Climate change frames and frame formation:

An analysis of climate change communication in the Swedish agricultural sector

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Abstract

While previous research into understandings of climate change has usually examined general public perceptions and mainstream media representations, this thesis offers an audience-specific departure point by analysing climate change frames and frame formation in Swedish agriculture. The empirical material consists of Swedish farm magazines' reporting on climate change, as well as eight focus group discussions among Swedish farmers on the topic of climate change and climate change information. The analysis demonstrates that while Swedish farm magazines frame climate change in terms of conflict, scientific uncertainty, and economic burden, farmers in the focus groups tended to concentrate on whether climate change was a natural or human-induced phenomenon, and viewed climate change communication as an issue of credibility. It was found that farm magazines use metaphorical representations of war and games to form the overall frames of climate change. In contrast, the farmers' frames of natural versus human-induced climate change were formed primarily using experience-based and non-experience-based arguments, both supported with analogies, distinctions, keywords, metaphors, and prototypical examples. Furthermore, discussions of what constitutes credible climate information centred on conflict- versus consensus-oriented frames of climate change communication along with different views of the extent to which knowledge of climate change is and should be practically or analytically based. This analysis of climate change communication in the Swedish agricultural sector proposes that the sense-making processes of climate change are complex, involving associative thinking and experience-based knowledge that form interpretations of climate change and climate change information.

Keywords: climate change communication, frame analysis, Swedish agriculture, farm magazines, focus groups

Sammanfattning

Den här avhandlingen studerar uppfattningar om klimatförändringar och bidrar med sin målgruppsorienterade utgångspunkt till tidigare forskning kring hur klimatförändringar kan förstås och uppfattas. Avhandlingen studerar klimatkommunikation inom den svenska lantbrukssektorn genom analyser av 10 års klimatrapportering i tidningarna *ATL* samt *Land Lantbruk*, samt åtta fokusgruppsdiskussioner med svenska lantbrukare. Analysen visar att medan svensk lantbruksmedia ramade in klimatförändringar som en fråga om konflikter, vetenskaplig osäkerhet och ekonomisk börda, rörde lantbrukarnas diskussioner om klimatförändringar (i) dess orsaker; naturliga eller antropogena, (ii) olika faktorer som påverkar huruvida klimatinformation anses trovärdig. Därtill visar avhandlingen att lantbrukstidningar använde krigs- och spelmetaforer för att gestalta klimatförändringar medan lantbrukarna formade klimatinramningar genom analogier, distinktioner, nyckelord, metaforer och prototypiska exempel. Tillsammans med lantbrukarnas upplevda erfarenheter bildade dessa kommunikativa verktyg olika gestaltningar av klimatförändringar. Lantbrukarna visade på olika uppfattningar kring trovärdighet och klimatinformation. Vanligen efterfrågades ett informationslandskap karaktäriserat av en mångfald av perspektiv. Återkommande i materialet var också uppfattningen att kunskap om klimatförändringar borde vara praktiskt baserad snarare än teoretisk hållen för att öka i trovärdighet. Denna avhandling kring klimatkommunikation inom den svenska lantbrukssektorn pekar på komplexiteten i tolkningsprocesser och visar att associativt tänkande och erfarenhetsbaserad kunskap tillsammans utgör grunden för hur klimatförändringar och klimatinformation uppfattas.

Nyckelord: klimatförändringar, kommunikation, frame analys, Svenskt lantbruk, lantbrukstidningar, fokusgrupper

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This has been a remarkable mental journey. Commencing research education is like embarking on a mental journey, but unlike most other journeys I have taken, I didn't know either the distance or the destination when I began. However, I did know that the journey would take about four years, that it would be challenging, and that I would receive generous support and help along the way.

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List of papers

The dissertation is based on the following papers, which will be referred by their roman numerals:

I. Asplund, T., Hjerpe, M., Wibeck, V., 2013. Framings and coverage of climate change in Swedish specialized farming magazines. *Climatic Change* 117 (1–2): 197–209. Published with kind permission of Springer Science + Business Media.

II. Asplund, T., 2011. Metaphors in climate discourse: an analysis of Swedish farm magazines. *Journal of Science Communication* 10 (4) 1–8. Published with kind permission of Journal of Science Communication.

III. Asplund, T. "Do you believe in climate change?" Processes of joint construction of climate perceptions. Submitted manuscript.

IV. Asplund, T., Hjerpe, M., Wibeck, V. Credibility in climate change communication – Swedish farmers' perceptions. Submitted manuscript

Author's contribution

For article I, Therese Asplund performed the analysis. The introductory, background, and discussion sections were collaborative efforts with Dr Mattias Hjerpe and Dr Victoria Wibeck.

For article IV, Therese Asplund performed the literature review forming the basis of the analysis and performed the analysis. The manuscript was finalized by all authors working in collaboration.

Therese Asplund was solely responsible for articles II and III.

Contents

1 Introduction

What is climate change?

