). For example, in case of asking 'why do journalists represent scientific knowledge in a particular way?', journalists might not be aware of all their reasons, that can be provoked by the social context journalists are embedded in. Second, CDA is more interested in ways *how* discourses are constructed, than in reasons *why* they have been framed in a specific way. This can be explained by the CDA goal of raising "critical language awareness" (Jørgensen & Phillips, 2002, p.88). That means, that CDA aims at raising awareness about what discourses dominate in the society, and how the public supports hegemony of the dominating discourse by its every-day usage.

This thesis sets a research question '*how did the identified discourses influence, and were influenced by, objectivity?*'. This question guides the analysis of all framework dimensions, i.e. texts (i.e. how scientific knowledge on the Arctic was represented in news articles), text-production (i.e. how representations of scientific knowledge were produced through interaction between scientists and journalists), and social practice (i.e. how scientists and journalists understood and practiced the norm of objectivity). Each framework dimensions needs to be analysed, first, separately, and, later, all together to shed light on interrelationship between discourse and social practice.

To analyse the text dimension, scholars suggest to start with 'a postponed text-analysis'. Instead of deep text analysis, Carvalho (2008) suggests to combine open-minded reading of the sampled articles. Reading without any research question and pre-defined criteria allows data to show its main characteristics, whereas ideas on what might have got excluded by journalists might come if asking critical questions throughout reading, e.g. "[w]hy do some things get said and others do not? How are things said and what are the possible implications of that?" (Carvalho, 2008, p. 166). Carvalho (2008) and Fairclough (2001) suggests to delay text-analysis, because discourse analysis should be "a resource within critical social research" that focuses on a social problem (p. 238). Once this inquisitive reading is done, the actual text analysis can be carried out.

Building on some key features identified during open-minded and critical reading, text-analysis can focus on textual features (headlines, vocabulary and writing style, nominalisation and active/passive voice) and discursive features (topics and suggested explanations, references helping to comment on topics) (Carvalho, 2008). Discursive features, like suggested explanations for a particular topic, point to "what was available for journalists to choose from, as well as which arguments ''belonged'' to different interests" (Philo, 2007, p.179). Mapping these available explanations would help to see the overview of what is included in discourses, whereas researcher's exposure to different "description of reality" would give ideas on what is excluded from the overall picture (Jørgensen & Phillips, 2002, p.77).

Since language is neither static, nor transparent (Wetherell, Taylor, & Yates, 2001), analysis of the text-production dimension should follow, to shed more light both on meanings of texts, and social practice of representing scientific knowledge. To analyse text production, Philo (2007) suggests to consider ideology of journalists, and of the media they work for, but reminds that ideological views can be embedded in a larger belief-system, and political, economic, and institutional context. This suggestion seems to blend analysis of discourse production with social context. Instead of going into broad contextual analysis, this thesis will follow a more practical question of Jørgensen and Phillips (2002), e.g. "what kinds of processes does a text go through before it is printed?" (p.81). This question can be operationalised by tracking journalists' routines, (e.g. choosing sources, evaluating the obtained evidence, cross-checking in with other sources), and journalists' values on objectivity.

3.2. Conceptual framework on objectivity

To guide the analysis of non-discursive elements of the social practice understood as objectivity, this thesis will employ Douglas' (2004) conceptual framework on objectivity. Even though Douglas (2004) develops the concept with reference to science, the conceptualisation can be adapted to journalism for two reasons. First, both in science and journalism, the concept of objectivity refers to results of investigations, methods applied to approach 'truth', and values guiding the investigation (as argued in chapter 2.3.1). Second, the concepts of scientific and journalistic objectivity have gone through similar historical development (as argued in chapter 2.3.2). Choosing the conceptualisation from Douglas (2004) is motivated by her broad understanding of objectivity, that covers many journalistic routines in text-production (how journalists choose sources, if and how they evaluate, and cross-check evidence, how journalists decide on a frame and scope of an article). Furthermore, Douglas' third mode of objectivity pays

attention to interaction between group members involved in knowledge, or discourse, production. That meaning would be useful for cases if journalists try to reconcile the contrasting evidence.

Douglas (2004) argues for three modes and eight meanings of objectivity, neither of which is superior or redundant (see Table 4). "Objectivity$_1$" refers to how specialists approach 'the reality'. Objective 'reality' can be reached when applying objective (i.e. reliable) methods, and collecting objective (i.e. consistent) evidence, which manipulable and convergent objectivity refer to, respectively. In this thesis, manipulable objectivity is operationalised by enumerating methods journalists use to get information on a topic, and assessing journalists' self-reported confidence in reliability of a method. For example, journalists can contact a scientist, read a scientific article, or use secondary sources on the same topic.

Table 4. Conceptualisation of objectivity

Objectivity$_1$ referring to how experts approach 'reality'	Objectivity$_2$ referring to reasoning process and values	Objectivity$_3$ referring to interaction between experts
Manipulable (methods)	Detached (no desires about outcome or evidence)	Procedural (not relevant for journalistic reporting)
Convergent (evidence)	Value-free (no values)	Concordant (how agreement is reached among sources)
	Value-neutral (balanced representation of arguments)	Interactive (composition of a group)

Sources: adapted from Douglas (2004)

Confidence in obtained evidence relates to convergent objectivity. In this thesis, convergent objectivity is assessed by self-reported confidence in obtained evidence, and by instances journalists have cross-checked evidence obtained from a source. Some studies point to journalistic tendency to contact only one source (Wien, 2014; Albæk, 2011), which might mean compromised journalistic objectivity, or excessive trust towards scientific knowledge (Meyer, 2006).

The next mode, "objectivity$_2$", consists of three meanings, and relates to objective reasoning process, and exclusion of underlying desires and values. The first, detached, objectivity means having no desires about outcome, or evidence. The second, value-free, meaning refers to exclusion of all epistemic and non-epistemic values, and is contrasted to the third meaning, value-neutral, that results from a balanced representation of existing arguments. Even though values are empirically difficult to measure, Douglas (2004) suggests to operationalise this mode of objectivity "by internal retrospection or by external examination of an individual's reasoning process" (p. 461). Following

this suggestion, this thesis will aspire to discover if journalists consider their own underlying values while choosing sources and evidence over alternative ones.

The last mode, objectivity$_3$, relates to how knowledge are produced and agreed upon within a group, e.g. a group of sources quoted within one news article. Concordant objectivity is meant to check how agreement is reached within a group. In this thesis, this objectivity can be operationalised by checking, in case of journalists presenting opposing views within a news article, how journalists reconcile opposing views in a news article. Interactive objectivity is concerned with composition of 'a group', e.g. what kind of sources, in terms of level of expertise, journalists referred to. Douglas (2004) also suggests the procedural objectivity, which imply the same result "regardless of who processes that information". This meaning will be excluded due to its irrelevance, because journalistic reporting depends on individual features, like writing style.

To sum up this chapter, one possible contradiction will be discussed. Combining theoretical and conceptual frameworks from the social-constructivist perspective and the concept of objectivity, commonly associated with the positivist perspective, might be argued as incompatible. This thesis argues otherwise. First, CDA is argued to welcome interdisciplinary "integration of different theories within a multiperspectival research framework" (Jørgensen & Phillips, 2002, p.86). Second, the adopted concept of objectivity stems from social-constructivist perspective. Third, the objects of analysis - journalists - are argued to adhere to social-constructivist view on objectivity (e.g. Post, 2015; Hiles & Hinnant, 2014).

4. Methodology

This study explores the relationship between the concept of 'objectivity' and the Norwegian Arctic discourses constructed by Norwegian scientists and journalists. Being guided by the Critical Discourse Analysis framework, this thesis studies the three dimensions - texts, text production, and social practice. This chapter starts with explaining the choice of the Arctic and the Norwegian context, followed by the methodological choices for each dimension separately. The chapter finishes by explaining how the overall analysis has been carried out.

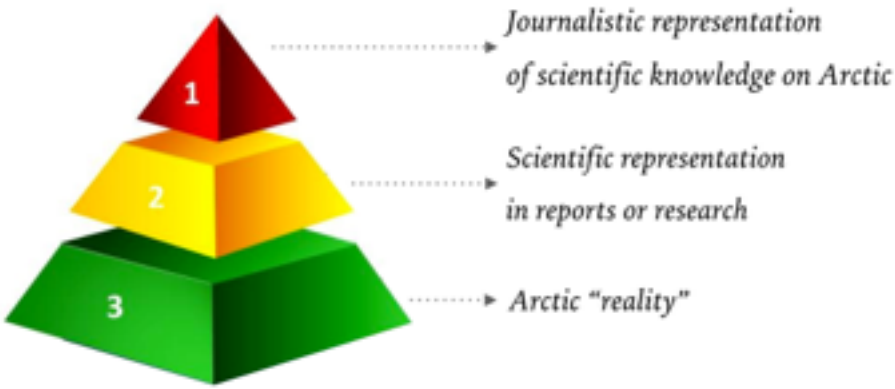
4.1. Research design: why the Arctic as the case

Among five research designs (experimental, cross-sectional, longitudinal, case study, and comparative), presented in Bryman (2016), this thesis adopts a case-study research design. A case study aims at revealing noteworthy characteristics typical for the chosen case at the particular time, contrasted to, for instance, cross-sectional research design that reveals relationship between variables "regardless of time and place" (Bryman, 2016, p.61). In this thesis, the Arctic is regarded as a special case due to its noteworthy characteristics.

The Arctic represents a case with many interests involved. To start with, eight Arctic countries (i.e. Iceland, Norway, Denmark, Sweden, Finland, Canada, Russia, the USA) aim to defend their national interests, with some of the Arctic countries being interested in economic benefits from opening the Northern Sea Route (Keil, 2014). However, *national* political and economic interests might clash with *global* environmental concerns. Scientists predict environmental changes with consequences within the Arctic, and globally, e.g. changed habitats of Arctic animals and plants, and rising sea level (IPCC, 2007; IPCC, 2014). Taking into account these conflicting interests between countries and environment, Arctic issues deserve an objective representation in the media. But can Arctic issues be represented objectively, if media stories on the Arctic are based on scientists' interpretations, and get re-interpreted by journalists, resulting in double-lens representation?

Journalistic representation of Arctic issues is, in most cases, based on secondary sources (see Graph 1). Risking oversimplification, consider an example of covering a meeting among politicians, and writing about melting ice in the Arctic. Covering a political meeting, journalists can travel to the venue, make their own observations, and legitimise their investigation with other sources. By contrast, journalists writing about scientific issues, particularly about the Arctic, cannot grasp the complexity by observing. Instead, journalists have to rely on scientific findings, which are only interpretations of real estate of Arctic issues. As a result, representations of Arctic issues published

in newspapers goes through double lens - the lens of a source, and the lens of a journalist. That makes the case of the Arctic even more insightful about the journalists' role in constructing discourses.



Graph 1. Layered representation of Arctic issues

4.2. Research site: why Norway

This thesis has studied Arctic discourses circulating in Norwegian newspapers, and constructed by Norwegian scientists and journalists for two reasons. The first reason to focus on Norwegian context stems from the existing literature. The existing literature lacks empirical studies on text-production of Norwegian Arctic discourses, on interaction between Norwegian scientists and journalists, and on objectivity's role in Norwegian journalism.

The second reason for conducting the study in Norway is grounded within the CDA framework. While choosing an issue to study, researchers employing the CDA framework should balance between two requirements. The first requirement is to have "cultural competence" about the issue under investigation (Dunn & Neumann, 2016, p.83). Cultural competence means having basic knowledge of the political, social, and cultural contexts of the country under investigation. However, this knowledge should not be too deep, because it would conflict with the second requirement. Discourse analysts should keep a distance from the issue under investigation, because, otherwise, researchers might take for granted what is accepted in, and excluded from, discourses (Jorgensen & Phillips, 2002).

Taking these two requirements into account, I have chosen to study Norwegian context. Having lived in Norway for the last four years, I have learnt Norwegian language to the level that allows me understand newspaper articles, and communicate with informants. In addition, my studying in the Norwegian University and working experience connected to Arctic issues exposed

me to scientific discourses, in general, and discourses on the Arctic, in particular. As a result, I have gained required "cultural competence", but still preserving distance. Originally Russian, I was embedded in the political, social, and cultural contexts different to the Norwegian one. This distance helped me stay critical through the whole research process.

4.3. Text dimension

4.3.1. Sampling: what media type

In general, journalists can reach out to scientists for commentaries on complex scientific issues, for instance, while writing a newspaper article, recording a TV or radio programme, and speaking directly at panel debates. Thus, discourses resulting from scientist-journalist interaction can be studied via written texts, images, and audio files (Dunn & Neumann, 2016). This thesis has purposively chosen printed newspaper articles as the main data source to study journalistic discourses for the following reasons.

Discourse analysis is typically based on texts. This preference is not accidental, because texts are easier to work with, compared to video and audio recordings that require transcription first. However, studies employing discourse analysis are criticised for focusing only on textual discourses (Carvalho, 2008; Philo, 2007). Nevertheless, this thesis has chosen to study textual discourses in newspapers, because written texts represent a more elaborated discourse, contrasted to discourses constructed during panel debates or in images. In the case of a panel debate, journalists are limited to asking only one or two questions, whereas images in newspaper articles do not have to be approved during interaction with a scientist.

Discourses constructed in the social media were considered as a potential data source, but rejected for this thesis. Even though the social media represent examples of textual discourse, journalists posting news in the social media might adhere to alternative meanings of objectivity, like transparency, and performance (Karlsson, 2010; Boudana, 2011). Thus, the social media is argued not to suit as a data source to answer the research questions on conventional meaning of objectivity as balanced and neutral reporting.

4.3.2. Sampling: what newspapers

This thesis has purposively sampled four Norwegian newspapers *Aftenposten*, *Klassekampen*, *Dagbladet*, and *Nordlys*. These newspapers cover a broad scope of issues and large target audience reading the newspapers. Aftenposten is a "national and conservative newspaper",

whereas Klassekampen represents a national "radical and leftist newspaper" (Jensen, 2007, p. 248). Dagbladet can be characterised as a tabloid, while Nordlys - the only regional newspaper among the sampled ones - is specially devoted to northern news.

The choice of the Norwegian newspapers was inspired by previous studies on Norwegian Arctic discourses, and critique of previous studies on scientist-journalist interaction. *Aftenposten*, *Klassekampen*, and *Nordlys* were included to be able to compare and contrast the findings of this thesis with the accumulated knowledge among the previous studies on Norwegian-Arctic discourses (e.g. Jensen, 2007; Jensen & Hønneland, 2011; Hønneland, 2003; Burke & Rahbek-Clemmensen, 2017). Besides 'quality' press, the tabloid newspaper *Dagbladet* was included to extend the variety of newspapers. Furthermore, *Dagbladet* was included to address the gap identified among the reviewed studies on scientist-journalist interaction. Typically, those studies sampled journalists working for national broadsheets. By adding tabloid newspaper, this study aspired to discover interaction between scientists and journalists working for the tabloid. However, this aspiration was not accomplished, because no tabloid journalists accepted the invitation to an interview.

This thesis has chosen printed newspapers over online versions of the same newspapers. This choice can be regarded as outdated in the context of growing audience of the online newspapers. Indeed, the number of readers of online newspapers has been rising for all four newspapers since 2000, contrasted to the declining numbers of paper-version readers (see Table 5). However, the factor of a bigger audience is irrelevant for this thesis, aiming at analysing scientist-journalist interaction, but not readers' perceptions about the Arctic. Whereas the number of readers does not play a significant role for this thesis, the number of articles available for analysis matters for this study.

A bigger number of articles referring to Arctic has been found among the sampled printed newspapers, contrasted to online versions of the same newspapers (see Table 6). This thesis needed to find a media type that had a consistent output of articles on Arctic. Online newspapers did not have a consistent output of articles, for example, *Aftenposten* had no articles on the Arctic in 2017. Furthermore, comparing online, and paper versions of the sampled newspapers, online versions showed fewer articles referring to the Arctic, than paper newspapers. For instance, *Klassekampen* had only 18 online article versus 139 articles in the paper version of the newspaper. Thus, printed versions of the four newspapers have been chosen.