The above question may evoke associations to a heating sun, rising temperatures, melting glaciers, polar bears, catastrophic impacts, or questions of responsibility to combat the climate threat. Perhaps one may find rising temperatures pleasant, as they may conjure up images of grapevines growing in the backyard and nearby flowering fields. What this illustrates is that climate change can be described in many different ways and carry quite different meanings. While the understanding of climate change as a physical phenomenon has gradually advanced with the release of reports by the Intergovernmental Panel on Climate Change (IPCC), the scientific body that reviews and assesses information on climate change (IPCC, 1990, 1995, 2001, 2007a, 2013), Hulme (2009) suggests that the idea of climate has probably been changing more than the physical climate itself. Throughout history, he argues, climate change has been a carrier of ideologies, such as racism, mastery of nature, the wildness of nature, and system (in)stability, meaning that how we conceive of climate change says something about other ideas and values that we hold. For example, talking about climate change using the language of causes and solutions suggests an understanding of climate change as a predictable and manageable problem, which entails assumptions as to the relationship between humans and nature and how these two can or should interact.

Climate change has shifted from being regarded as an exclusively physical phenomenon to being a social phenomenon as well, entailing many interpretations and multidimensional frames (Hulme, 2009). While previous research into understandings of climate change has usually examined the general public's perceptions and mainstream media representations, there are now calls for more case-specific and audience-specific research (Moser, 2010) taking account of larger social or cultural groupings (Whitmarsh and Lorenzoni, 2010) in order to gain new insights into the field of climate change communication. This thesis offers such an audience-specific perspective.

1.1 Swedish agriculture: an example of audience-specific research

As previously noted, there is a lack of studies of how climate change is communicated to and among particular audiences[1] and groupings (e.g., the

[1] The literature on the concept of audiences for climate change communication activities suggests that various segments of the public make sense of climate change differently, depending on their interpretative frames (Whitmarsh and Lorenzoni, 2010; Wibeck, 2013). In this thesis, the audience concept is used to pinpoint farmers as a group that potentially frames and communicates climate change differently from other groups, such as the general public. However, this study simultaneously suggests that the categorization of audiences for climate change communication is a complex process, as demonstrated by the multiple ways farmers potentially make sense of

agricultural sector) identified as relevant to societal responses to climate change. At the same time, and perhaps somewhat paradoxically, information is generally regarded as a factor determining the capacity to adapt to and mitigate climate change (IPCC, 2007b). Sweden may serve as an example of an information landscape characterized by frequent reports on human-induced climate change and its effects, both in the national news media (Olausson, 2009) and targeting the agricultural sector through websites and reports from the Swedish Board of Agriculture (SBA, 2013) and various farming organizations, such as the Federation of Swedish Farmers (LRF) (LRF, 2013).

I will study the communication of climate change in the context of Swedish agriculture for two reasons:

First, agriculture is a sector identified as relevant to societal responses to climate change. Globally, agriculture is characterized as sensitive to climate change since climate change will directly influence the quantity and quality of agricultural production and the daily lives of farmers (FAO, 2008; IPCC, 2007b,c). While moderate warming is modelled to benefit crop and pasture yields in some regions, it is likely to decrease yields and livestock productivity in other regions. However, the agricultural sector is not only affected by climate variability and change, but agricultural activities also emit greenhouse gases (GHGs), contributing to global anthropogenic GHG emissions. In a review of GHG emissions from agriculture and food systems, Vermeulen et al. (2012) claim that food systems contribute 19–29% of global anthropogenic GHG emissions. For Swedish agriculture, climate change presents both challenges and opportunities, but a government inquiry has suggested that, from a 25-year perspective, benefits are likely to outweigh negative consequences due to longer growing seasons, higher yields, and opportunities to grow new crops (SBA, 2007; SOU 2007:60). However, higher temperatures and changing precipitation patterns is expected to make drainage and water availability highly challenging and bring increased risks of pest outbreaks. Though information is generally regarded as a factor determining the capacity to adapt to and mitigate climate change (IPCC, 2007b), we lack studies of how climate change is communicated among the particular audience comprising farmers.

Second, due to the agricultural context and agricultural practices, farmers potentially differ from the general public, justifying a particular focus on how farmers make sense of climate change. Farmer's skills and experiences, manifested as a high level of adaptability to climate variation (IPCC, 2007b), may have implications for the communication of climate change to farmers. Moser

climate change and climate change communication (papers III and IV). The thesis contributes to the emerging argument that there are multiple publics, each with a different viewpoint, which challenges the concept of public opinion as consensual, fixed, and measurable (Barnett and Mahony, 2011; Michael, 2009; Mohr et al., 2013).

(2010) argues that, as the daily lives of farmers are largely dependent on weather and climate, in contrast to the general public, which spends relatively little time in nature, farmers are more likely to observe and notice subtle environmental changes. Furthermore, Hansen et al. (2004) hypothesize that farmers may be better able to process probabilistic climate information, but also recognize a potential mismatch in format and substance between farmers' personal experience and analytically based climate forecasts.

1.2 The inevitability of frames and framing processes

Insights into how climate change is framed in various contexts are essential for the study of how climate change is perceived and responded to. Frame analysis is a concept increasingly used in environmental communication in general (Hansen and Doyle, 2011), and in studies of the communicative aspects of climate change in particular (see section 3.4). The framing literature suggests that, to make sense of the world, people think in terms of unconscious structures called frames (Goffman, 1974; Lakoff, 2010). Lakoff (2010) argues that all of our knowledge makes use of frames, and that every word is defined through the frame or frames it activates; accordingly, all thinking and talking involves "framing". Thus, when we talk about climate change, we always frame it in some way, whether or not we are aware of it. Framing can thus be seen as a process in which the substance of the frame is constantly negotiated between various frame articulators or claim makers. For example, if climate change is framed as an environmental problem, rather than as an issue of development or economics, this implies that we will talk about, compare, and understand climate change in relation to how we understand other environmental issues; see, for example, how ozone layer depletion is used in climate change sense-making processes (e.g., Bostrom et al., 1994; Lorenzoni et al., 2006). As climate change is inevitably framed in one way or another, the study of framing is essential in furthering our understanding of how climate change is made sense of and responded to.