Table 5. Number of readers of online- and paper-versions of the sampled newspapers (counts per 1000)

Newspaper	Version	2000	2009	2017
Aftenposten	**Online**	110	554	816
	Paper	781	707	386
Dagbladet	**Online**	230	972	1166
	Paper	824	520	170
Klassekampen	**Online**	0	0	39
	Paper	24	69	97
Nordlys	**Online**	0	33	48
	Paper	92	92	43

Source: MedieNorge (2018a), MediaNorge (2018b)

Table 6. Number of articles with the keyword 'Arktis' among the sampled newspapers

Newspaper	Version	2000	2009	2017	Total
Aftenposten	**Online**	4	50	0	54
	Paper	48	95	59	202
Dagbladet	**Online**	0	39	61	100
	Paper	6	32	37	75
Klassekampen	**Online**	0	1	18	19
	Paper	0	41	139	180
Nordlys	**Online**	0	141	27	168
	Paper	20	205	180	405
	Online				**341**
	Paper				**862**

Source: the media database ATEKST

4.3.3. Sampling: what time frame

This thesis has purposively sampled articles from January 1, 2018 to October 31, 2018. Aiming to analyse text-production process of the sampled articles, this thesis has sampled recent articles, because scientists and journalists are more likely to remember details of article production from this year, than from the previous ones. However, such a short timeframe to analyse discourses can be criticised, because discourses on complex cases, like the Arctic, evolve over much longer

time (Carvalho, 2008). To address the methodological critique of a short timeframe, this thesis compared the identified discourses against those in the existing literature on Norwegian Arctic (e.g. if the findings are consistent with, or contrary to, the literature).

4.3.4. Sampling: what articles

Whereas the media type, newspapers, and the timeframes were sampled with "priori" criteria, the sampling of articles followed "contingent" sampling (Bryman, 2016, p.410). "Priori" criteria refers to pre-defined sampling criteria, whereas "contingent" sampling means developing criteria over time, while working on the data. The newspaper articles were searched using the online media database ATEKST. Out of 312 articles mentioning the search word Arktis, 96 results were generated for the combination of key words Arktis AND forsker OR forskeren OR forskere OR forskerne[1] between January 1, 2018 and October 31, 2018 (see Table 7). All 96 articles have been looked through to identify the articles' type (e.g. news articles, commentaries, or feature stories), and articles referring to names of scientists. Out of 96 articles, 70 articles were excluded. Aiming to address the critique of not specified criteria of text sampling, this thesis comments on reasons for excluding articles[2] . Six commentary articles were excluded, because commentary articles typically expressing the opinion of an editor, or a journalist, are irrelevant for the thesis that aims to research objectivity. 45 articles referring to scientists in general, without specifying names, were excluded, because this thesis needed to sample scientists and journalists who have interacted (further discussed in 4.5). Six articles were excluded, because those articles were written by scientists themselves. Thirteen articles, even though having the key word 'Arktis', were excluded, because the work Arktis referred not to the geographical location. The final sample size was 26 articles.

Table 7. Number of articles with the keywords Arktis AND (forsker OR forskeren OR forskere OR forskerne)

Newspapers	January	February	March	April	May	June	July	August	September	October	Total
Aftenposten	12	4	3	0	4	1	0	6	5	3	38
Dagbladet	8	2	1	2	2	3	3	3	4	6	34
Klassekampen	1	2	2	1	1	0	2	2	2	2	15
Nordlys	2	0	2	2	1	0	0	1	0	1	9
	23	8	8	5	8	4	5	12	11	10	**96**

Source: the media database ATEKST

[1] The Norwegian word Arktis is translated as the Arctic in English, whereas forsker and its variations (forskeren, forskere, and forskerne) is translated as researcher or scientist

[2] For the full overview of the excluded, and sampled articles, with explained reasons, see Appendix 5, 6, 7, 8

The next step suggested by the CDA framework was open-minded reading of all the sampled articles (as discussed in chapter 3.1.3). The sampled articles were preliminary approached without any research question or sampling criteria, guided by the suggestions of Carvalho (2008) and Fairclough (2001). Such inquisitive reading helped to identify the key features of the data, and establish the relevant criteria for further analysis.

To describe the discovered discourses, this thesis discussed the textual, and discursive features of the articles (as discussed in chapter 3.1.3). Articles were also evaluated according to the criteria of objectivity (as discussed in chapter 3.2). Looking at texts through the lens of objectivity helped enhance text-analysis, and contributed to the analysis of how non-discursive element of social practice affected discourses. However, if relying only on text-analysis of newspaper articles, many questions would have been left unanswered, e.g. why journalists chose certain sources, if journalists confirmed the evidence with other sources, and if the presented arguments were trustworthy. Thus, the analysis of the text-production dimension followed.

4.4. Text-production dimension

4.4.1. Sampling methods: what informants

To analyse the text-production dimension, this thesis purposively sampled Norwegian journalists who wrote the sampled articles, and Norwegian scientists who were mentioned in the sampled articles. Purposive sampling helped to find informants relevant to the research questions (Bryman, 2016). Journalists have been sampled, because journalists are the ones who typically initiate interaction with scientists, and evaluate evidence presented by scientists. Both the initiative whom to contact, and the choice of evidence to publish affect the constructed discourses.

Scientists have been sampled to address the critique of previous CDA studies. Previous CDA studies can be criticised for studying discourses coming only from one participant, e.g. journalists. By conducting text-analysis of only newspaper articles, it remains unclear, if discourses in newspapers represent journalistic discourse, or reproduction of discourses from other sources. Carvalho (2008) suggests to analyse other texts, like scientific articles, or political reports, to compare journalistic discourses against other participants' discourses. This thesis accepted Carvalho's (2008) suggestion to compare discourses, although not via texts, but at the level of text production. By interviewing scientists about interaction with journalists, and the articles they were

quoted in, this thesis collected perceptions of scientists on what got excluded in the articles, and if journalists represented scientific knowledge objectively.

4.4.2. Data collection tools

For the text-production dimension, data was collected through individual semi-structured interviews with three scientists and two journalists. Semi-structured interviews helped to explore viewpoints of respondents, while the interview guide with pre-defined topics and pre-formulated interview questions helped to secure comparable data from the five informants, contrasted to unstructured interviews (for the interview guide, see Appendix 2).

All the sampled informants were contacted via e-mails, and those who agreed to participate, were interviewed. Out of 20 journalists contacted, only five responded the e-mail, with two journalists agreeing, and three denying to participate. Scientists were more willing to participate, with eight answering positively to the request to interview them. However, it was decided to not to over-represent scientists in my sample. The interviewed journalists worked for two different newspapers, although any further details about their personalities would be kept in confidence. Among the interviewed scientists, all three shared the background in natural sciences, with some expertise over climate-change issues.

All the informants were interviewed during 30 to 40 minutes, depending on availability of the informants. Informants were interviewed in their offices, that kept interviews formal. Interviews with the scientists and journalists were scheduled in a mixed order, depending on availability of the informants. Hearing viewpoints of the informants in a mixed order helped prevent a bias towards the first group I would have interviewed.

The interviews were audio-recorded and transcribed. Audio-recordings helped to access the exact quotes of the informants during the analysis. In addition, audio-recordings prevented possible discomfort from video-recordings, or distractions of the interviewees in case of note-taking (Bryman, 2016). Transcribing the interviews allowed to “bring myself closer to the data” (Bryman, 2016, p.483). Moreover, immediate transcription after each interview helped identify key points mentioned by each informant, and cross-check those points with the next interviewee (Bryman, 2016).

4.5. Social-practice dimension

To shed light on the social practice, the CDA framework's third dimension prescribes to analyse non-discursive elements of the social-practice. To keep the research manageable, this thesis has narrowed down the analysis to one non-discursive element - the norm of objectivity. The analysis of this dimension was based on three sources. First, the literature review of the concept of objectivity gave insights on how objectivity evolved over time in science and journalism. Second, the text analysis of the sampled articles showed the presence or absence of objectivity. Third, the interviews with the sampled scientists and journalists shed light on perception, and practice of objectivity as the occupational norm of journalists.

4.6. Overall analysis

While the CDA framework prescribes to start analysing three dimensions separately, a CDA study should conclude with analysing mutual relationship between discourse and social practice. In other words, a CDA study should show how discourses influence, and are influenced by, the social practice. This CDA study started with analysing the constructed discourses in the sampled newspapers, followed by interviewing scientists and journalists on their interactions to produce texts of the sampled articles. Since the social practice was narrowed down to one non-discursive element (i.e. the concept of objectivity), text-analysis focused on presence of absence of objectivity, whereas text-production analysis investigated if, and how, objectivity was practiced during scientist-journalist interactions.

Taking into account insights from three dimensions, this thesis discusses, first, how the previously-constructed discourses in newspapers affected interactions among the sampled scientists and journalists. That means, if any previously-written newspaper articles, and widely accepted discourses affected choices of the sampled journalists, e.g. how journalists chose what sources to contact, and what evidence to accept or reject. On the other hand, this study sheds light on how practicing, or neglecting, objectivity affected the discourses that emerged from the analysed articles. For example, if journalists were critical towards scientists' statements, if journalists tried to understand the limitations of scientific evidence, or if journalists presented the existing opposing views.

4.7. Quality criteria

To evaluate a qualitative study, some scholars argue against applying typical quality criteria - validity and reliability[1] (e.g. Schwandt, Lincoln & Guba, 2007). *Validity* usually describes how well the suggested indicators measure a phenomenon in question, whereas *reliability* refers to how consistent the results of a study are in various contexts (Bryman, 2016). These criteria might indeed be regarded as irrelevant, because studies applying qualitative research methods usually aim neither to measure a phenomenon, nor to obtain generalisable results. Instead, qualitative research tries to grasp nuances of a given context. This study follows the suggestion of Flowerdew (1999) reminding that a CDA study cannot be evaluated according to "positivistic criteria", because the CDA approach has accepted the criteria of "ambiguity, imprecision, probabilistic interpretation and diversity of opinion" (p. 1091). Thus, this thesis adapts the alternative criteria of *trustworthiness* developed by Schwandt, Lincoln and Guba (2007).

Trustworthiness consists of four criteria, i.e. credibility, confirmability, transferability, and dependability (Schwandt, Lincoln & Guba, 2007). *Credibility* evaluates if research results can be trusted. To enhance credibility of this study, the findings were triangulated with previous studies on similar topics, among the interviewed informants, and across different dimensions (e.g. presence, and understanding of objectivity was checked at text-analysis, text-production, and social-practice dimensions).

The criterion of *confirmability* refers to how objectively the findings were interpreted. Even though a CDA study accept personal interpretations, it does not imply that vested interests can enter the process of data analysis. I argue that no personal values entered the stage of data interpretation, because I did not have any motivation or reason to wish for a particular result of this study. One may argue that, being a researcher myself, I could have taken side of scientists, and aimed to establish that journalists misrepresented scientific knowledge. However, it was not the case, because this study did not aim to establish *who* is to blame, but to document *how* scientific knowledge is represented. Furthermore, being explicit about sampling criteria of both the articles, and the informants, and providing quotes from the articles and the interviews (i.e. "thick description"), I left room for contrasting interpretations of the data (Bryman, 2016, p. 384).

Based on *transferability*, findings can be judged as applicable to other contexts. This study warns against generalising the findings to other contexts due to the small sample size. However, some features of the Norwegian journalism discussed in this study might also be discovered in

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[1] By contrast, other scholars argue that criteria of validity and reliability are suitable both for quantitative, and qualitative studies, e.g. Brock-Utne (1996), Kleven (2008).

Sweden, or Denmark, because these countries belong to the same media system - Democratic Corporatist Model (Hallin & Mancini, 2004).

Dependability of the findings can be evaluated based on consistency of the results across different time and contexts. The consistency of the results is difficult to check in a study applying qualitative research methods.

4.8. Challenges and limitations

Every researcher faces some challenges while conducting a study. Being explicit about the challenges, and acknowledging what limitations they caused allow to enhance a researcher's reflexivity (Bryman, 2016). This study encountered the main challenge of finding journalists willing to participate. Out of 20 journalists contacted, only five responded, with two willing to participate, whereas three journalists explicitly refusing to participate without any explanations. Such a challenge resulted in the small sampled size, and no "data saturation", i.e. with a bigger sample of informants, this study could have established a wider range of nuances (Bryman, 2016, p. 412). Furthermore, since the informants were unavailable, this thesis were unable to apply any other data-collection method, like group discussions between scientist and journalists. Group discussions could have shed new light on scientist-journalist interactions, and helped to triangulate the findings discovered at text-analysis dimensions, and during the individual interviews.

5. Findings and discussion

Following the Fairclough's three-dimensional framework, this chapter will present and discuss the findings for each dimension, i.e. text-analysis, text-production, and social-practice dimensions (Figure 3). The first dimension is devoted to text analysis, and guided by the research question that asks '*how scientific knowledge on the Arctic was represented in news articles*'. To answer this research question, the first section will present the identified discourses with their discursive, and textual features. Discursive features refer to topics within discourses, suggested explanations for the topics, and sources helping construct those topics and explanations. This section will continue with in-depth text-analysis, by presenting textual features of the sampled articles (i.e. headlines, vocabulary and writing styles of the articles). This section will finish with analysis of the articles based on the operationalised concept of objectivity (see Appendix 3).

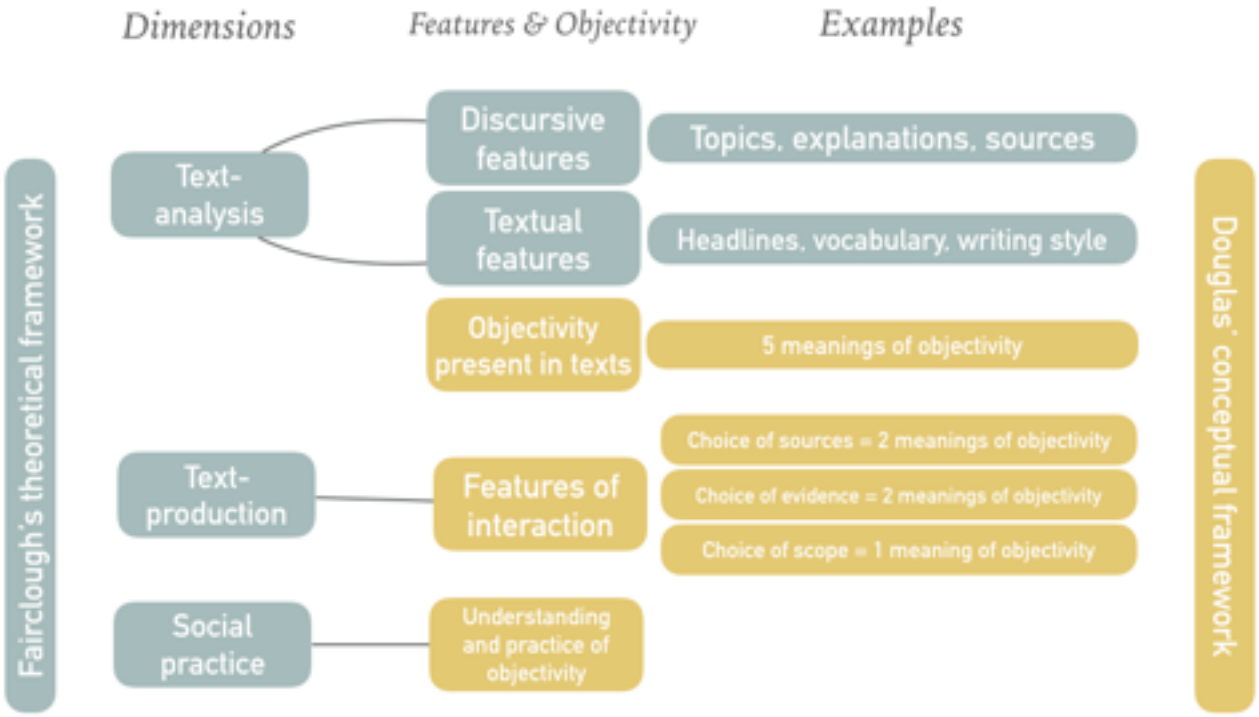

Figure 3. Visual presentation of how both theoretical and conceptual frameworks were combined in this thesis

The Fairclough's second dimension analyses text production. To guide the analysis of text production, this thesis questioned '*how representations of scientific knowledge were produced through interaction between scientists and journalists*'. This research question was answered based on the findings from individual interviews with journalists and scientists. The interviewed journalists and scientists shed light on text production of some sampled articles, on interactions between scientists and journalists, and on meanings of objectivity operationalised in this thesis (Appendix 3).

The third dimension is focused on the social practice of *journalistic reporting on scientific knowledge.* Particularly, this thesis looked at the non-discursive, or non-textual, element of the social practice - *objectivity*. Answering '*how scientists and journalists understood and practiced the norm of objectivity*', this section will present and discuss the findings from interviews with scientists and journalists, cross-checking these findings with the existing literature on the concepts of scientific and journalistic objectivity, and with findings from two previous dimensions.

To sum up the findings of three dimensions, this Critical Discourse Analysis study will analyse mutual relationship between the identified discourses and the chosen non-discursive element of the social practice - objectivity. Thus, the last section will discuss how the identified discourses influenced, and were influenced by, objectivity.

5.1. How scientific knowledge on the Arctic was represented in news articles

5.1.1. The identified discourses and their discursive features (topics, suggested explanations, and sources)

With reference to the Arctic and Norwegian scientists, Norwegian journalists have constructed two discourses in 2018 - 'the Arctic as a place', and 'the Arctic as a cause'. The two discourses differed in terms of how the Arctic is used. The discourse 'the Arctic as a place' described the Arctic as a geographical location where different events happened, e.g. Arctic ice was melting, plastic found in the Arctic ocean was harming Arctic animals, countries were planning to use the Northern Sea Route, and new technologies were developed to make data collection in the Arctic easier. By contrast, the discourse 'the Arctic as a cause' used the Arctic as an explanation to extreme weather conditions in Norway in 2018, e.g. more frequent heatwaves, droughts, or extreme coldness. Despite some identified similarities between the discourses, scientific knowledge was represented in predominantly different ways, with diverse topics included into the discourses, contrasting ways of framing scientific explanations, and different sources involved in the co-construction of the discourses.

The topics included in each discourse differed. The discourse 'the Arctic as a cause' included only one topic of climate, particularly, extreme weather in Norway observed in 2018, whereas the discourse 'the Arctic as a place' dealt with four topics (i.e. climate, fauna, politics, and

research)[1]. Even though the topic of climate was present in both discourses, this topic was worth comparing and contrasting, because the discourses constructed climate issues with contrasting explanations suggested by scientists, and different sources involved. Identifying discursive features, like suggested explanations and involved sources, helps a discourse analyst to shed light on 'explanation-kit' journalists had at their disposal (Philo, 2007).

5.1.1.1. The discourse "the Arctic as a cause"

In the discourse 'the Arctic as a cause', extreme weather in Norway was explained with a linear causal chain, e.g. global warming provoked faster melting ice in the Arctic, and melting Arctic ice caused changes with jet streams (A1, A3)[2], ocean currents (D2), CO2 emissions (A4), and sea level (K12) (Figure 4).

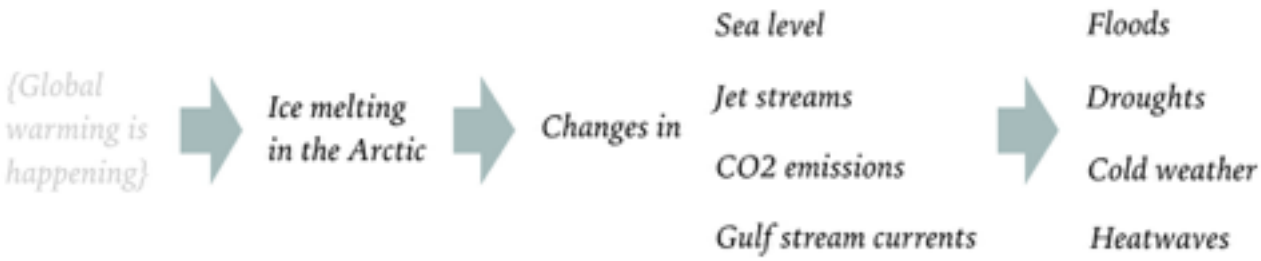

Figure 4. Mapping the suggested explanations for the discourse 'the Arctic as a cause'

Consider the following examples[3],

> "*Researchers are disagreeing about what causes this [droughts], but a strong hypothesis is that it [warmer and drier periods] is a result of Arctic getting more warmer as a consequence of global warming. […] This has provoked the jet stream that carries air masses from west to east has become weaker*"[4]

> "*The reason for extreme cold in Norway and Europe is that the jet streams over the Cap of the North has changed. The polar jet streams are stable air currents that go around the Cap of the North and mark the distinction between very cold air mass over the Arctic and warmer air in*

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[1] Since this thesis followed the qualitative strategy, the number of articles, and topics included in the discourses was considered as irrelevant for identifying the discourses. Instead, the main criterion was the presentation of the Arctic (either as a cause for extreme weather, or as a geographical location). Using this criterion, the two discourses could be clearly identified, preventing identification of many smaller discourses. However, the data could still be interpreted differently.

[2] All the sampled articles has been assigned a code. A list of full headlines of the sampled newspaper articles, with publication dates can be found in Appendix 9.

[3] All the following quotes from the sampled newspapers are translated by myself in this chapter. The footnotes after each quote would give readers the opportunity to interpret the quotes themselves.

[4] "- Forskerne er uenige i hva som forårsaker dette, men en sterk hypotese er at det er et resultat av at Arktis er blitt mye varmere som følge av den globale oppvarmingen. […] Dette har medført at Jetstrømmen som frakter luftmasser fra vest mot øst er blitt svakere" (A3)

Europe. […] The experienced researcher points to another possible reason [of changed jet streams]: global warming"[1]

"*The global warming provokes all extremes to increase. […] The simple explanation of the weather staying stable over time is that the difference in temperatures between the Arctic and areas to the south becomes smaller. The Arctic gets warmer much faster than the rest of the Earth, and is 3-5 degrees warmer now than normally*"[2]

"*The records [of the high temperatures] are caused by the weather, surely. But that records happened so fast after the previous one is caused by climate change*"[3]

"*We know that the Arctic and Norway gradually become warmer as a consequence of global warming*"[4]

Mapping all the suggested explanations displayed the complexity of extreme weather, whereas the news articles misrepresented that complexity in two ways. First, each of the seven articles was devoted to one linear causal chain. In other words, each article covered only one of the possible consequences of global warming and melting Arctic ice (Figure 5). By describing only one chain, journalists avoided displaying interdependency of climate processes, and multiple possible consequences of global warming and the melting Arctic (for example, even Figure 4 showed at least four possible consequences).

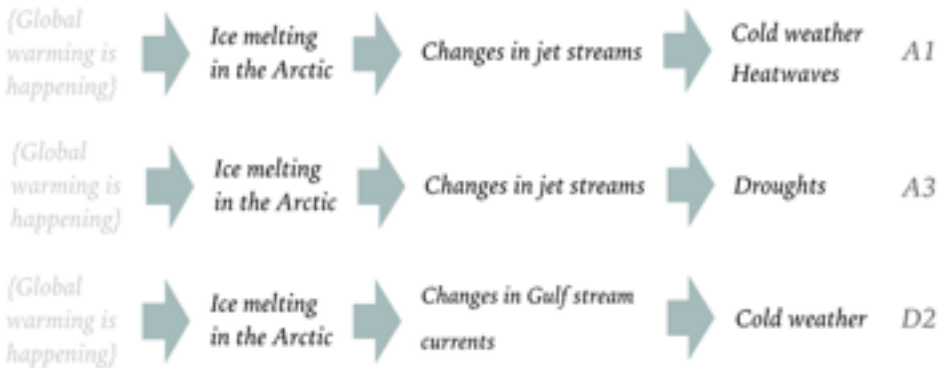

Figure 5. Mapping the presented linear causal chains in some of the article in the discourse 'the Arctic as a cause' (for codes of the articles - see Appendix 9)

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1 "Årsaken til sprengkulden i Norge og Europa er at jetstrømmene over Nordkalotten har endret seg. De polare jetstrømmene er stabile sirkelvinder som går rundt Nordkalotten og markerer skillet mellom svært kald luftmasse over Arktis og varmere luft i Europa. […] Den erfarne forskeren peker på en annen mulig årsak: global oppvarming" (A1)

2 "– Den globale oppvarmingen fører til at alle ekstremer øker […] – Den enkle forklaringen på at været holder seg stabilt over tid, er at temperaturforskjellene mellom Arktis og områder lenger sør blir mindre. Arktisk varmes opp mye raskere enn resten av jorda, og er nå 3–5 grader varmere enn normalen" (K8)

3 - Rekordene skyldes været, helt klart. Men at det ble rekorder nå igjen, så kort etter den forrige, skyldes klimaendringer (N3)

4 - Vi vet at Arktis og Norge stadig blir varmere som følge av global oppvarming" (D2)

Second, this discourse presented a connection between Arctic ice-melting and global warming as established and indisputable. None of the seven articles discussed the premises of global warming. Even if this connection was well-grounded, a critical discourse analyst would aim to identify what discourses, and consequently, what participants were excluded from construction of discourses (Carvalho, 2008; Philo, 2007; Jørgensen & Phillips, 2002). Being built upon an accepted, or "normalised", discourse that global warming was happening, the discourse 'the Arctic as a cause' *did* exclude discussion of any alternative explanations of extreme weather, and critics' views on global warming (Dunn & Neumann, 2016, p. 5).

Scientists suggesting explanations and co-constructing the discourse 'the Arctic as a cause' can predominantly be characterised by three features: natural-science background, top-level positions in Norwegian research institutes or universities, and 'pro-global warming' beliefs. Scientists with certain natural-science background, like oceanographers, meteorologists, physicists, climatologists, were highly relevant to explain climate processes. However, scientists could, and tended to, suggest explanations only within their expertise, e.g. an oceanographer would explain extreme weather with ocean currents (ex. D2), whereas meteorologists would comment on higher temperatures (ex. N3). Quoting scientists with a certain background would not cause any problems, if journalists quoted numerous scientists with diverse background. However, all the seven articles belonging to this discourse quoted one or two scientists with a certain background. A limited number of sources resulted in storylines being simplified, and inter-relations between climate processes being ignored. In addition, journalists quoted, predominantly, scientists from top-level positions.

Within the discourse 'the Arctic as a cause', seven out of ten quoted scientists occupied leading positions at their universities or research institutes, e.g. senior researchers, leaders of research projects, directors, and professors. Not only journalists quoted top-level scientists, but also directed readers' attention to scientists' high expertise. For example, journalists introduced scientists as "*the experienced scientist*"[1], and emphasised scientists' theoretical knowledge, and practical experience, e.g. "*he [the quoted scientist] is himself a farmer and a researcher, and teaches subjects like agriculture and climate*"[2]. Occasionally, journalists pointed to scientists' expertise by commenting on scientists' data collection methods, e.g. "*he [the quoted scientist] has gone through statistics of crops collected by Statistics Norway [a statistical bureau]*"[3]. Some studies explained

[1] *Den erfarne forskeren (A1)*

[2] *Han er selv bonde og forsker og underviser i landbruk og klima (K8)*

[3] *Han har gått gjennom avlingsstatistikken hos Statistisk sentralbyrå (K8)*

journalists' trend to quote top-level scientists by journalists' need to legitimise articles' frames (Gascoigne & Metcalfe, 1997; Weigold, 2001; Dunwoody, Brossard & Dudo, 2009; Peters, 2013). Possible reasons why Norwegian journalists quoted top-level scientists will be further discussed based on data from the text-production analysis in section 5.2.1.

Within seven articles, all ten quoted scientists shared a belief in anthropogenic global-warming. In other words, sceptics of global warming, or "critical voices", were excluded from the discourse (Jensen & Hønneland, 2011, p.11). Here, readers should be reminded that Critical Discourse Analysis does not evaluate what is right or wrong. In other words, by observing that sceptics were excluded, I do not mean to say that global warming is not happening, or not man-made. Instead, a discourse analyst aims to report what is excluded from discourse, and how exclusion happens. Exclusion of "critical voices" might happen because of two factors, e.g. increasing power of 'pro-global warming' scientific community, and journalists' conscious decision. The discourse can be considered as shifting towards pro-environmental one, because scientific community might gain more power, if compared to 2005 and 2006, when Norwegian newspaper articles gave little space to pro-environmental voices (Jensen & Hønneland, 2011). However, the second assumption - that journalists decided to exclude sceptics and their alternative explanations - is also supported with numerous examples. Out of the seven articles within the discourse 'the Arctic as a cause', journalists did not bring up the opposing views, even though four scientists mentioned existing disagreement within scientific communities. Consider the following examples,

> "*According to climate models and theoretical estimations, it should suggest that the jet stream will become more unstable, and that we will experience more often what is happening now [extreme coldness and heat weaves]. The scientists argue if it is really so. Some scientists think so, whereas others claim that the weather is influenced by so many factors that one cannot say anything for sure.*"[1]

> "*Researchers disagree about what has caused that [dry summers], but a strong hypothesis is that it is a result of Arctic getting more warmer as a consequence of global warming. […] The likelihood of the number of dry summers will increase, it is there, even if no one is certain today that this can be directly linked to climate change.*"[2]

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[1] *Ifølge klimamodeller og teoretiske beregninger skulle det tilsi at jetstrømmen blir mer ustabil og at vi oftere vil oppleve det som skjer nå. Forskerne krangler om det virkelig er slik. Noen mener det, mens andre fremholder at været er påvirket av så mange faktorer at man ikke kan si noe sikkert" (A1)*

[2] *"Forskerne er uenige i hva som forårsaker dette, men en sterk hypotese er at det er et resultat av at Arktis er blitt mye varmere som følge av den globale oppvarmingen. […] Sannsynligheten for at antall tørkesommere vil øke, den er der, selv om ingen i dag er sikre på at dette direkte kan kobles til klimaendringer." (A3)*

> "*Climate scientist [name of the scientist] says that this [changes in the ocean currents as the factor that has influenced the climate the most] is one of the topics that splits the field the most*"[1]

> "In those cases when climate sceptics often criticise climate models, this is a solid evidence"[2]

To avoid the risk of jumping to conclusions, the question of how journalists chose their sources would be shed light upon with the data from the text-production dimension (further discussed in section 5.2.1).

5.1.1.2. The discourse "the Arctic as a place"

The discourse 'the Arctic as a place' shared many discursive features with 'the Arctic as a cause' discourse, e.g. explanations of the raised issues were simplified, references were limited to one or two top-level scientists, and critical voices were excluded. However, three features made the discourse 'the Arctic as a place' contrast with the first discourse.

First, unlike other topics within both discourses, the topic of climate dealing with melting Arctic ice contained an explanation not limited to global warming. Three articles explained melting Arctic ice with reference to global warming, whereas the article "*Ice melting in the Arctic is caused not just by warm air*"[3] stated that "*sea ice in the Arctic does not melt only due to warmth in the atmosphere, but also due to feedback mechanisms of the ocean*"[4]. The article did not define feedback mechanisms, and the only specification given to explain the concept to readers was as follows,

> "*[c]limate researchers Sigrid Lind and Lea Svendsen have discovered that the extensive climate changes in the Arctic are not just caused by global warming directly. Saltier water to the north of the Barents sea and heatwaves in the Pacific ocean have at least an equal impact.*"[5]

Besides the presented alternative explanation, the quoted scientists commented on why other explanations dominated the discourse over a long time as follows,

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[1] *"Klimaforsker […] sier at dette [endringer i havstrømmene som den faktoren som har påvirket klimaet aller mest] er ett av temaene som splitter fagmiljøet mest" (D2)*

[2] *"Der klimaskeptikere ofte kritiserer klimamodellen, er dette håndfaste bevis" (A5)*

[3] *At Arktis smelter, skyldes ikke bare varmen i luften (A6)*

[4] *"[…] sjøisen i Arktis ikke bare smelter på grunn av varmen i atmosfæren, men på grunn av tilbakekoblingsmekanismer i havet" (A6)*

[5] *"Klimaforskerne Sigrid Lind og Lea Svendsen har funnet ut at de omfattende klimaendringene i Arktis ikke bare skyldes global oppvarming direkte. Saltere vann nord i Barentshavet og varmebølger i Stillehavet har minst like stor innvirkning" (A6)*

> "*[s]ince the 1970s warming in the Arctic has been explained by the increasing greenhouse effect. But from 1910 to 1940 there were not enough greenhouse gases to explain periods of warming. We also know that changes in solar and volcanic activity cannot be the complete explanation. What explanation can it be, then? We found the answer in the Pacific ocean."*[1]

In other words, the article displayed how the previously dominated explanation did not suffice to explain melting ice, while presenting the recent finding as a missing, but significant puzzle piece. Moreover, unlike other 25 sampled articles, the article shed light on scientist's methods,

> "*[b]y using climate models and analysing historical data on period of warmth in the Pacific ocean during the first decade of the last century, Svendsen [the quoted scientist] has displayed that it [the period of warmth] coincides with a warm period in the Arctic during the same years*"[2].