Although widely used, the concept of framing has been criticized for its theoretical and methodological imprecision (see, e.g., Entman, 1993, 2007; Scheufele, 1999; Scheufele and Tewksbury, 2007; Weaver, 2007). There is clearly no universal definition of the concept of framing, which is used in different ways in different traditions. Hence, an important part of this thesis is to develop the concept of framing for the specific purposes of this study.

1.3 Aim and research questions

The overall aim of the thesis is to analyse frame formation of climate change in Swedish agriculture. The empirical basis of the thesis consists of specialized media material and focus groups with farmers. Specifically, the thesis addresses the following questions:

1) What frame articulations of climate change are potentially available to farmers and are discussed by them?

2) How are framing devices used to form climate change frames?

3) How is the credibility of the frame articulations of climate change judged?

For the focus group study, I will draw on an approach that emphasizes the dynamic, co-constructive appearance of frames and interactive framing processes (e.g., Benford and Snow, 2000; Dewulf et al., 2009; Gray, 2003; Snow and Benford, 1988) in contrast to dominant views of frames as individual and cognitive structures. My intention is to let the empirical material "respond" to the literature on framing, particularly when studying framing processes in face-to-face interactions. The challenge of including dynamics in analyses of framing processes in face-to-face interactions is addressed throughout the thesis.

1.4 Orientation and organization of thesis

After this introduction to the thesis, the second chapter focuses on previous studies in the field of climate change communication, particularly concerning media representations and public perceptions. Chapter three includes overviews of the literature on frame analysis followed by an overview of the literature using frame analysis in the study of climate change. Chapter four presents the rationale for the methods and materials used in the present study. In chapter five, I synthesize the findings of papers I–IV and discuss these findings in relation to the literature on climate change communication. Chapter six includes reflections on the main contributions of this dissertation. The main contribution of this thesis to the field of media and communication studies is the audience-specific choice of empirical material and the focus on frame formation. The contribution to the field of environmental sciences lies in the problematization of the causal links between information, perception, and behaviour. Recommendations for applied climate change communication in the Swedish agricultural sector concern reflective and conscious communication initiatives. Chapter six concludes by presenting reflections on the applications and potentials of frame analysis.

2 Previous studies of media representations and public perceptions of climate change, and their potential links

This chapter presents an overview of the literature on climate change communication and is intended to contextualize the results of this study. In chapter five, I will discuss the findings of climate change frames and framing processes in the Swedish agricultural sector in light of this literature.

2.1 Media frames of climate change

Media frames of climate change have typically been studied by analysing high-quality newspapers worldwide (e.g., Akerlof et al., 2012; Dotson et al., 2012; Nerlich et al., 2012; Vestergård, 2011; Zamith et al., 2013) and to some extent tabloids (e.g., Kumpu, 2013; Waitt et al., 2012) and on-line sources (e.g., Jančevskaite and Telešiene, 2013; Scharl et al., 2013; Thorsen, 2013). In an analysis of United States (US) media and political debate from the late 1990s and onwards, Nisbet and Scheufele (2009) identified that climate change was framed as an issue of *economic development/competitiveness*, *morality/ethics*, *scientific or technical uncertainty*, *public accountability*, and inter-group *conflict/strategy*; finally, analogies to *Pandora's box* were invoked, highlighting the need for precaution to avoid severe and far-reaching consequences. Previous studies of media coverage and frames (or other theoretical orientations such as media representations) of climate change indicate the prominence of the *Pandora's box*, *scientific (un)certainty*, and *conflict* frames. The *Pandora's box* frame is evident in headlines and coverage articulating fear, misery, and doom (Boykoff, 2008), describing climate change as sensational, alarming (Hibberd and Nguyen, 2013; Russill and Nyssa, 2009), and harmful (Ambler, 2007; Carvalho and Burgess, 2005; Zamith et al., 2013). On the other hand, contradictory to the *Pandora's box* frame, the news media have also depicted climate change as a conflict over the uncertainties of anthropogenic climate change, starting from the assumption that climate scientists disagree about the human contribution to increases in GHG emissions (McIlwaine, 2013). While US news reporting on climate change has portrayed climate change as entailing scientific uncertainty (Akerlof et al., 2012; Freudenburg and Muselli, 2010; Painter and Ashe, 2012), the news media in several European countries, such as Sweden (Olausson, 2009), France (Brossard et al., 2004; Painter and Ashe, 2012), and Germany (Weingart et al., 2000), instead draw on a scientific *certainty* frame, as do the print media in Brazil, China, and India (Painter and Ashe, 2012). In British newspapers, the frames differ between newspapers and over time, even regarding scientific uncertainty (Ambler, 2007; Boykoff, 2007; Carvalho, 2007; Painter and Ashe, 2012). The

conflict frame is not only central to media depictions of the conflicting causes of climate change but also underlies the more or less accepted idea in the common discourse that global climate change produces winners and losers (O'Brien and Leichenko, 2000), as exemplified by Chilean news media articulations of conflicts between business and environmentalists (Dotson et al., 2012) and conflicts in the attribution of mitigation responsibilities by the Australian news media (Waitt et al., 2012).