Besides obvious questions for Critical Discourse Analysis, e.g. how journalists happened to exclude certain topics, sources, and, consequently, discourses, the above-discussed article raised an extra question of how the interaction between scientists and journalists led to an alternative explanation being published. Did the journalist aim to find an alternative explanation, or did the quoted scientists approach the journalist themselves? Such questions would be answered with the data collected for the text-production dimension (further discussed in the section 5.2).

The second feature differentiating the two discourses is contrasting functions of sources. The discourse 'the Arctic as a cause' quoted scientists to explain complex climate processes, confirm the existing climate problem, and predict possible scenarios. As the issues of extreme weather conditions required expert opinion, the quoted scientists ended up referring to established scientific knowledge. By contrast, the discourse 'the Arctic as a place' presented scientists' description, and comments on their own research studies (e.g. the articles A6, N2, A2, K5, K9, K10). The observation that newspapers tend to quote scientists for two dominating reasons - to confirm a problem, and to describe scientific research results - corresponded to other discourse-analysis studies of Norwegian newspapers (e.g. Andersen & Hornmoen, 2011; Hønneland, 2003).

The third difference between the two discourses is the presence of sources other than scientists in the discourse 'the Arctic as a place'. While the discourse 'the Arctic as a cause' quoted

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[1] *"Siden 1970-tallet har oppvarmingen av Arktis vært forklart med økt drivhuseffekt. Men i perioden 1910-1940 var det ikke nok drivhusgasser til å forklare varmeperioden. Vi vet også at endret sol- og vulkanaktivitet ikke kan være hele forklaringen. Hva var den da? Vi fant svaret i Stillehavet" (A6)*

[2] *"Ved å bruke klimamodeller og analysere historiske data av en varm periode i Stillehavet de første tiårene i forrige århundre, har Svendsen påvist at den faller sammen med en tilsvarende varm periode i Arktis" (A6)*

explanations exclusively from natural scientists, the discourse 'the Arctic as a place', and its topics of 'fauna', 'politics', and 'research' involved comments from both natural, and social scientists. Furthermore, journalists covered topics of 'fauna' and 'politics' by referring to members of political parties, photographers, residents of territories neighbouring to the Arctic region.

Taking into account the identified discursive features (Appendix 10), scientific knowledge on the Arctic proved to be framed differently within the two discourses. The first discourse 'the Arctic as a cause' framed scientific knowledge on the Arctic and global warming as established and indisputable. Instead of explaining the complexity of global warming and climate processes, the scientists' quotes pointed to direct relationship between the melting ice in the Arctic, and extreme weather conditions in Norway in 2018. Thus, the quoted scientists were framed as experts, despite the simplified explanations presented, and limited sources with a certain background quoted within the articles. Even in cases when the scientists explicitly stated the existing disagreements in the scientific communities, the journalists did not elaborate on that issue, for instance, by cross-checking either with other like-minded scientists, or with opponents. By contrast, the second discourse 'the Arctic as a place' framed scientific knowledge on the Arctic as an ongoing process of discovery, rather than a source of definite and indisputable knowledge. The quoted scientists referred mostly to their research findings, instead of speaking as experts for certain scientific fields.

Although scientific knowledge was framed differently, three similarities were identified among the discursive features, i.e. journalists quoted top-level scientists, referred to few sources per article, and excluded sceptics and alternative explanations. However, those similarities might represent common journalistic routines, instead of certain features of the identified discourses. Some studies discovered that common journalistic practices were to quote top-level researchers (Gascoigne & Metcalfe, 1997; Weigold, 2001; Dunwoody, Brossard & Dudo, 2009; Peters, 2013), to cite only one source per article (Wien, 2014), and to report uncritically (Eide & Ottosen, 1994; Wien, 2014). Analysing only article texts enables observations of what is present in the discourses, but limits possible conclusions yet. Thus, the distinction between discourse features and journalistic practices will be further discussed with help of text-production, and social-practice dimensions in section 5.4.

5.1.2. Textual features of the two identified discourses (headlines, vocabulary, and writing style)

The two discourses resembled each other in headlines, and vocabulary, whereas persuasive writing style of the discourse 'the Arctic as a cause' contrasted narration of 'Arctic as a place'. The

headlines of the sampled articles can be divided into two groups, with neutral versus sensational headlines. A few sampled articles presented neutral descriptive headlines, e.g. "*Researchers believe that this may happen when the temperature rises*"[1], "*Drones measure depth of the ocean*"[2] and "*Here polar bear cubs chew plastic garbage*"[3]. However, the majority of the articles was characterised by sensational, and intriguing headlines, e.g. "*Extreme cold weather in Europe and record warm weather in the Arctic astonish researchers*", "*These maps of Svalbard make the climate scientists worried*", "*More dry summers in a row can give big problems*", "*Melting of the Arctic is caused not only by warmth in the air*", "*Norway becomes colder*", "*The problem increases*", "*Too late to turn around*", "*Beating all records of droughts*", "*Half a degree that matters*", "*The shocking pictures*"[4].

In most cases, the sensational headlines contrasted with neutral language in the articles. Whereas some headlines and sub-headlines described scientists' strong emotions, e.g. scientists are concerned (A5, K10), shocked (A1), and afraid (K6), all articles used neutral descriptive verbs to accompany scientists' statements, e.g. a scientist has told, thought, or explained. Besides, scientists' statements themselves rarely expressed any trait of worries, shock, or surprise. For example, the article with the headline "*Extreme cold weather in Europe and record warm weather in the Arctic astonish researchers*"[5] quoted a scientist explaining extreme coldness in Norway without any astonishment, e.g. "*[t]he first simple answer is that the weather is like that! The weather is influenced by many factors simultaneously, and we struggle to predict jet streams more than one week ahead*"[6]. Another scientist was neither surprised nor shocked while commenting on bears chewing plastic, e.g. "*[p]olar bears examine everything. They are curious by nature and check and plays with everything. They survive like that*"[7]. Only a few scientists explicitly expressed some traits of emotions and worries, e.g. "*There are scary trends all the way, and that the ice cracked up where we thought it should be stable shows that it is unstable in the whole Arctic*"[8], and "Most [of plastic]

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[1] *"Dette tror forskere vil skje når temperaturen stiger" (A4)*

[2] *"Droner lodder havet" (K3)*

[3] *"Her tygger isbjørnungene på plastsøppel" (A2)*

[4] *"Ekstremkulde i Europa og rekordvarme i Arktis forbløffer forskerne" (A1); "Disse Svalbard-kartene bekymrer klimaforskerne" (A5), "Flere tørkesomre på rad kan gi store problemer" (A3), "At Arktis smelter, skyldes ikke bare varmen i luften" (A6), "Norge blir kaldere" (D2), "Problemet øker" (K5), "For seint å snu" (K6), "Slår alle tørkerekorder" (K8), "En halv grad som teller" (K11), "Sjokkbildene" (N2)*

[5] *"Ekstremkulde i Europa og rekordvarme i Arktis forbløffer forskerne" (A1)*

[6] *"Det første enkle svaret: sånn er været! Været drives av mange faktorer på en gang, og vi sliter med å forutsi denne jetstrømmen mer enn en uke i forveien" (A1)*

[7] *"Isbjørnen undersøker alt. De er nysgjerrige av natur og sjekker og leker med alt. Slik overlever de" (A2)*

[8] *"Det er skumle trender hele veien, og at isen sprakk opp der vi trodde det skulle være stabilt, viser at det er ustabilt i hele Arktis" (A5)*

lies on the seabed, much is floating in the water masses, but the degraded plastic, the micro plastic, which we do not see with the eyes, is the most scary"[1]. Scientists might lack feelings of surprise or worries due to long exposure to an issue scientists specialise in, or might reserve such feelings because of adherence to objectivity normative understood as being value-free (as discussed in section 2.3.1). However, that question can be further examined at the text-production dimension, because observations made based only on text analysis do not allow to say "whose rhetoric" is represented in the newspaper (Philo, 2007, p.186).

Besides specific words chosen to describe scientists' statements and feelings, some journalists avoided specifying the number of scientists journalists referred to. For example, one headline stated "*Shocking pictures: researchers believe […]"*[2] without stating how many 'scientists' (*forskere* or *forskerne*) are implied either in the headline, or in the main body. Similarly, the article "*Extreme cold weather in Europe and record warm weather in the Arctic astonish researchers*"[3] referred to 'researchers' in plural without specifying the numbers or names, e.g. "*Of the extreme effects observed by the researchers, […]*"[4]. Unspecified number of scientists was considered problematic for two reasons. First, the word 'scientists' (*forskere* or *forskerne*) might give an impression of reference to a broad scientific community, while referring in fact only to a couple of scientists. For instance, the report referred to in the article "*Shocking pictures*"[5] was written by two scientists. Second, clear references complicated follow-up of the presented information. Some articles presented a general reference to 'scientists', e.g. "*[b]oth scientists and politicians from the whole world think that there are all reasons to raise the alarm*"[6], and "*[i]n Norway scientists found 30 plastic bags and some micro plastic in stomach of a sick Cuvier's beaked whale that had to be killed last winter*"[7].

The writing style differed between the two discourses. In the discourse 'the Arctic as a cause', the complex causes for extreme weather were explained exclusively with scientists' direct quotes. In some articles, quotes from scientists occupied whole paragraphs, paragraph after paragraph, without any words from the journalist (e.g. "*More dry summers in a row can give big*

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[1] *"Det meste [av plast] ligger på havbunnen, mye flyter rundt i vannmassene, men den nedbrutte plasten, mikroplasten, som vi ikke ser med øynene, er den mest skumle" (K5)*

[2] *"Sjokkbildene: forskere tror […]" (N2)*

[3] *"Ekstremkulde i Europa og rekordvarme i Arktis forbløffer forskerne" (A1)*

[4] *"Av de ekstreme utslagene som forskerne observerer, […]" (A1)*

[5] *"Sjokkbildene: forskere tror plastforrurensning kan bli et kjempeproblem i framtiden" (N2)*

[6] *"Både forskere og politikere fra hele verden mener det er all grunn til å slå alarm" (K5)*

[7] *"I Norge fant forskere i fjor vinter 30 plastposer og noe småplast i magen på en syk gåsenebbhval som måtte avlives" (A2)*

problems"[1]). By contrast, the discourse 'the Arctic as a place' was narrated by journalists themselves, with some additional information from diverse sources. Such different approaches to covering topics might be explained by climate issues being more complex for journalists without any scientific background. Hence, journalists had to rely on scientists' direct quotes, being unable to paraphrase.

5.1.3 Objectivity within the sampled articles

To be able to shed light on the relationship between the discourses and the social practice's non-discursive element (i.e. objectivity), this thesis analysed the sampled articles for the presence of Douglas' (2004) meanings of objectivity, taking into account all the findings from the text-analysis (for the overview of findings, see Appendix 10).

The *manipulable* objectivity could not be evaluated at the level of text-analysis. As operationalised in this thesis (Appendix 3), the manipulable objectivity referred to methods journalists used to get information on a topic. Even though the sampled articles referred to numerous written sources (e.g. research reports, scientific journals, other newspapers), and specialists (e.g. scientists, politicians), the articles did not make any explicit remarks on how journalists chose the sources. Unlike the manipulable objectivity, text-analysis could shed light on the interactive objectivity.

The *interactive* objectivity referring to combination of sources mentioned in the articles was considered absent in the sampled articles. The analysed articles presented a combination of sources, e.g. up to three scientists, other interviewees, and written sources, like respectable scientific journals (e.g. *Nature*, *Science*), foreign daily newspapers (e.g. the Guardian), and online media websites (e.g. Mashable), data from Global Forecast System and meteorological institutes (e.g. Danish, Norwegian ones), and research reports. Despite a range of sources per article, the sources were framed as providing extra arguments, instead of supporting or opposing the already-presented arguments. For example, the quoted scientists commented on issues within their specific background, while written sources were meant to present background information, or point to a broader relevance of a discussed issue with the help of references to international sources. In other words, each mentioned source was meant to add an extra puzzle piece to the story, instead of following up or cross-checking already-presented information. As a result, the convergent objectivity was undermined in the sampled articles.

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[1] *"Flere tørkesomre på rad kan gi store problemer" (A3)*

The *convergent* objectivity understood as instances journalists have cross-checked evidence was not observed, because only one article explicitly cross-checked the presented information out of 26 analysed articles. The article "*Researchers believe that this may happen when the temperature rises*"[1] published answers of three scientists to the same questions, even though three scientists were like-minded, i.e sharing pro-global warming belief. The lack of cross-checking is consistent with the study of Eide and Ottosen (1994) that discovered uncritical one-source reporting across many Norwegian newspapers. To avoid jumping to conclusions about the other articles, more data should be collected at the text-production dimension to illuminate if lack of explicit cross-checking in the articles *did* mean that journalists uncritically accepted the obtained evidence.

The *concordant* objectivity operationalised as ways how journalists reconciled opposing views was absent in the analysed articles, because all the analysed articles did not present any contrasting views. Even in cases when scientists explicitly stated the existing disagreement in scientific communities (e.g. A1, A3, A5, D2), journalists did not quote any opponents. This finding is consistent with Jensen's (2007) study on Arctic discourses, that stated "it is striking how seldom these counter-arguments made their way to the different newspapers" (p. 251). However, only data about the text-production process would illuminate journalists' decision not to quote the opponents (further discussed in section 5.2.2). Likewise, more data was needed to shed light on journalists' values.

Three meanings of objectivity dealing with values (i.e. *detached*, *value-free*, *value-neutral*) were not discovered in the article texts. Those meanings were operationalised as internal retrospection or external examination of journalists' reasoning process. Since no signs of internal or external reasoning were present, three meanings of objectivity devoted to values will be further discussed in the next section.

5.2. How representations of scientific knowledge are produced through interaction between scientists and journalists

The following section presents and discusses how representations of scientific knowledge was produced through the interaction between scientists and journalists. The interactions were analysed based on the criteria of journalists' choices of sources, evidence, storyline, and scope. These criteria were operationalised from the conceptualisation of objectivity in this thesis. The answers of the interviewed journalists were cross-checked with the scientists' opinion about their

[1] *"Dette tror forskere vil skje når temperaturen stiger" (A4)*

interaction with journalists, with text-analysis of the articles, and with the existing literature on interactions between scientists and journalists.

5.2.1. How the journalists chose sources

Answering the question of '*how you choose sources for an article*', the interviewed journalists pointed to two main ways, i.e. the journalists found sources during a preliminary research of a topic, and the sources can initiate contacts with the journalists. The preliminary research of a topic gave journalists ideas of how topics were already covered in other media, or other written sources (like scientific journals) - i.e. the existing debate on the topic, and who took part in that debate. For instance, the second journalist shared, that

> *[searching for sources] starts with me reading articles about wind power, and then I'm trying to get ideas about how to develop different articles about that theme. When I have that, I can read newspapers to try to find examples of how people are fighting against wind power and… Or I can contact environmental organisations to get information… or, in this case, reading letters from different communities which react on the proposition of where to place these wind power plants.*

Such reliance on the previous coverage of a topic might explain, for example, how the topics of 'climate', and 'fauna', identified during the text-analysis, got re-constructed.

The interviewed scientists shared that they were unsure how journalists selected them for interviews. One scientist said that the university's PR department might have connected him with a journalist (e.g. "*I think they [journalists] contacted the institute first and then they [the institute] put them [the journalists] through to me*" (Scientist 1)), whereas two other scientists said that they received direct e-mails from journalists requesting interviews. Through their experience of communicating with the media, the scientists got an impression that journalists typically find relevant sources through an online search, through a PR department, or through finding a scientist's name in a publication. One scientist also shared an opinion that journalists might contact scientists randomly. That opinion was based on his own experience that journalists asked questions beyond the scientist's expertise.

> *Interviewer: Have you experienced that you are approached with a question which is beyond your competence?*
>
> *Scientist 2: Yeah, quite often. Moreover, we [the research institute] have a certain list [of scientists with their expertise specified], but I have a feeling that that list is*

never used. So journalists… they just call usual names [that are often quoted in newspapers], even if it's far outside the competence of the people they call.

The interviewed journalists have claimed that they typically contact many different sources while collecting background information (e.g. "*for very crucial information, you always try to have more than one source, anyway*", journalist 1). However, this claim should not be taken at face value for two reasons. First, some phrases, said by the journalists further in the interviews, raised questions of how many sources they *actually* contact as a rule of thumb. For instance, the second journalists shared that he "*[…] very seldom interview very many scientists concerning one matter*". So, his phrase about contacting many sources might be interpreted as contacting sources from many different spheres (e.g. a scientist, a politician, an activist), but not many scientists with opposing views for the sake of cross-checking. That corresponds with findings from the existing literature on interaction between scientists and journalists. For instance, studies of Eide and Ottosen (1994), and of Andersen and Hornmoen (2011) claim that Norwegian journalists typically quoted just one scientist, aiming to get legitimisation of the frame of the article, instead of reporting on the state of scientific knowledge on a particular issue. One of the interviewed scientists suggested a possible explanation why journalists did not contact many scientists. That scientist said, that "*they [journalists] have a few names they are used to call, I guess, there are a few [scientists specialising in a certain issue] in Oslo, and a few in Bergen*". The second reason to doubt that journalists contact many sources is based on the findings from the text-analysis dimension. The text-analysis dimension showed that journalists quoted just one or two sources in the sampled articles. To clarify that contradiction between the claims and the articles, both journalists have been asked if they typically contact more sources than they quote in the articles.

Both journalists answered that question similarly, "*of course [I have contacted sources that have not been quoted]*" (Journalist 1), "*that [not quoting all contacted sources] happens often*" (Journalist 2). These two phrases gave an impression that not quoting all sources represents a common practice. Moreover, both journalists justified that common practice similarly, i.e. by limited space of an article, and required focus on the topic. For instance, the second journalist said, that "*a newspaper article is not very long. So, I have limited space and I will almost always get in contact with more sources than I need to quote*". Similarly, the first journalist shared that "*you have your story here, and you can't do ten different stories at the same time*". These conditions of space and focus are understandable, although they do not explain how journalists choose *which* sources will be quoted among all the contacted ones.

Based on the experience of working with different sources, the journalists shared, and justified a clear preferences towards sources with broad overview of a topic.

> "*I would say, I don't need this very specific knowledge concerning one specific part of wind power […], I'm not interested in how the wind turbines work. I'm not interested in how to maximize the the electric energy movement in the power line […] I need people that are experts but that are experts on the more varied kind of subjects concerning wind power*" (Journalist 2)

> "*you have Mr. O, and then you have Mr. R, and they both worked on this project together, but Mr. O led the whole thing. So, to talk to him about that specific project would probably be enough, because he probably knew everything, but to talk to Mr. R. alone without having Mr. O wouldn't be good enough, because he knew only a specific part of it*" (Journalist 1)

The journalists justified this preference by having little time for gathering evidence before publishing an article. This preference of journalists corresponds with the literature on interaction between scientists and journalists, and with the findings from text analysis. Many studies stated that journalists typically contacted more 'visible' and experienced scientists occupying high academic positions (Gascoigne and Metcalfe, 1997; Weigold, 2001; Dunwoody, Brossard & Dudo, 2009; Peters, 2013). Besides, the text-analysis of this study showed that all the sampled articles referred mainly to senior scientists, professors, or directors of Norwegian research institutions.

Besides broad knowledge, the journalists preferred to quote sources with certain knowledge. However, according to the second journalist, especially scientists spoke about uncertainties a lot, e.g.

> *"[S]cientists are not very clear about what they mean. They can have too many... what do you say... doubts about their results... and that can be interesting if you have a lot of space in your article, but not if you don't have enough space"*

That seems quite understandable, taking into account that science rarely operates with clear, definite, and factual knowledge. For instance, social scientists typically obtain non-generalisable findings due to small sample size, and purposive sampling methods. Similarly, natural scientists, even with bigger samples and controlled experiments, cannot generalise to different contexts. As a result, expectations of journalists to get clear knowledge from scientists cannot be met. Even though the interviewed journalist showed awareness of that (*"That [that scientists warn about their*

limitations and uncertainty of research results] happens all the time, and I respect it. Of course I respect it!"), the journalist still expressed expectations about interaction with scientists (*"I would love to have scientists being more clear about their results!"*). Both journalists' preferences for broad, and clear knowledge resulted in contacting only scientists at the high academic positions. However, one of the interviewed scientists expressed concerns about being interviewed about research that his colleagues conducted, e.g. "*right persons should be given credit*". Being a director of a research institute, the scientist often experienced presenting research conducted by his colleagues from the same research institute. The same scientist gave a potential explanation, by saying

> *"I think most journalists have a short list. […] You see it's the same people, more or less, who get interviewed. […] So, I think mainly that the journalists call people they have been in contact with from before"*

Besides finding sources on their own, the journalists experienced diverse institutions suggesting the journalists whom to contact. For example, the first journalist experienced that universities sent out lists of people and their contacts to the media before some big events, like the elections, Nobel Prize awards, or public announcement of tax lists (*Skattelister*). The second journalist got suggestions for future articles, e.g. *"I just got an email from a representative of the Norwegian parliament. And his email consists of a propositional case that he thinks I should write something about"* (Journalist 2). Two of the three interviewed scientists with long working experience also shared that they tend to contact journalists directly with research results the scientists found interesting, e.g.

> *"if we have some research, for instance, a new paper, or a new product, then we contact our journalists, we have our short list, so it's quite a lot of the personal contacts, journalists have personal contacts with the scientist, but we [scientists] have also personal contacts with journalists"* (Scientist 2)

> *"I sometimes contact them, and tell my story, so they you have story already. […] I know some journalists there [in one of the Norwegian newspapers], and I say... I got this paper out, this is quite interesting and say, and explain why I think it's interesting. Sometimes they pick up up on that, but sometimes they don't"* (Scientist 3)

Sources initiating to contact journalists were explained similarly by the interviewed journalists and scientists. For instance, the first journalist attributed that initiative to *"I guess that's probably a side-effect of all the universities having their own communication departments"* (Journalist 1), whereas scientists explained that by their desire to communicate findings they consider significant to the public (e.g. "*media is very important channel for us to […] communicate our knowledge to society*" Scientist 2).

The data on how journalists choose what, and how many sources to contact matters for evaluating the presence of *manipulable*, and *interactive* objectivity. This section points to both undermined *manipulable*, and *interactive* objectivity. In this thesis, *manipulable* objectivity has been operationalised as methods how journalists gather evidence, e.g. via primary or secondary sources, like interviews with experts versus published articles in other newspapers or scientific journals. The interviewed journalists mainly relied on their own search for sources, but also gladly used the provided lists of names, which undermined the *manipulable* objectivity.

The *interactive* objectivity refers to combination of sources journalists contact, e.g. sources with different level of expertise, and from different institutions. The journalists reported to contact many diverse contacts, but preferred scientists occupying top-positions, assuming that such contacts had broader and clearer knowledge. As a result, exclusion of certain sources led to lack of the *interactive* objectivity. Moreover, the journalists' preferences about sources limited the *detached* objectivity. The next section will present how the interviewed journalists worked with obtained evidence, and discuss what meanings of objectivity their decisions correspond to.

5.2.2. How the journalists worked with data provided by scientists

To find out how journalists work with evidence, the interviewed journalists were asked if they approached evidence critically, how they handled contradicting evidence, and if they cross-checked evidence.

Approaching evidence critically was regarded by two journalists in contrasting ways. The first journalist associated critical questions towards evidence with pushing journalists' own agenda. The first journalist expressed a strong opinion about such journalists, by saying "*I don't like people [journalists] who do news stories, put their own opinions and then try to camouflage them [opinions] as news stories*". The second journalist viewed critical questions as a common practice, responding that "*if you are to become a good journalist, you have to ask critical questions*". This contrast between the journalists can be partially explained by their working place. The first

journalist works for Aftenposten, a conservative newspaper, whereas the second journalist writes for Klassekampen, a radical and leftist newspaper.

Scientists shared similar experience on journalists asking critical questions. The three interviewed scientists reported that journalists did not ask critical questions about the statements the scientists presented. For instance, the first scientist got an impression that journalists want scientists just "*to give them [to journalists] the information*", whereas the second scientist phrased a similar impression, e.g. "*they [journalists] are taking notes, and then they say good-bye*". The third scientist did not even expect critical questions, because, according to him, journalists do not have a specific background to fully grasp what scientists stated.

> "*I think they usually accept it [a statement], I don't think they have the sufficient background to be critical. Sometimes they ask my opinion about what other scientists say […] but not really... they don't really ask if my information is... trustworthy*"

Indeed, many journalists might not have special training, or science background. However, critical questions, like how scientists came to some findings, or based on what scientists made certain claims, do not require special training, but simply critical thinking skills. However, scientists reported that they typically do not experience such questions from journalists, e.g. "*I don't think I ever got that question [how certain a scientist was of his statement] actually*".

All the scientists wanted their quotes presented correctly in articles, but differed in their views on who was responsible for correct presentation of scientific statements. Having the least experience in media communication (among the three interviewed scientists), the first scientist preferred not to check quotes, explaining his preference as follows, e.g.

> *"I haven't asked for the article before [publishing]. I think it's quite uncommon to do this. Journalists are under time pressure to get the article out, so I don't think it's… I feel, it would probably be unreasonable for me to request [to see the article before publishing]. In that way, you're kind of doubting their ... or questioning their performance as journalists.... I feel it would be disrespectful to ask"*

The third scientist neither initiated to see quotes before the article was published, not refused to check if being asked, e.g.

> "*I think, about at least 50 percent of times journalists will send and ask, if I want to read through it [the article]. So I said OK. […] But it's my job to look, to make sure that journalists are writing it right, because … [did not finish the thought]. So it's more like a service rather than negotiations"*

The second scientist regarded helping journalists as the most reasonable activity, explaining it as follows, "*I know from earlier, that this complicated things often come out as a misunderstanding, or they are very hard to understand for people reading it*". That scientist shared an example of e-mail communication with the journalist after the interview (Appendix 4). The e-mails showed the draft amendments, e.g. the first draft sent to the scientist, because the scientist asked to see the quotes, the second draft consisting of the scientist's amendments, and the article published in the newspaper. Comparing the three texts led to the following two observations.

The first draft written by the journalist after having interviewed the scientist was considerably amended by the scientist. The scientist suggested a more expressive vocabulary, by adding words like '*extreme*', '*much warmer*'. In addition, the scientist corrected the simplified explanations written by the journalist, e.g. instead of saying "*The Arctic has become warmer*[1]", the scientist suggested to write "*this is a result of the Arctic having become much warmer as a consequence of the global warming*[2]", and instead of "*[w]e may get more extreme periods with droughts and heavy precipitations*[3]", the scientist expanded the explanation, by saying "*the effect of it [global warming] is reflected in even more extreme weather, like periods of heat waves, droughts, or periods of heavy precipitations*[4]". The journalist's simplified language might be interpreted in three ways. First, the journalist did not fully grasp what the scientist shared at the interview. Second, the journalist intentionally tried to make scientific knowledge more simple for readers. Third, the journalist assumed that the audience did not need scientific details suggested at the interview with the scientist. However, the last two interpretations can be discarded, taking into account the published article, where the journalist uncritically accepted all suggested changes from the scientist. The degree of the journalist's uncritical acceptance of the suggested amendments was observed, by comparing the scientist's suggestions with the published article. The journalist accepted all the suggestions, except for lengthy explanation at the end, most likely due to word count for the article.

Not only that example of e-mail communications points to lack of critical thinking among the journalists, but also their phrases during the interviews. For instance, the second journalist's limited critical thinking emerged during the discussion of installing windmills in Norway, e.g.

> *"I mean it's difficult to argue against the height of a windmill, or the cost of a windmill, or how many kilometres with roads between the windmills they have to*

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[1] *"Arktis er blitt varmere" (Appendix 4, draft 1)*

[2] *"det er et resultat av at Arktis er blitt mye varmere som følge av den globale oppvarmingen" (Appendix 4, draft 2)*

[3] *"Vi kommer til å få flere ekstreme perioder med tørke og med stor nedbør" (Appendix 4, draft 1)*

[4] *"det gjør seg utslag i stadig mer ekstremt vær, som perioder med varme- og tørke eller perioder med store nedbørsmengder" (Appendix 4, draft 2)*

construct in order to to get a good power plant or windmills. I mean these are facts. There is no reason for me to doubt the fact"

This phrase pointed to the journalist's perception of quantitative information as factual, and indisputable, whereas "*opinions coming from people that you have interviewed…these opinions are always disputable. Cold facts, and numbers are not*".

The first journalist showed similar limited critical thinking, while discussing oil tankers going along the Northern Sea Route (in the Arctic). The first journalist said that "*you don't need a scientist to say that it's not good to drive a huge boat using gasoline and leaking oil through unspoiled nature*". Indeed, from the environmentalist perspective, oil tankers in the Arctic are commonly regarded as dangerous. However, journalist's job is not to report on topics from one-sided perspective, and not to assume what is common knowledge or not. Instead, journalists are expected to report the current debates, to provide relevant participants with space to express their views. However, that journalist reasoned that if "*there is a very, very, very broad scientific consensus*" on an issue, then journalists are justified not to bring up the opposing views. *"When something is properly established, and it's true, then you don't have to present both [the mainstream view, and the opposing view] just for the sake of balanced reporting".* Such uncritical reasoning might prevent opposing views from being presented in the media.

The lack of opposing evidence was surprising, taking into account that the journalists regarded having contradicting evidence as beneficial for news reporting. For instance, the first journalist said that "*it's no problem to have both [sources] contradicting each other. Moreover, I also think that having contradicting evidence makes a story better…makes a story stronger*". Similarly, the second journalist admitted his willingness to quote both contradicting sources, by saying "*[t]here might be even different research, or results. In that case I come to both parts. If I know that there are opposition, then I will quote it, because it's interesting in itself*". Such a positive attitude towards opposing views in an article contrasts the results of text-analysis (i.e. opposing views were missing in all the analysed articles), and the existing literature on scientist-journalist interaction (e.g. Wien, 2014; Albæk, 2011).

In the analysed articles, only the quoted scientists mentioned existing disagreement in the scientific community. One of the interviewed scientists commented on how existing scientific disagreement got mentioned in the article, by sharing that,

"That was a tip I gave to [name of the journalist] about a paper which came out on the Ocean circulation. [That paper] discusses this topic that [provokes] a fair amount of disagreement [in the scientific community]. So there are different

groups having different ideas. And this is something we don't know the answer to yet, but they are different possibilities for what may be the outcome. I wanted to get that message out, that there are some differences. And I think this is a good way of presenting uncertainty as to say that some people say this, and other people say, and they disagree and that in itself implies that some degree of uncertainty"

That corresponds to the findings from the text-analysis dimension, particularly, that existing scientific disagreement was brought up by scientists in all the analysed articles. In the articles, journalists neither cross-checked with other sources, nor followed up the scientists' suggestions. Thus, the interviewed journalists were asked about cross-checking, particularly, how they decided that the obtained evidence is sufficient.

This question provoked some irritation, confusion, long reflection, and defensive reactions from both journalists. For instance, after asking the first journalist "*you were saying that you have to cross-check evidence obtained from different sources. Do you have any remarks on the issue of cross-checking?*", the journalist started to speak about limited time if writing an article during the evening shift, as if trying to justify himself, and differentiate the importance of the topic, e.g.

"*Yeah. That's… it's ... of course it's… it's… that also depends on the story. If you… if you work the evening shift, and your boss says that you need something on the weather for tomorrow, then if you call one meteorologist, you don't need to call two more to see if it's actually gonna be.... But if you work with bigger stories, then you want to cross-check…*"

A more defensive reaction was provoked in the second journalist, who started to speak about limited time, and contrast journalism against science, e.g.

"*If he [a journalist] is given enough time, I would say, he has a chance to do a proper research, but I think if…[thinking long] this is journalism...This is not science, which means…which means that we don't... we don't...we don't necessarily dig very deep to find the truth…I mean if you write... if you write... if you write two or three articles or even more, it's… it's quite obvious to me that you don't have a chance to do a proper research. There will always be questions in that article that haven't been answered properly. It's impossible.*"

These two phrases can be interpreted as follows, that the journalists regarded cross-checking as a routine performed only if they had "enough time", and for "bigger stories".