Moreover, recent studies suggest that media attention to dystopian scenarios, for example, depicting climate change as an impending catastrophe, is declining. Studying longitudinal trends, Young and Dugas (2011) recently found that Canadian media coverage of climate change paid less attention to impacts, instead emphasizing how it intersects with policy and business. Similarly, Lyytimäki (2011) suggests that, after a phase of widespread media coverage, climate issues will shift from being featured in highly visible headlines to constituting less visible, although more pervasive, background information. These findings are supported by Zamith et al. (2013) who, based on a comparative analysis of media coverage in Argentina, Brazil, Colombia, and the USA, found that media in Brazil and the USA highlighted policy progress mainly in economic terms, whereas media in Argentina and Colombia, which devoted less attention to climate change, portrayed the issue as urgent, emphasizing the catastrophic consequences of climate change. The observation regarding the USA is in line with Boykoff's (2012) finding that US media reports in 2010 discussed the economic opportunities presented by climate change.

While existing studies of the media frames of climate change offer insights into the frames of news coverage, they allow for only limited analysis. Zamith et al. (2013, p. 350) argued that future research should seek to employ better-honed tools, such as linguistic repertoires, to gain a more nuanced understanding of media coverage of climate change. Although such research has so far been limited, Howe (2009) has highlighted the range of choices made in communicating climate change, demonstrating how the use of linguistic repertoires differs between various scientific disciplines, leading to different scientific disciplinary perceptions of and responses to climate change. Koteyko et al. (2010) has also paid attention to linguistic repertoires through the identification of new lexical combinations, such as carbon finance, carbon tax, and carbon sinner, in on-line discussions of climate change mitigation. Furthermore, Höijer (2010) has analysed the emotions on which media reporting on climate change draws, demonstrating that representations are attached to emotions of fear, hope, guilt, compassion, and nostalgia.

This overview concludes that mainstream media in Western countries have been generously studied regarding their reporting on climate change, while studies of media in other geographical orientations are rare. The overview further concludes

that in-depth studies, for example, applying a linguistic approach, are rare. Finally, the overview concludes that the specialized media, regardless of their geographic location, are understudied in both respects, i.e., regarding both specialized coverage of climate change and the linguistic repertoires employed. To address these knowledge gaps, paper I of this thesis analyses the specialized media frames of climate change, while paper II takes a more nuanced, in-depth approach to media coverage of climate change by analysing farm magazines' use of metaphors in communications of climate change.

2.2 Public perceptions of climate change

Studies of public perceptions of climate change are typically conducted quantitatively using closed-ended questions in surveys and questionnaires. While this gives the opportunity to generalize to a larger population, the material and datasets of quantitative studies entail limitations when considering respondents' experiences, as the frames of climate change are pre-articulated by the questions posed and response alternatives offered rather than drawn from the respondents' experiences, associations, and thinking. For example, while the BBC (2010), the Pew Research Center (2008, 2012), and Poortinga et al. (2011) probed respondent perceptions of climate science along lines of scientific certainty, the Eurobarometers (2008, 2012) gauged respondents' views of the seriousness of climate change and of associated responsibility and action, thereby articulating the frame of concern. Hence, closed-ended questions may prescribe certain articulated frames of climate change, for example, the *scientific uncertainty*, *climate change as natural or human-induced*, *environmental concern and response*, *social progress*, and *economic development* frames.

The *scientific uncertainty* frame is driven by the thesis that climate science is uncertain as to the causes of climate change. Several studies have asked respondents whether climate change is established (BBC, 2010) or whether there is solid evidence that climate change is occurring due to human activities (Pew Research Center, 2008, 2012). It was found that most UK respondents believed that climate change was happening but diverged in their opinions as to whether it was confirmed to be largely man-made or not yet proven to be largely man-made (BBC, 2010; Shuckburgh et al., 2012). Similar patterns have been found in studies of the US public. Most US respondents think there is solid evidence of higher global temperatures, but studies also demonstrate that the public is divided as to whether scientists agree that climate change is human-induced (Pew Research Center, 2008, 2012). Smith and Leiserowitz (2012) studied members of the US public using an open-ended word-association method based on the question "When you think of 'global warming,' what is the first word or phrase that comes to your mind?" (p. 1024), and found an increase in the proportion of "naysayer" associations, such as conspiracy theories, doubts about the existence of climate

change, media hype, and scientific uncertainty.

Frames of *natural climate change* or *anthropogenic climate change* are also activated, but not in combination with questions of whether or not the scientific foundations are established. For example, among the UK public it is common to claim that climate change is caused partly by natural processes and partly by human activity, while just over a third believe that climate change is mainly or entirely caused by human activity (Poortinga et al., 2011; Shuckburgh et al., 2012). Findings regarding the US public differ on the point. While Leiserowitz et al. (2013) found that a large proportion of the US public is uncertain about the causes of climate change, the Pew Research Center (2012) found that 42% of US respondents believed that the warming is caused mostly by human activity.