The questions if the journalists approach evidence critically, cross-check, and present contradicting evidence matter for evaluating two meanings of objectivities - *convergent*, and *concordant* objectivity (Appendix 3). *Convergent* objectivity was operationalised as instances journalists have cross-checked evidence, whereas *concordant* objectivity is evaluated according to ways how journalists reconcile opposing views, if opposing views are presented in an article.

The observations made in this section helped to evaluate *convergent*, and *concordant* meanings of objectivity. First, the journalists' assertion of being critical towards evidence should not be taken at face value, taking into account what the journalists regarded as factual knowledge. In other words, even if the journalists reported confidently that, for instance, quantitative "*facts*" were regarded as indisputable (Journalist 2), uncritical acceptance of such "facts" by journalists undermined *convergent* objectivity. Second, *convergent* objectivity is also questionable, taking into account the journalists' inconsistent routine to cross-check evidence depending on the perceived significance of news stories, and on time available for "*proper research*" (Journalist 2). Third, even though both journalists regarded contradicting evidence, or opposite viewpoints, as beneficial, neither the articles written by them, nor their attitudes towards cross-checking evidence pointed to their intention to look for viewpoints opposite to those already presented in the articles. The lack of any opposing evidence corresponds to lack of concordant objectivity. These observations of lacking opposing views, and limited critical approach to evidence can also be explained by the journalists' decisions on scope, and storyline of articles.

5.2.3. How journalists decided on scope, and storyline

The issues of scope and storyline refer to journalists' judgements when to stop collecting evidence, and how to frame an article. Being asked about these judgements, both journalists seemed not to know what to answer, or how to formulate what they meant. After thinking for a while, both journalists started enumerating the already-discussed points, like evaluating the strength and trustworthiness of collected evidence, cross-checking, and time constraints. Despite writing newspaper articles on regular basis, the journalists seemed unaware, or unconscious, about how they decided on the scope and frame. The following examples supported such an interpretation.

> ***Interviewer****: How do you decide that the evidence you collected is enough?*
>
> ***Journalist 1****: That's tricky to answer actually. One thing… it's sort of what you… what you have to do. If you're writing… if you're… let's say that someone did something, then you have to call them, but it's… it's usually… you sort of have*

to… to analyse your story and see if it's strong enough. It's if … if ..and also to decide if your source is good enough. Basically if… No, it's… it's… it's tricky. You have to… It's um... and see of course if there are… if a source says something, you check if there are others … but no, it's difficult… it's… it's a bit of common sense also. Anyway, you have to, sort of, see, to look at every story for itself

***Interviewer**: What is the rule of thumb for a journalist to conclude that that's [the collected evidence] enough?*

***Journalist 2**: I don't know. I don't know. It differs from subject to subject, it differs from article to article, it differs on how much time you got. If I have to deliver an article at 2 o'clock, at half past one I have to finish all my research, and then I have half an hour to re-write and send it. So, the rule of thumb in that case is - when I've spent the time, I have to finish (laughing). So...I would say the rule of thumb is more the question of time than of the quality. You have to finish, and usually the same day as you started.*

***Interviewer**: But in the ideal situation, if you had, for example, a week for an article, how would you decide that the collected evidence is enough?*

***Journalist 2**: I don't know if it is possible to answer that question.*

Even though the journalists could not recall how they chose certain frames for their articles, the journalists' preliminary research of a topic might predetermine how articles would be framed. For instance, the second journalist shared that he sometimes "*ask him [a scientist] about findings [the journalist made during the preliminary research of a topic]*". Such knowledge of a topic might pre-frame the journalist's questions from the very beginning of an interview with a source. A similar situation was experienced by one of the interviewed scientist, who shared that "*there were occasions that I felt that journalists were wanting me to confirm something that they wanted to write which I believe to be incorrect*". Indeed, journalists have to pre-formulate a topic and prepare questions. However, if journalists have expectations of what the article should present, such expectations might undermine their *detached* objectivity, understood as having no desires about outcome, or evidence.

Speaking more about the frame and scope of the existing newspaper coverage of scientific knowledge, the interviewed scientists shared their thoughts on how journalists could create a better understanding of scientific knowledge among the public. All three scientists were concerned with journalists not covering limitations, and uncertainties inherent to scientific research. For instance, the first scientist explicitly spoke about the uncertainties,

> *"I think the balance thing would be to discuss the uncertainty about the issues that are still under discussion in science. So the rate of global warming, how rapidly temperature is going to increase in the future. Like when do we expect that the Arctic will be ice-free, like these types of things, rather that...is it happening, is it man-made, like we as the scientific community got over those questions a long time ago" (Scientist 1)*

whereas the two other scientists spoke more about a cut-down picture of scientific research, by saying that journalists do not cover the whole process, e.g. "*I think [the audience need] more in-depth stories that say how scientists have come to this conclusion, or what scientists have done, and how they have been thinking*" (Scientist 2), and "*what they [journalists] write is not wrong, but it gives us a limited picture… a narrow picture to what we [scientists] do, because what we do is maybe more… there're so much more details that are not presented*" (Scientist 3).

Journalistic practices of how to choose frame and scope of an article affect the mode of objectivity devoted to reasoning process and values, particularly, *detached*, *value-free*, and *value-neutral* objectivity. This mode was operationalised by internal retrospection or by external examination of an individual's reasoning process. In other words, if journalists consider their own underlying values that might guide their choices of sources and evidence over alternative ones. During the interviews, the journalists' phrases, and opinions pointed to presence of their values, while choosing sources and evaluating evidence.

Even though the findings cannot be generalised due to a small purposive sample, the interviews with the journalists and scientists illuminated some aspects of their scientist-journalist interactions. The discussed aspects enabled to speculate about objectivity in a more informed way, contrasted to text-analysis that allowed only to observe signs, or lack, of objectivity. The discovered details of scientist-journalist interactions helped to identify certain degree of *manipulable*, and *interactive* objectivity, and to support previously identified lack of *convergent*, and *concordant*

objectivity. Furthermore, the interviews provided data for evaluating three meanings of objectivity devoted to values (i.e. *detached*, *value-free*, and *value-neutral*) that were difficult to observe at the level of text-analysis.

The *manipulable* objectivity was present with a certain degree due to numerous ways the journalists found their information sources. However, the *manipulable* objectivity could easily be undermined in cases when the journalists relied on lists of contacts provided purposively by PR departments of Norwegian universities or research institutes, or scientists themselves. Although the journalists were aware that sources approaching them might have an agenda (e.g. freshly published scientific report), the journalists accepted such sources, justifying it with little time available for an article. By accepting uncritically sources' suggestions whom to contact, journalists might exclude less 'visible' scientists from fields that that get less media attention (Ivanova et al., 2013; Weigold, 2001).

In addition to uncritical acceptance of sources, both interviewed journalists admitted their preference to sources with broad and clear knowledge on a topic. Limiting a range of possible sources only to those with certain features undermines the *interactive* objectivity. As a result, journalists might exclude perspectives of 'others' from the discourse (Dunn & Neumann, 2016). At the same time, both journalists asserted to contact many more sources than those quoted in articles. Indeed, the text analysis showed many diverse contacts quoted, and the interviews gave the impression of the journalists conducting a broad background research. Based on the journalists' assertions, and findings from the text analysis, the *interactive* objectivity can be judged as present to a certain degree.

Besides giving extra insights about the manipulable, and interactive objectivity, the interviews provided possible explanations of the lacking *convergent*, and *concordant* objectivity identified at the text-analysis dimension. Regarding the convergent objectivity, the articles might lack cross-checking, because either journalists associated being critical with pushing a journalist's agenda, or had limited critical thinking skills. The latter explanation was supported by the interviewed scientists reporting that journalists typically do not ask critical questions. As for the concordant objectivity, the journalists excused their one-sided reporting with limited time and space available for articles, despite some scientists explicitly stated existing opposing views among scientists.

Unlike the text analysis that did not allow for tracking journalists' values, interviewing the journalists clearly pointed to presence of values throughout the whole process of text-production. While searching for sources, the journalists could accept suggested names to contact, or topics to cover, for the sake of journalists' convenience. While choosing what sources to quote, the journalists preferred sources with broad and certain knowledge. At the interviews with scientists, the journalists judged if scientific statements were common knowledge, or required extra legitimisation from experts. Thus, the interviewed journalists were considered neither *detached*, nor *value-free*, nor *value-neutral*.

5.3. How the scientists and the journalists understood and practiced the norm of objectivity

The interviews with the journalists did not intentionally raise the issue of objectivity, to observe if the journalists would speak about objectivity themselves. Although both journalists did not say explicitly the word 'objectivity', both spoke about journalistic ethics, particularly, about "*the ideal [of balanced reporting]*" (journalist 1), and giving "*the other part that is being criticised a chance to answer*" (journalist 2). Such understanding of the concept equaled to the *concordant* objectivity of Douglas (2004). However, when objectivity was mentioned explicitly in the interviews, understanding of, and attitude towards objectivity differed between the journalists.

The first journalist understood objectivity as "*the right to defend yourself*" (journalist 1). The first journalist believed, that the right to defend yourself "*goes quite far in the Norwegian media, even further than many other countries*", meaning that Norwegian journalists tend to provide the space for two opposing sides to express their views, for example, "*when Erna Solberg [Prime Minister, and leader of the Norwegian Conservative Party] says something, then you call Jonas Gahr Støre [leader of the Norwegian Labour Party] also*". The sampled article written by that journalist indeed displayed his positive attitude towards objectivity. His article gave space to many participants of the debate, and in case of not being able to interview some relevant participants, the journalist transparently reported that those participants refused to be interviewed. However, being asked why the journalist did not look for insights from social scientists who could illuminate the discussed topic based on scientists' research, the journalist gave the impression of thinking about such a possibility for the first time, and then considering that possibility beyond the scope of the article, e.g.

> *It would be easier of course if [name of a participant who refused to be interviewed for the article] wanted to comment […], but… but… that is true. It*

> *would be interesting to elaborate further…it's true, it would have been perfectly possible to do it…but I guess, it's also a case of … you have your story here, and you can't do ten different stories at the same time.*

Indeed, a comment from a social scientist in the sampled article might be judged as a separate story. However, having compared the sampled article with the other articles written by the same journalist before the interview, I asked the journalist about reasons for not contacting scientists to comment on articles dealing with environmental issues. In that case, the journalist regarded that redundant, saying that "*you don't need a scientist to say that it's not good to drive a huge boat using gasoline and leaking oil through unspoiled nature [the Arctic]*". These two cases pointed to flexibility of objectivity, because the journalist decided to apply the ideal of balanced reporting, depending on a case. Assumption, or personal judgement, that "*you don't need a scientist*" limited opportunities for some relevant participants to express their opinion on an issue.

Contrasted to the first journalist, the second journalist explicitly denied the value of objectivity. Being asked "*how do you understand an objective journalism?*", the second journalist answered "*[it's] very dull journalism*". That journalists tried to explain his view, by saying

> *"[y]ou have to understand me. I think being balanced… being fair, which should be the basis of our all journalism… that means giving people the chance to… express themselves, defend themselves, being able to write about different points of views concerning one specific subject that you are covering. That is one thing. But if there is no... if there is no you in it, it becomes dull. There must be some sort of engagement and that judgment which would form…a foundation of your journalism. If that engagement is not there as the foundation of your journalism, journalism becomes dull.*

Thus, the explicit question about objectivity highlighted not only the journalists' different understanding, but also practice of objectivity. Whereas both journalists acknowledged the *concordant* meaning of objectivity as valuable, the journalists might not have practiced it in their reporting due to the journalists' values and judgements. For instance, the first journalist occasionally judged what statements required experts' legitimisation, whereas the second journalist advocated the need of engagement in journalistic reporting.

By contrast to the interviewed journalists, the three scientists shared understanding of objectivity. Being asked what was required for more objective journalistic reporting of scientific knowledge, the scientists spoke about "*the uncertainty about the issues that are still under*

discussion in science" (Scientist 1), "*more in-depth stories that say how scientists have come to this conclusion, or what scientists have done, and how they have been thinking*" (Scientist 2), and an escape from "*a narrow picture to what we [scientists] do"* (Scientist 3). The issues of applying objective (e.g. reliable) methods, and collecting objective (e.g. consistent) evidence referred to *manipulable* and *convergent* objectivity (Douglas, 2004).

The scientists pointed to the significance of the *manipulable* and *convergent* objectivity not only at the text-production dimension, but also at the text-analysis dimension. Among the sampled articles, the quoted scientists explicitly stated their evidence, and existing uncertainties of scientific knowledge. However, one question remains open, i.e. why the articles did not report on scientific methods applied to establish the quoted scientific claims, or simply, why no critical questions were asked towards scientists' statements. Possible explanations will be discussed in the next section that sums up all the three dimensions, and establishes how the identified discourses influenced, and were influenced by, objectivity.

5.4. How the identified discourses influenced, and were influenced by, objectivity

Based on the findings of three dimensions, this thesis established the mutual relationship between the identified discourses and the chosen non-discursive element of the social practice - objectivity. In other words, the identified discourses influenced, and were influenced by, objectivity.

Two features of the identified discourses excused journalists from applying the norm of objectivity. First, by presenting scientific knowledge as well-established and indisputable, the discourses seemingly exclude the need to hear others' opinions. For example, the discourse 'the Arctic as a cause' presented the causal connection between the melting Arctic and extreme weather conditions in Norway as well-established and indisputable. Such representation of scientific knowledge resulted from certain discursive, and textual features. The discursive feature refers to the limited number of like-minded experts quoted. Even when the quoted scientists pointed to existing scientific disagreements, journalists did not elaborate on such examples. In addition, textual features - choosing sensational headlines, generalising about 'scientists' in plural, and referring to scientists' emotions about the raised issues - added an impression of urgency, and widespread scientific agreement. Whereas these features might suggest journalists' agenda-driven reporting, the interviews hinted that journalists might under-represent the complexity of an issue due to lack of critical questions (according to the interviewed scientists), or time (according to the interviewed journalists). By limiting quoted sources, and excluding their opponents, the discourses compromised on journalistic objectivity understood as balanced reporting.

Besides excluding views of certain sources, the identified discourses neither elaborated on, nor cross-checked the presented explanations due to the second feature - being based on the previously accepted discourse. For example, global warming was used as an explanation, but not questioned within both discourses. Journalists might consider questioning of global warming as redundant, possibly assuming that "*in the Norwegian media climate change, for example, is sort of accepted as something that actually happens*" (Journalist 1). Journalists' judgements pointed to presence of values potentially guiding journalistic practices, and undermining objectivity interpreted as neutral reporting.

Two dimensions within this study, and the reviewed literature on discourses in Norwegian newspapers pointed to journalists' comprising on *concordant* and *value-free* objectivity. Despite finding no studies that simultaneously analyse discourses, and presence of objectivity, some of the reviewed discourse-analysis studies reported similar lack of "critical voices" in Norwegian oil discourses (Jensen, 2007; Jensen & Hønneland, 2011, p. 11), and sensational vocabulary used to construct "environmental 'hysteria'" (Hønneland, 2003, p. 197). Contrary to the latter studies reporting shortage of scientific facts in the 1990s, and anti-oil voices in 2003-2005, the discourse 'the Arctic as a cause' was constructed exclusively with pro-environment scientists' statements. Nevertheless, a discourse shift cannot be argued for, because the analysed articles were sampled purposively with reference to scientists. The observations of compromised *concordant* objectivity also remain puzzling, because the interviewed journalists shared positive attitude towards the ideal of balanced reporting, yet the evidence from textual analysis displayed lack of contrasting views included in the discourses. Fairclough's third dimension - the social practice, particularly, the concept of objectivity - helped explain the findings from the text-analysis, and text-production dimensions in a more informed way.

Certain understanding of objectivity influenced the way Norwegian journalists constructed the discourses. Objectivity traditionally understood as balanced reporting has been criticised, because balance might lead to biased and uncritical reporting. For example, equal space given to defenders, and sceptics of global-warming scenarios might lead to skewed representation of the climate-change debate (Boykoff & Boykoff, 2004). In other words, whereas balance in newspaper articles might present the both parts as equally powerful, the real share of proponents might be larger, and their arguments stronger.