A general *frame of concern* dominates the Eurobarometer surveys on climate change (2008, 2012). In 2012, just over half of respondents considered climate change one of the world's most serious problems and 20% felt it was the single most serious problem (Eurobarometer, 2012). Segmenting the US public according to levels of concern, most respondents expressed overall concern about the harmfulness of climate change, even though not all of these believed it to be so harmful as to call for precaution (Leiserowitz et al., 2013). Sixteen per cent of the US public is labelled "alarmist" (Leiserowitz et al., 2013; Pew Research Center, 2008; Semenza et al., 2008), which corresponds to Nisbet and Scheufele's (2009) Pandora's Box frame in which the rhetoric of tragedy, disaster, and catastrophe are constitutive.

Coupled to a frame of concern is a *frame of response*. European respondents see climate change as an issue that calls for responses from various actors, such as governments, industries, and individuals (Eurobarometer, 2008, 2012). European respondents view climate change as a shared responsibility calling for action, activating a *collective action frame* (Eurobarometer, 2008, 2012); in contrast, US respondents view it as a matter of individual sacrifices (Pew Research Center, 2008), activating an *individual action frame.*

In addition to the climate change frame presented above, mitigation of climate change has been framed by both the US and European public in terms of *social progress* and *economic development*. For example, improved health and a better life for children and grandchildren ranked among the top three perceived benefits of climate change mitigation action (Leiserowitz et al., 2013). Climate change mitigation was also seen by some groups as resulting in green jobs and a stronger economy (Leiserowitz et al., 2013). The European public also share the view that responses to climate change can boost the economy and create jobs (Eurobarometer, 2012). Notably, the social progress and economic development frames are activated in response to climate change *mitigation*, particularly in response to the perceived benefits and costs of reducing fossil fuel use, and not climate change per se. In contrast, in an analysis of business magazines, Nerlich

and Koteyko (2010) found that climate change – rather than climate change mitigation per se – was framed in terms of economic development and business opportunities. Economic opportunity frames can be attributed to both climate change and to climate change mitigation.

Qualitative methods are rarely used in studies of public perceptions of climate change, but Wolf and Moser (2011) argue that they are needed in order to understand sense-making processes. In a review of qualitative studies, Wolf and Moser (2011) conclude that: 1) individual understandings of climate change are always contextualized within broader considerations, so information is inevitably filtered through pre-existing worldviews; 2) experiences of climate change shape individuals' views; 3) traditional ways of knowing shape perceptions of climate change; 4) there is a range of views of personal and collective responsibility; and 5) religious beliefs affect perceived agency regarding climate change. To my knowledge, few qualitative studies have analysed understandings of climate change in depth, so we have little insight into the dynamics of how particular ideas are shaped. Nevertheless, there are a few in-depth studies of climate change sense-making processes (Olausson, 2011; Ryghaug et al., 2011; Smith and Joffe, 2012; Wibeck, 2014; Wibeck and Linnér, 2012). These studies suggest that associative thinking guides sense-making processes; in particular, associations with melting polar ice caps, endangered polar bears, floods, and droughts have been identified in focus group discussions involving the Swedish (Wibeck, 2014) and Norwegian (Ryghaug et al., 2011) public. Moreover, Olausson (2011) concludes that Swedish focus group respondents make use of everyday experiences of weather in sense-making processes regarding climate change. Taken together, these studies shed light on the often unconscious processes that underlie intuitive thinking, and strengthen findings that, while scientists learn via abstract and analytical reasoning, laypeople typically draw on associative reasoning and personal experience when learning (Kahneman, 2011; Marx et al., 2007; Weber, 2010; Weiler et al., 2012).

To conclude, this overview suggests that climate change can be described in many different ways and carry quite different meanings. The frames of climate change range from concerning the causes of climate change and scientific (un)certainty, to frames of environmental concern, responses, social progress, and economic development. The overview further concludes that studies of public perceptions of climate change are dominated by quantitative methods and that in-depth qualitative studies are rare. To address this knowledge gap, paper III of this thesis performs a qualitative in-depth study of climate change frames and their formation.

2.3 The relationship between information on and perception of climate change

Whether and how media content shapes audience perceptions are questions that have been discussed extensively, and it has repeatedly been argued that perception entails complex processes in which media information constitutes only one of several sense-making resources (Olausson, 2011). Olausson (2011) argues, however, that research into climate change reporting uses the argument that the media play a central role in shaping citizens' understandings of environmental risks – an assumption that is rarely supported by citing empirical studies of the relationship between media output and audience perceptions.