Even though objectivity as balanced reporting has been criticised in the media research (Boykoff & Boykoff, 2004), rarely observed in the Norwegian media (Eide & Ottosen, 1994, Andersen & Hornmoen, 2011; Krøvel, 2012), and not found in this study, the ideal of balanced

reporting is not compromised, but transformed. Similarly to interviews with two journalists in this study, nine Norwegian journalists specialising on climate issues regarded the ideal of balance as important (Ytterstad, 2011). However, journalists might justify the lack of opposing views in one article, based on the emerging meaning of objectivity as "balance *over time*[1]" (Ytterstad, 2011, p. 330). In other words, the interviewed journalists justified their pro-environmental coverage of climate issues with presence of anti-environmental vested interests among Norwegian journalists, and the media. Thus, sampling a wider range of Norwegian newspapers can help to check if objectivity understood as balance is reached across the media.

Lack of convergent objectivity, i.e. no explicit cross-checking, and critical questions towards scientific statements, can be explained with help of text-production routines, and the social practice of objectivity. Being limited by article space, journalists might choose to leave evaluation of experts' claims outside published articles, by presenting their conclusions without giving insights to their background research (Krøvel, 2012). That argument is supported by the interviewed journalists' assertions of contacting many diverse sources, but does not explain lack of critical questions reported by the interviewed scientists. Having adopted campaigning journalism, journalists might skip critical questions, being already convinced by scientific statements (Ytterstad, 2011). Instead, such journalists might quote scientists to confirm on the pre-framed articles, as observed in the discourse "the Arctic as a cause".

By combining Fairclough's three-dimensional framework, and Douglas' conceptualisation of objectivity, this thesis was able to discuss the findings in a more informed way. The text-analysis dimension helped to describe the identified discourses, with their discursive and textual features, whereas analysing text production answered some of the questions, like how the discourses happened to be constructed in a certain way. Checking the presence of objectivity at the textual, and text-production levels enabled a more informed interviewing of scientist-journalist interactions. Analysing understanding and practice of objectivity helped to avoid preliminary conclusions that five out of seven meanings of the operationalised objectivity were absent. Instead, this thesis established (1) certain degrees of *manipulable*, and *interactive* objectivity, because journalists typically look for, and contact diverse sources; (2) both *convergent*, and *concordant* objectivity require more analysis to establish if cross-checking is typically conducted during text-production stage, and if journalists indeed balance the contrasting views over time and across newspapers; (3) a clear presence of values, judgements, and preferences across all stages or journalistic reporting. The

[1] *"balanse over tid"*

findings cannot be generalised due to small purposive sampling, but are largely triangulated across different dimensions within this study, and with the reviewed literature.

6. Conclusion

The main objective of this thesis was to analyse how discourses on the Arctic influenced, and were influenced by, the norm of objectivity. This thesis has argued that the discourses emerging from the sampled articles, and the norm of objectivity have mutually influenced each other. The identified discourses have presented scientific knowledge as well-established and indisputable. Such framing of scientific knowledge allowed *convergent* objectivity to be compromised by not posing critical questions towards the scientific knowledge quoted in the analysed articles. In addition, being based on the previously accepted discourse that global warming is taking place, the discourses involved only supporters of global-warming hypothesis. Excluding opposing views resulted in a compromised *concordant* objectivity.

The concept of objectivity has been argued to influence the ways the discourses were constructed. While the discourses excluded opposing views, the interviewed journalists acknowledged the need to quote the opposing views. That disparity was explained by a changing understanding of objectivity most likely developing among Norwegian journalists. Objectivity is traditionally understood as a balanced representation of proponents and opponents in one article. However, journalists seemed more comfortable with taking a stance, for instance, on climate-change issues, believing that balance would be reached "*over time*" (Ytterstad, 2011, p. 330), due to a broad spectrum of standpoints present in the Norwegian media.

These findings were enabled by combining Fairclough's three-dimensional framework, and Douglas' multilayered understanding of objectivity. Each dimension of Fairclough's framework provided additional explanatory power of the previous dimension. The textual analysis displayed *what features the discourses were characterised with*. Scientific knowledge were presented with simplified explanations, and as indisputable facts giving an impression of a broad scientific agreement, even if a limited number of sources were involved in the discourses. The text-production analysis shed light on *how the discourses were constructed*. Due to limited time, or background knowledge, journalists were unable to pose critical questions to the scientific evidence, and seek other sources for cross-checking evidence. The social-practice dimension suggested *why the discourses had been framed in a specific way*. Even though supporting the idea of balanced reporting, the journalists allowed values to enter the process of text-production while choosing sources, and evaluating their evidence.

Besides, the Critical Discourse Analysis (CDA) contributed to a more informed analysis of the findings. Unlike other discourse approaches that analyse only how discourse influences social practice, CDA regards discourses and social practices as mutually influencing. Such an

understanding encouraged iterative analysis of objectivity at the text-analysis, text-production, and social-practice dimensions. Such an approach also helped to cross-check journalists' attitudes to the norm of objectivity versus application of objectivity in the articles.

Douglas' (2004) conceptual framework provided a broad range of meanings of objectivity required for this explorative study. Exploring how scientists and journalists understood the norm of objectivity, this thesis operationalised Douglas' understanding of objectivity covering all possible meanings, e.g. objective 'reality', methods, and values. The interviewed scientists and journalists valued different meanings of objectivity. The interviewed scientists valued *manipulable*, and *convergent* objectivity referring respectively to reliable methods, and consistent evidence. By contrast, the interviewed journalists supported the idea of *concordant* objectivity understood as presenting opposing views. However, when asked explicitly, the journalists displayed their flexible understanding of objectivity, justifying personal judgement and advocating engagement in journalistic reporting.

The findings of this research suggest to ask the following three aspects in future research. First, further research can focus on how journalists choose their sources. This question is raised by the finding that only proponents of the climate-change hypothesis have been involved in the climate discourses, contrasted to the studies discovering the lack of pro-environmental voices in Norwegian newspapers (e.g. Jensen, 2007; Jensen & Hønneland, 2011). This disparity may suggest that the Norwegian media have shifted their discourses towards pro-environmental ones.

Secondly, journalists' decisions on article scope are worth researching further, induced by the puzzling finding that journalists did not elaborate on existing scientific disagreement, even when quoted scientists emphasised it. Even though this thesis suggested that values might have refrained journalists from elaborating on scientific disagreement, other possible factors might be involved.

Thirdly, the concept of objectivity should be further explored. This thesis has established multi-layered understanding, and flexible application of the concept among Norwegian journalists, similarly to the study of Ytterstad (2011). However, further research can establish if multi-layered and flexible objectivity spread among certain journalists, e.g. those with certain working experience, covering certain topics, or working for certain media types.

The established findings, and answers to the suggested questions matter for a more informed understanding of Arctic discourses. Since Arctic issues, like increased shipping in the Arctic Ocean, and oil drilling, heavily depend on scientific knowledge, journalists cannot avoid interacting with scientists. Knowing how journalists work with scientific sources and evidence can help scientists to express their scientific knowledge in a clearer way. Furthermore, the public depends on fair

representation of complexity inherent to Arctic issues, because the media shape public opinion on diverse issues, especially scientifically complex ones like climate change (Bell, 1994; De Vreese & Boomgaarden, 2006; Delshad & Raymond, 2013). Thus, transferring knowledge about if journalists represent scientific knowledge in a balanced way would prevent the public from being misguided by the media discourses. However, scholars studying Arctic discourses, and the norm of objectivity should not mislead their readers by analysing discourses, and objectivity in isolation. Conducting only textual analysis of discourses does not show *whose* discourse it is, as well as isolated analysis of the concept of objectivity does not display *how* the concept is applied in journalism. With comprehensive analysis of discourses, scientist-journalist interactions, and their values, scholars would gain a further depth.

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Appendix

Appendix 1: Design plan

Sub-RQs	Data needed to answer the RQs	Data collection methods	Sample unit and size
What topics on the Arctic have been constructed by Norwegian journalists with reference to Norwegian scientists from 1 January 2018 to 31 October 2018?	List of the topics	Discourse analysis	26 news articles
What textual, and contextual features dominate in the Arctic discourses among the sampled articles?	Analysis of the present features	Discourse analysis	26 news articles
What meanings of objectivity are present in the sampled articles?	List of present meanings of objectivity, and examples on how these meanings are realised in the articles	Application of the operationalised concept of objectivity	26 news articles
How did journalists choose information sources?	Description of the choice	Semi-structured individual interviews	2 Norwegian journalists
How did journalists evaluate the obtained evidence?	Description of the evaluation process	Semi-structured individual interviews	2 Norwegian journalists
How did journalists decide on the storyline and scope of the article?	Description of the decision	Semi-structured individual interviews	2 Norwegian journalists
How did scientists perceive the representation of scientific knowledge in the article they were quoted in?	Opinions on how objectively articles represent scientific knowledge	Semi-structured individual interviews	3 Norwegian scientists
What views should have been included in the articles scientists have been quoted in, according to scientists' opinion?	List of ideas what scientific knowledge have not been presented in the articles	Semi-structured individual interviews	3 Norwegian scientists
How (and if) did the scientists and journalists practice the concept of 'objectivity' while interacting on the content of a news article on Norwegian Arctic?	Reflection on if, and how, objectivity was guiding the interaction between the two sides involved	Semi-structured individual interviews	3 Norwegian scientists and 2 journalists

Appendix 2: Interview guide

Sub-RQs	Potential interview questions
How did journalists choose information sources?	In this article you wrote, how did you come up with the ideas for the sources to include? While writing this article, have you contacted any other sources that have not been quoted in this article? + Why did you (not) contact other sources? Why did you not quote those sources?
How did journalists evaluate the obtained evidence?	What did you think of the comments/statements/ evidence the scientist presented during your conversation? How did you decide that the evidence suggested by the source is worth publishing?
How did journalists decide on the storyline and scope of the article?	How did you realise that the collected evidence is enough for the article you were writing? How did you decide to conclude the article in that way?
How did scientists perceive the representation of scientific knowledge in the article they were quoted in?	What do you think of the way this article covers the topic?
What views should have been included in the articles scientists have been quoted in, according to scientists' opinion?	In your opinion, what information should have been included to the article to give the audience a more objective representation of the topic?
How (and if) did the scientists and journalists practice the concept of 'objectivity' while interacting on the content of a news article on Norwegian Arctic?	What does it mean for you to be objective?

Appendix 3: Operationalisation of the concept of objectivity

Meanings of objectivity	Operationalisation	What interview question tries to evaluate meanings of objectivity
Manipulable	Methods journalists use to get information on a topic; journalists' self-reported confidence in reliability of a method	How journalists choose sources
Interactive	Combination of sources journalists referred to, in terms of level of expertise, and institutional affiliation	How journalists choose sources
Convergent	Instances journalists have cross-checked evidence; self-reported confidence in obtained evidence	How journalists work with evidence
Concordant	Ways how journalists reconcile opposing views, in case if opposing views are presented in an article	How journalists work with evidence
Detached; Value-free; Value-neutral	Internal retrospection or external examination of an individual's reasoning process (if journalists consider their own underlying values that might guide them to choose particular sources and evidence over alternative ones)	How journalists decided on scope and storyline + the above-mentioned questions as well, since values can enter journalistic reporting at any stage

Appendix 4: An example of changes resulted after interaction between a scientist and a journalist[1]

The first draft written by a journalist after the interview with a scientist	**Changes suggested by the interviewed scientist**	**The published article**
Det vi opplever nå med en tørkesommer som begynte i mai, er i grunnen bare det klimaforskerne har varslet i flere år. Hele planeten blir varmere jevnt og trutt. Vi kommer til å få flere ekstreme perioder med tørke og med stor nedbør, sier direktør Tore Furevik ved Bjerknessenteret i Bergen. Han er også professor innenfor fagfeltet hav og klima ved Universitetet i Bergen. Han henviser til brannene i Hellas og Sverige, ekstreme temperaturer og nedbørsmengder i Japan og tørkesommeren i Skandinavia og England som eksempler på værforhold man vil få mer av i årene som kommer.	Det vi opplever nå med en **ekstrem** tørkesommer som begynte **allerede** i mai, er ~~i grunnen bare~~ **i tråd med** det klimaforskerne har varslet i ~~flere~~ **mange** år. Hele planeten blir ~~varmere jevnt og trutt~~ jevnt og trutt varmere, ~~Vi kommer til å få flere ekstreme perioder med tørke og med stor nedbør~~ **og det gjør seg utslag i stadig mer ekstremt vær, som perioder med varme- og tørke eller perioder med store nedbørsmengder**, sier direktør Tore Furevik ved Bjerknessenteret for **klimaforskning** i Bergen. Han er også professor ~~innenfor fagfeltet hav og klima~~ ved Universitetet i Bergen. Han henviser til brannene i Hellas og Sverige, ekstreme temperaturer og nedbørsmengder i Japan og tørkesommeren i Skandinavia og England som eksempler på værforhold man vil få mer av i årene som kommer.	Det vi opplever nå med en ekstrem tørkesommer som begynte allerede i mai, er i tråd med det klimaforskere har varslet i mange år. Hele planeten blir jevnt og trutt varmere, og det ~~gjør~~ **gir** seg utslag i stadig mer ekstremt vær, som perioder med varme og tørke eller perioder med store nedbørsmengder, sier direktør Tore Furevik ved Bjerknessenteret for klimaforskning i Bergen. ~~Han er også professor ved Universitetet i Bergen.~~ Han henviser til brannene i Hellas og Sverige, ekstreme temperaturer og nedbørsmengder i Japan og tørkesommeren i Skandinavia og England som eksempler på værforhold ~~man~~ **vi** vil få mer av i årene som kommer. **[Deleted the title of the interviewed scientist, and changed the suggested phrase from being impersonal to addressing directly to readers with help of the pronoun "we"]**
– Hvorfor har vi fått en slik tørkesommer som bare blir værende i Norge?	– Hvorfor har vi fått en slik tørkesommer som bare blir værende i Norge?	- Hvorfor har vi fått en slik **langvarig** tørkesommer s~~om bare blir værende i Norge~~?

[1] *From the article "More dry summers in a row can give big problems", or "Flere tørkesomre på rad kan gi store problemer" (A3)*

– Forskerne er uenige i hva som forårsaker dette, men en sterk hypotese er at Arktis er blitt varmere. Som et eksempel har Svalbards temperatur steget med 6 til 8 grader. Dette medfører at Jetstrømmen som frakter luft fra vest til øst blir svakere. Fordi Jetstrømmen er svakere, så oppstår bølger på den. Disse buktningene kan bli til blokkeringer som legger seg som høytrykk eller lavtrykk. Akkurat nå fører en slik bølge på Jetstrømmen til et høytrykk over Skandinavia, og vi får tørke.	– Forskerne er uenige i hva som forårsaker dette, men en sterk hypotese er at ~~Arktis er blitt varmere~~ **det er et resultat av at Arktis er blitt mye varmere som følge av den globale oppvarmingen**. Som et eksempel har Svalbards temperatur steget med 6 til 8 grader. Dette **har medført** at Jetstrømmen som frakter ~~luft~~ **luftmasser** fra vest mot øst **er blitt** svakere, ~~Fordi Jetstrømmen er svakere, så oppstår bølger på den.~~ **og at bølger eller buktninger på jetstrømmen har blitt mer langvarige**. Slike buktningene ~~kan bli til blokkeringer som legger seg som~~ er **det som skaper** høytrykk og lavtrykk, ~~Akkurat nå fører en slik bølge på Jetstrømmen til et høytrykk over Skandinavia, og vi får tørke.~~ **og i år har vi altså hatt en ekstrem situasjon hvor vi har hatt høytrykk over Skandinavia i flere måneder i strekk. Resultatet ser vi i form av høye sommertemperaturer og langvarig tørke.**	- Forskerne er uenige i hva som forårsaker dette, men en sterk hypotese er at det er et resultat av at Arktis er blitt mye varmere som følge av den globale oppvarmingen. Som et eksempel har Svalbards temperatur steget med 6 til 8 grader. Dette har medført at Jetstrømmen som frakter luftmasser fra vest mot øst er blitt svakere, og at bølger eller buktninger på jetstrømmen er blitt mer langvarige. Disse buktningene er det som skaper høytrykk og lavtrykk. ~~og i år har vi altså hatt en ekstrem situasjon hvor vi har hatt høytrykk over Skandinavia i flere måneder i strekk. Resultatet ser vi i form av høye sommertemperaturer og langvarig tørke.~~ **[Deleted a big part of explanation suggested by the scientist]**
– Kan Jetstrømmen bli sterkere igjen?	– Kan Jetstrømmen bli sterkere igjen?	- Kan Jetstrømmen bli sterkere igjen?