Studies of the relationship between media coverage of climate change and audience perceptions are few but suggest that the media hinder active public involvement. For example, Hibberd and Nguyen (2013) argue that, due to a lack of positive and relevant messages, UK media messages have tended to hinder UK youths from becoming more actively involved. Similarly, Olausson (2011) found that emotional reporting, the commercial preconditions of the news media, and a lack of continuity and integration were likely to hamper rather than encourage Swedish public engagement in climate change responses. In addition, it has been theoretically suggested (Snow and Benford, 1988) and empirically supported (Wolf and Moser, 2011) that information is always and inevitably filtered through pre-existing worldviews. For example, Ryghaug et al. (2011) found that Norwegians' perceptions of climate change and climate change communication were formed by different interpretations of Norwegian media depictions of climate science. These media depictions treated climate science as uncertain about the causes of climate change, while treating climate change as likely to have catastrophic impacts. It was found that those who believed in human-induced climate change used arguments concerning the seriousness of climate change and more or less dismissed the scientific uncertainty frame, while others used the scientific uncertainty frame to cast doubt on the gravity of the consequences of climate change, and yet others employed the uncertainty frame to reject the idea of climate change altogether. In another study of potential links between climate change frames and audience perceptions among the American public, Jones and Song (2013) found that when respondents were exposed to culturally congruent stories, they were more likely to mirror the story. Furthermore, it has been found that political affiliation plays a significant role in American public responses to climate change messages, resulting in polarization in support for climate mitigation policies (Hart and Nisbet, 2012) and differences in perceptions of news media coverage of climate change and its credibility (Kim, 2011).

Although discussions of the relationship between information, media messages, and perceptions have a long history, the various areas of study are traditionally

kept relatively separate (Hansen, 2011). Consequently, Hansen (2011) advocates reconnecting the three major foci of communication research into media and environmental issues: 1) the production/construction of media messages and public communications; 2) the content/messages of media communication; and 3) the impact of media and public communication on public/political understanding and action with regard to the environment.

The research design of this thesis, which analyses climate change frame formation in two types of empirical material, i.e., specialized farm magazines and focus group discussions with one target audience examining their views of climate change information (paper IV), seeks to advance discussions of the relationship between the media's frames of climate change and the audiences' frames of climate change.

3 Overview of literature on frames and framing

It has been argued that the framing concept lacks theoretical, methodological, and conceptual rigour and several attempts have been made to make it more theoretically coherent (Dewulf et al., 2009; Entman, 1993, 2007; Scheufele, 1999). On the other hand, Reese (2007) argues that the value of frame analysis does not hinge on its potential as a unified research approach; instead, the primary benefit of frame analysis is that it supplies a model that, for reasons of theoretical diversity, has developed a comprehensive understanding of frame processes – if not a consistent terminology. Proposing a unified understanding and use of the framing concept seems impossible and, in any case, is outside the scope of this thesis. In light of Reese's (2007) argument and given the topic of the present research, I find it essential to review the literature on frames and framing processes. The concept of framing is used in various fields of study, such as policy (Rein and Schön, 1991), social movements (Benford and Snow, 2000; Snow and Benford, 1988), and media (Entman, 1993; Gamson and Modigliani, 1987). This section aims to overviews various approaches to frame analysis and positions the present study in relation to them. The second part of the chapter reviews the use of *frames* and *framing* specifically in relation to the issue of climate change.

3.1 Frames and framing

The words *frame* and *framing* have come to be often used, and useful, in everyday academic language. These concepts are generally used from a constructivist perspective to refer to the presentation of an issue from a certain perspective. Surely, the strong metaphor of a picture frame, whose contents appear differently if the frame is reoriented, helps concretize the idea that an issue can be understood in many different ways and from various angles (Kahneman and Tversky, 1979). A frame, however, can be seen as formed by various processes, which suggests that framing is an activity (Benford and Snow, 2000; Dewulf et al., 2009; Snow and Benford, 1988). I use the words *framing* and *frame formation* interchangeably to refer to such processes. Based on my reading, *framing* can be synonymous with assigning meaning and refers to the sense-making processes of understanding an issue, while a *frame* can be seen as an outcome of these processes.

There are theoretically divergent approaches to frames and meaning construction. Several attempts have been made to clarify and categorize these divergent approaches (e.g., Beland Lindahl, 2008; Dewulf et al., 2009; Perri 6, 2005; Raitio, 2008). Referring to their emphases, I refer to these divergent approaches as the policy, media, cognitive, and interactional approaches. Although these approaches have been developed and used by different disciplines in relative isolation, there is a general tension between those who view frames as cognitive structures formed

of individual memory, and those who view frames as social constructions (Raitio, 2008). Different approaches to frames and framing often hold different assumptions as to how to acquire knowledge of frames, so both their research foci and questions differ.

The policy approach covers policy controversies (Rein and Schön, 1991), institutional settings (Bohman, 2010; Perri 6, 2005), natural resource management (Beland Lindahl, 2008), and conflict management (Gray, 2004; Raitio, 2008). The policy approach is not the main approach examined here. Nevertheless, as climate change is a highly political issue, studies of frames in relation to policy are important in order to advance our knowledge of how climate change can be understood from various angles. For example, Rein and Schön (1991) argue that, in policy conflicts, facts, values, theories, and interests are integrated. Frames often result in multiple social realities and, consequently, disputes and "stubborn policy controversies" (p. 262). To resolve such frame conflicts, they argue, policy processes need to be more reflexive by clarifying the criteria employed in assessing the adequacy of a frame. Rather than being seen as two parties engaged in a struggle for control that takes the form of a win or lose game, Rein and Schön (1991) suggest that frame conflict can be seen as members of a cooperative social system facing a problematic situation – initially interpreted in different ways – with shared interests in reframing and resolution. In relation to climate change, studies of climate change in political and sociocultural contexts include frames of climate change adaptation across multiple scales of governance (Juhola et al., 2011), frames of carbon accounting in the academic literature (Ascui and Lovell, 2011), frames of climate change adaptation and mitigation policies in the Congo Basin forest sector (Somorin et al., 2012), frame conflicts regarding the future of the Swedish forest sector (Lindahl and Westholm, 2012), frames of policy conflicts in Europe over bioenergy and forestry (Söderberg and Eckerberg, 2013), and frames of climate change among participants in climate change negotiations (Hjerpe and Buhr, 2014).