– Sannsynligvis ikke, på grunn av den globale oppvarmingen. Så vi må regne med perioder med for eksempel ekstrem tørke. Effekten av langvarig høytrykk er at det blir varmere for hver gang.	– ~~Sannsynligvis ikke, på grunn av den globale oppvarmingen.~~ **Enkelte år vil den være det. Men den sterke oppvarmingen i Arktis fører til at vi kan forvente en ytterligere svekkelse**. Så vi må regne med flere slike perioder med for eksempel ekstrem tørke **som vi ser i år. Eller med store nedbørsmengder som vi hadde i fjor.** En effekt av ~~langvarig høytrykk er at det blir varmere for hver gang~~ **den globale oppvarmingen ser altså ut til å være mer langvarige perioder med høytrykk eller lavtrykk, og dette kommer på toppen av at vi får et varmere klima som følge av den globale oppvarmingen.**	- Enkelte år vil den være det. Men den sterke oppvarmingen i Arktis fører til at vi kan forvente en ytterligere svekkelse. Så vi må regne med flere slike perioder med for eksempel ekstrem tørke som vi ser i år. Eller med store nedbørsmengder som vi hadde i fjor. En effekt av den globale oppvarmingen ser altså ut til å være mer langvarige perioder med høytrykk eller lavtrykk, og dette kommer på toppen av at vi får et varmere klima ~~som følge av den globale oppvarmingen.~~ **[Deleted a small addition suggested by the scientist]**.

Appendix 5: List of all articles with keywords 'Arktis' and 'forsker', in Aftenposten*

	Headline	When	Approved? If not, why?	Link
2018	**Fant spor etter frodig og varmt Svalbard 50 millioner år tilbake i tid**	09.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201801094228527&serviceId=2
	Kunstig lys truer livet i Arktis	01.02	No, written by scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201802014289747&serviceId=2
	Ekstremkulde i Europa og rekordvarme i Arktis forbløffer forskerne	28.02	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201802284361749&serviceId=2
	Under streken, Forskerne leter fortsatt etter svar	09.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201803094384527&serviceId=2
	De trosset Jernteppet for fisken i havet	14.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201803144397836&serviceId=2
	Uærlighet i klima-politikken	09.04	No, reference to Arctic is just to the picture	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201804094461193&serviceId=2
	Uten soppen når ikke skogen toppen	08.05	No, reference to Arctic is just as an example of Arctic plants	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201805084536543&serviceId=2
	Her tygger isbjørnungene på plastsøppel	12.07	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201807124699603&serviceId=2
	Flere tørkesomre på rad kan gi store problemer	26.07	Yes, Arctic is referred to as an explanation of warm summer	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201807264731886&serviceId=2
	Dette tror forskere vil skje når temperaturen stiger	05.08	Yes, Arctic is referred to as an example of what will happen in case of global warming	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201808054755612&serviceId=2
	Disse Svalbard-kartene - bekymrer klimaforskerne	23.08	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201808234805196&serviceId=2
	At Arktis smelter, skyldes ikke bare varmen i luften	03.09	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201809034832728&serviceId=2
	Kina vil bli en arktisk stormakt	07.09	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201809074844571&serviceId=2
	Høyere planter tar over i et varmere Arktis	04.10	No, written by scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201810044919045&serviceId=2
	Al Gore blir hovedtaler på Nobel Peace Price Forum i desember	12.10	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=020002201810124942408&serviceId=2

Appendix 6: List of all articles with keywords 'Arktis' and 'forsker', in Dagbladet*

	Headline	When	Approved? If not, why?	Link
2018	MILJØBEVEGELSEN MÅ VELGE PARTI	10.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05500720180110616ad74634ee50d60ffc1f74fc203d4b&serviceId=2
	DET UKJENTE SPILLET I ARKTIS	13.01	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=05500720180113e713e997b1f0c9884f7ee733b7a7ff0a&serviceId=2
	RETT FRA NETT	05.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05500720180305bb442cc32854ffe82a5cda24ec3f111c&serviceId=2
	Alle vil tjene på en framoverlent klimapolitikk	10.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05500720180310e0a8c0b02a799d569b524d35a9e33e80&serviceId=2
	TJENER MILLIARDER PÅ«DØDENS DAL»	14.04	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055007201804148000fa665f8fad7843db3fbdcbd12cda&serviceId=2
	NORGE BLIR KALDERE	14.04	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=05500720180414dc63ffd7baef65b7691d9012cea0c84e&serviceId=2
	Same shit, new wrapping?	15.05	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055007201805155cc1fbed8a8ec754ea488e706e14454e&serviceId=2
	Brent jord	11.08	No, Arctic is used just as a word, not a context	http://web.retriever-info.com/services/archive/displayDocument?documentId=055007201808118412852557077 62d3aa06f3efcafc8b3&serviceId=2
	Ut av klimadepresjonen	10.10	No, a commentary	http://web.retriever-info.com/services/archive/displayDocument?documentId=05500720181010f1a9951526f732e131903b91418c2cd1&serviceId=2

Appendix 7: List of all articles with keywords 'Arktis' and 'forsker', in Klassekampen*

	Headline	When	Approved? If not, why?	Retrieved from
	I Nansens kjølvann	02.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801024261128serviceId=2
	Utvider Norges grenser	04.01	Yes, new methods to make maps of ice	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801044267038serviceId=2
	Lys skremmer bort fisken	12.01	Yes, how new oil platforms disturb Arctic fish	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801124287488serviceId=2
	Droner lodder havet	17.01	Yes, new methods to measure smh in Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801174300388serviceId=2
	Kamp om kysten	20.01	Yes, Arctic is used here as a context for potential shipping	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801204309498serviceId=2
	Russerne uteble	22.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801224312928serviceId=2
	Problemet øker	24.01	Yes, Arctic is used as a context, to show how wide the problem of plastic is extending to even Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801244318698serviceId=2
	En plan for unge	27.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201801274327868serviceId=2
	For seint å snu	15.02	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201802154377848serviceId=2
	Strid om romfart	22.02	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201802224395588serviceId=2
	Kalde fakta	09.03	No, a commentary	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201803094434648serviceId=2
	Skyfri himmel	13.04	No, a commentary	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201804134525258serviceId=2
	En polar prest	27.04	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201804274563748serviceId=2
	Kostbar smelting	19.05	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201805194619218serviceId=2
	Sedler blir historie	30.05	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201805304642338serviceId=2
	Tilbake til isødet	04.06	Yes, about new techno in Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201806044654038serviceId=2
	En nyskapende forsker	04.06	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201806044652508serviceId=2
2018	**Menneskehetens vugge**	21.06	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201806214700328serviceId=2
	Slår alle tørkerekorder	24.07	Yes, Arctic is used as an explanation	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201807244774058serviceId=2
	Det varme nord	27.07	No, a commentary	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201807274781218serviceId=2

	Gigantene dukker opp	28.07	Yes, Arctic is used as a context or habitat for an animal	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201807284784 52&serviceId=2
	Dette blir normalen	04.08	No, no names of Norwegian scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201808044799 46&serviceId=2
	På vippepunktet	16.08	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201808164827 60&serviceId=2
	Feberdrømmer	31.08	No, a commentary	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201808314865 02&serviceId=2
	Se til Himalaya!	06.09	No, no names of Norwegian scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201809064879 81&serviceId=2
	Klimaflyktning	11.09	Yes, Arctic is used to show context of melting ice affecting white bears	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201809114892 41&serviceId=2
	Undervurderte klimaendringer	24.09	No, no names of Norwegian scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201809244924 50&serviceId=2
	Verdens første dyr?	27.09	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201809274941 12&serviceId=2
	Halvøya faller fra	06.10	No, no names of Norwegian scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201810064966 12&serviceId=2
	Hornsund	06.10	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201810064963 86&serviceId=2
	En halv grad som teller	08.10	Yes, About plants in Arctic and how global warming creates challenges for plants	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201810084969 68&serviceId=2
	Forskere flykter fra havet	12.10	Yes, Arctic is used as a context, for presenting melting ice and how some cities prepare for higher sea level	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201810124979 96&serviceId=2
	Oljeeventyret ender ikke	18.10	Yes, Arctic is used as a context for presenting the topic of changes in oil industry	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201810184995 36&serviceId=2
	Frykter ny kald krig	25.10	Yes, Arctic is used for context	http://web.retriever-info.com/services/archive/displayDocument?documentId=055010201810255013 34&serviceId=2

Appendix 8: List of all articles with keywords 'Arktis' and 'forsker', in Nordlys*

	Headline	When	Approved? If not, why?	Link
	Arctic Frotiers - fordi det faktisk bor folk i Arktis	05.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180105e457c957f378269134b31db59b907284&serviceId=2
	Fiskebein kan gi MILLIARDVERDIER	06.01	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180106 52d3ed2f27fa6abb54b8ba7d43f74b13&serviceId=2
	Klokker, sex og død i Arktis	10.01	Yes, written by scientist	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180110 23d84d3794d06a320f655b5bd95fefde&serviceId=2
	Polhavets hemmeligheter	18.01	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180118bdfbd1bb12153e6e69636fae7b7ced7a&serviceId=2
	Arktis utenfor nordlige breddegrader	19.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180119c3454063c46fd3bb51deece69eb8de6d&serviceId=2
	Nye trusler trer fram	23.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180123 7e94cd65d2ca6cd029075da079f036d0&serviceId=2
	Mohn-prisen 2018: Om hav og is i Arktis	23.01	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180123 65df5e966770c8b797cbe8531817b547&serviceId=2
	Plastposefri by - en god idé	23.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180123a095d1a2fd87fd9c94dbc8ebb56e37db&serviceId=2
	Hvordan binde Arktis tettere sammen?	23.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180123 81247ba9bdd995600c163103b736061f&serviceId=2
	Stephens jobb er å stille makta til veggs mens de er i Tromsø	24.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180124d9badef1568dcd21d385642c5c82f329&serviceId=2
	Ny rapport om oljeboring i nord MOTSTANDEN ØKER	24.01	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180124 1075b97660db8fe69000fe537547239a&serviceId=2
	En perle som setter Tromsø på kartet	26.01	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180126302e2c3ae2617cab77103acda4be3feb&serviceId=2
	Helse Nord og ned	12.02	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180212 4e055106f9e48bf189df4db7246053db&serviceId=2
	Plastprosessoren	17.02	No, a commentary article	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180217 1898d99ef97d8f5f61a6d3783a34b89&serviceId=2
	Disney-land og Gran Canaria, det er hva jeg tror og tenker at dette stedet blir	21.02	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180221bf86247a810f86f755ed5cb20f3fecc5&serviceId=2
	SJOKKBILDENE	22.02	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180222bec78b3404be2870e455a3d11c6fdc40&serviceId=2
	I polardiplomatiets tjeneste	16.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180316 fc5d2ad43735a4e04d20f3fb7fe7e1c&serviceId=2

2018	Havner i en slags gründersituasjon	21.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201803219bcb1e3bd2621ca9935c7807a208fca0&serviceId=2
	Kong Neptun og hans nye tause tjenerskap	23.03	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180323e5b2de2be2820e402406e7f367ddfea5&serviceId=2
	Forskningssamarbeid er viktig utenrikspolitikk	09.05	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180509 67a4e81e41f5426066767 23eaa065073&serviceId=2
	Metanlekkasjer i et varmere Arktis	12.05	Yes, written by scientist	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201805122a2e89aa74d21ef9004014bc735d21da&serviceId=2
	Når kunst møter vitenskap	23.05	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180523083316 72ec5fbbbc74791ef6dfaffffa&serviceId=2
	Kina - stadig viktigere samarbeidspartner i arktisk forskning	24.05	Yes, written by scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201805244 0fa42551a354ff227d3439bf7a5ebde&serviceId=2
	Båten er et råskinn i isen!	02.06	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201806022 0ad0ea6a2396fe0ea4972737e70084a&serviceId=2
	En bjørnetjeneste	02.08	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180802eeecead4610fdebf0728114ba145b804&serviceId=2
	Flytter for karriere eller større bolig	03.08	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201808035d6f5d795810e8b6df2f6b4ea1766530&serviceId=2
	Bjørnetjeneste eller bjørnen en tjeneste?	04.08	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201808048f6bdef88523d07c94b804ec18888af7&serviceId=2
	Skal avdekke hemmeligheter	08.08	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201808 0879bb62faf66c0f63976003c03292f534&serviceId=2
	Havet som nasjonsbygger	24.08	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180824bfe7cfe8266fbeeff2416ce3ce853a82&serviceId=2
	På jakt etter klimaskatter	29.08	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201808298 20da1b1e09ec88add05e41060e82196&serviceId=2
	Fylkesrekorden satt i Skibotn TIDENES VARMEBØLGE i august	06.09	Yes	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201809 06ee5632e8a638610fedd555a43d5c7c89&serviceId=2
	EKSPLOSIVT KONGEBESØK	22.09	No, not about Arctic	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220180922b27101c7dcb3fa5e1b5051e7fb61f15e&serviceId=2
	UiT - 50 år med suksess	22.09	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201809223 8b39d82e1188287 9e57d248736fd7c0&serviceId=2
	Polartorskens usikre oppvekst i fremtidens Arktis	26.09	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201809 2635dd5da109a29519e80ff5e8d1102784&serviceId=2
	Spiller på lag for drivkraft i nord	26.09	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201809 2625044ecc57e5091c221f07d930f47378&serviceId=2
	En statsministers arktiske fascinasjon	02.10	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=05501220181002b133fe84ced4458ced3b56b0ca8cd242&serviceId=2
	Mistet en fjerdedel av inntektene over natta	11.10	No, no names of scientists	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201810118752758c8d99807373046be3d8861084&serviceId=2
	Hvorfor skal vi bry oss om arktiske hav?	29.10	Yes, written by scientist	http://web.retriever-info.com/services/archive/displayDocument?documentId=055012201810291 0e040817ca2394a5477c916e685644e&serviceId=2

Appendix 9: List of the articles sampled and coded for further reference

	Headline	Date	Code
Aftenposten	Ekstremkulde i Europa og rekordvarme i Arktis forbløffer forskerne	28.02	A1
	Her tygger isbjørnungene på plastsøppel	12.07	A2
	Flere tørkesomre på rad kan gi store problemer	26.07	A3
	Dette tror forskere vil skje når temperaturen stiger	05.08	A4
	Disse Svalbard-kartene bekymrer klimaforskerne	23.08	A5
	At Arktis smelter, skyldes ikke bare varmen i luften	03.09	A6
	Kina vil bli en arktisk stormakt	07.09	A7
Dagbladet	Det ukjente spillet i Arktis	13.01	D1
	Norge blir kaldere	14.04	D2
Klassekampen	Utvider Norges grenser	04.01	K1
	Lys skremmer bort fisken	12.01	K2
	Droner lodder havet	17.01	K3
	Kamp om kysten	20.01	K4
	Problemet øker	24.01	K5
	For seint å snu	15.02	K6
	Tilbake til isødet	04.06	K7
	Slår alle tørkerekorder	24.07	K8
	Gigantene dukker opp	28.07	K9
	Klimaflyktning	11.09	K10
	En halv grad som teller	08.10	K11
	Forskere flykter fra havet	12.10	K12
	Oljeeventyret ender ikke	18.10	K13
	Frykter ny kald krig	25.10	K14
Nordlys	Ny rapport om oljeboring i nord: Motstanden øker	24.01	N1
	Sjokkbildene: forskere tror plastforrurensning kan bli et kjempeproblem i framtiden	22.02	N2
	Fylkesrekorden satt i Skibotn Tidenes Varmebølge i august	06.09	N3

Appendix 10: Overview of the findings from the text-analysis dimension

		the Arctic as a cause	the Arctic as a place
Discursive features	**Topics**	Only one topic of climate	Four topics, i.e. climate, fauna, politics, research
	Explanations	Simplified linear causal chain between global warming -> melting Arctic -> four causes	Predominant description of research findings
	Sources	Scientists with natural-science background	Combinations of natural and social scientists
		One or two scientists	
		Top-level positions	
		No sceptics of global warming	One article presenting alternative explanation
		Sources explain and predict	Sources describe and comment
		No other sources quoted	Other sources included
Textual features	**Headlines**	The majority of the sampled articles are written with sensational headlines, across different topics, and discourses	
	Vocabulary	Contrast between emotional words to describe scientists, and scientists' neutral quotes	
		Unclear number of scientists resulted in impression of broad scientific agreement	
	Writing style	Explanations presented just by scientists with direct quotes	More like a narration

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