In the present research, in which climate change communication is central, I draw on analytical concepts from two approaches. To examine what frame articulations of climate change are potentially available to farmers, I found the media approach well suited, whereas to examine how climate change is communicated *among* farmers, I chose a dynamic approach to frames and framing – the interactional approach. These two approaches will be presented and discussed in the following sections.

3.2 Media frame analysis

In media studies, the concept of framing has come to position journalism and news production as aligned with constructivism: "the act of making news is the act of constructing reality itself rather than a picture of reality" (Tuchman, 1978,

p. 12). Studies of media frames therefore point out the active role of media in news construction. Shoemaker and Reese (1996) also established that media do not mirror reality but rather that media content is produced and shaped by a number of forces, including but not limited to media workers' socialization and attitudes, media routines, social institutions and forces, and ideological positions. The media approach to frame analysis portrays media as active constructors who use frames as tools in the communication processes. According to Entman (1993, p. 52), journalistic practice involves making ideas more salient in a communicating text, "in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described". Media texts therefore indicate the advocacy of certain ideas and provide signs to encourage certain kinds of interpretations among the audiences of the text (Pan and Kosicki, 1993).

Gamson and Modigliani (1987, p. 143) defined a media frame as "a central organising idea or story line that provides meaning to an unfolding strip of events, weaving a connection among them. The frame suggests what the controversy is about, the essence of the issue". Olausson (2009) argues that a frame is characterized by its implicitness rather than its direct articulation, and she suggests that, to grasp the totality of a frame, the analysis should not be reduced to the analysis of mere topics or themes but should increase in abstraction to include analytical devices able to excavate meaning-bearing elements. From the perspective of media studies, in which framing essentially involves selecting certain aspects of a perceived reality, Gamson (1992) argues that, while each issue has a set of ideas and symbols used to construct meaning about it, journalists contribute their own frames and invent their own catch-phrases and metaphors (Gamson, 1992). Other examples of such meaning-bearing analytical framing devices that help construct frames are the presence of certain keywords as well as stereotyped images and sentences (Entman, 1993).

The media approach to frame analysis was applied in examining how climate change is communicated to farmers, whereas the interactional approach was applied in the analysis of how climate change is communicated among farmers. The next section presents, discusses, and develops frame analytical thinking regarding meaning construction in interactional processes.

3.3 Interactional frame analysis

This section starts with a short presentation on influential theorists of the interactional approach to frame research. I will then review key concepts in the field of social movement studies that I find relevant to the study of how climate change is communicated among farmers, in particular, diagnostic, prognostic, and motivational framing. Thereafter, I will address questions of the perceived credibility of particular frames, and finally will reflect on the challenges of frame

analysis, including calls for a greater focus on the micro-level formation of frames.

Interactional frame analysis holds that people are conversationalists who interact in varying constellations while co-constructing the meaning of their world (Dewulf et al., 2009). In the interactional approach, the concept of framing is often attributed to Goffman's work, particularly to the book *Frame Analysis: An Essay on the Organization of Experience* (Goffman, 1974). Goffman assumed that individuals constantly struggle to make sense of the world around them. To classify and interpret interactions meaningfully, Goffman (1974, p. 21) argues, individuals apply interpretative schemas or "frameworks". The main focus of Goffman's frame analysis concerns activities that resemble other activities, such as fighting and play. Central to such frame analysis is the set of conventions that inform individuals of what is going on. In contemporary research, however, the use of *frames* or *framing* has come to be synonymous with understanding an issue from a certain perspective rather than – in Goffman's (1974) sense – an analysis of how various activities resemble other activities. When it comes to framing an issue, such as climate change, rather than an activity, frame analysis turns in a slightly different direction. The empirical focus shifts from the non-verbal to the verbal, from what is done to what is said, from the analysis of activities to the analysis of written or oral statements communicated face-to-face or mediated through various channels. Even though the empirical focus in contemporary frame analysis differs from Goffman's, the basic assumption remains the same, namely, that individuals, to interpret information meaningfully, apply often unconscious structures that guide their sense-making processes (Goffman, 1974).

Interactional frame analysis has been applied to and further developed in social movement studies (Benford and Snow, 2000; Snow et al., 1986; Snow and Benford, 1988) and in the conflict management literature (Dewulf et al., 2004, 2009; Gray, 2003). In these fields, frames and framing are understood not only as the interpretation of an issue but also as an active process through which individuals and collective actors arrange and make sense of events, often in order to mobilize for political action (Snow et al., 1986) or to find common ground in collaborative partnerships (Gray, 2004). As Dewulf et al. (2009, p. 160) put it: "Within this approach the term framing may be more appropriate [than frame], since it captures the dynamic processes of negotiators' or disputants' interactions".

3.3.1 Frame analysis through the lens of dialogism

When human sense-making is at the core of the frame analysis, two divergent approaches can be applied – the cognitive and the interactional. While the cognitive approach views people as information processers who use frames as heuristic devices in gathering and processing information, the interactional

approach portrays people as conversationalists who interact while co-constructing the meanings of their worlds (for an overview, see Dewulf et al., 2009). The present study of how climate change is communicated among farmers draws on interactional framing theory but, to better understand the departure points of that approach, I will briefly contrast it to the cognitive approach.

In the cognitive frame approach, frames are understood as cognitive representations held in the individual mind (Dewulf et al., 2009). Cognitive frames are seen as memory structures that help to organize and interpret incoming information; accordingly, meaning is located in the individual mind and ultimately depends on private understanding. In this approach, frames are considered relatively static entities that extend indefinitely in time. The cognitive-representational approach to framing focuses on how people experience, interpret, or represent issues. From this perspective, communication is seen as the transmission of messages (cf. Fiske, 1990). Transmission models of communication posit a linear process with the source, channel, and receiver being the basic components of communication. In such models, it is argued that, to understand the process of communication, we need to consider *who* says *what* in *which channel* to *whom* and with *what effect* (Lasswell, 1948). Consequently, transmission models may answer questions regarding the effectiveness of channels, how to improve the accuracy of decoding, and the efficiency of the process. In this approach, frames are viewed as biased representations of the external world (Dewulf et al., 2009).

By contrast, in an interactional approach to frame analysis, the assumptions differ from those of the cognitive approach. Treating frames as interactional co-constructions implies a shift in focus to dynamic processes. From an interactional viewpoint, frames are formed during ongoing processes of interaction (Dewulf et al., 2009). Meaning is therefore located between people in interaction and ultimately depends on the reactions of others. The interactional–constructionist stance on framing refers to communication as the *production and exchange of meaning* (cf. Fiske, 1990). Rather than using terms such as efficiency, this approach is concerned with how messages and people interact to produce meanings (Fiske,1990). In the interactional approach, frames are seen as perspective-based co-constructions of the meaning of the external world (Dewulf et al., 2009). Research applying the interactional approach focuses mostly on interaction processes. I argue that the analytical potential of interactional frame analysis could and should be explored not only to understand frames as static "picture frames" that can be repositioned in order to present different realities, as the metaphor implies, but also as dynamic, always in formation, debated, and negotiated.

To explore the interactional dimensions of frame formation in face-to-face

conversations, this thesis is specifically inspired by dialogism.[2] The theoretical tradition of dialogism, usually associated with Mikhail Bakhtin, refers to human sense-making and is a meta-theoretical framework for how we as human beings acquire knowledge about the world and ascribe meaning to the world (Linell, 2009). A basic assumption in dialogical theory is that meaning is created when we interact with others and the world. Hence, a dialogical approach to frame analysis implies that sense-making processes are dynamic. Such an approach can be seen as an alternative to cognitive theories based exclusively on the individual. In general, dialogists avoid talking about mental processes as internal to people's minds: they believe that no human beings are autonomous, but are strongly interdependent with others. Dialogism emphasizes that humans live in a world populated by others and that their existence, thought, and language are thoroughly interdependent with the existence, thought, and language of others (Marková et al., 2007). Consequently, a dialogical approach to frame analysis stresses the interdependency of others in interactional sense-making. However, dialogue is not a concept that applies exclusively to interaction between two or several individuals in face-to-face contexts, but equally applies, in a more figurative sense, to interaction between *arguments rather than people* (Marková et al., 2007; Wibeck, 2002). A dialogue between arguments rather than people concentrates on how content is expressed and how participants in a conversation generate and circulate arguments and understandings. In the present research, dialogue therefore refers to the frame articulators' or – in Marková et al.'s (2007) terms – interlocutors' face-to-face interactions with a focus on how understandings of climate change are negotiated through conversations. Drawing on dialogical theories of sense-making, frames can be seen as a result of interactional sense-making processes. Frames can also be seen as dynamic and always in circulation, exemplified by how frames build on or resist one another (i.e., Marková et al., 2007).

3.3.2 Diagnostic, prognostic, and motivational framing

Goffman (1974) argues that a frame allows its user to locate, perceive, identify, and label events so as to guide actions or, in the words of Entman (1993, p. 52), "to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation". In this sense, the framing concept links sense-making and action, suggesting that how we talk about an issue focuses our attention on certain elements, defines what is problematic, and suggests courses of action appropriate to it. This is disputed by Snow and Benford (1988), who claim that agreement about the causes of and solutions to a particular problem does not automatically generate action, so the rationales for action go

[2] Dialogism is also applicable to written messages (Marková et al., 2007); however, the present research focuses on communication about climate change in face-to-face interactions.

beyond problem definitions and solutions to concern issues of motivation. This means that the same course of action may not be associated with just one frame but may be consistent with several quite different frames (as also proposed by Rein and Schön, 1991) - for example, when climate change mitigation is motivated by a frame of economic opportunity rather than for reasons of environmental responsibility (paper I). The corollary is that the same frame can lead to different courses of action, for example, when people agree on the anthropogenic nature of climate change but nevertheless disagree about proper mitigation and/or adaptation strategies. To conclude, with this understanding, a frame does not determine a particular position on an issue, and many positions may be consistent with a given frame. Based on the relationship between frames and behaviour, Snow and Benford (1988) suggest three core framing tasks: diagnostic framing, prognostic framing, and motivational framing:

1) *Diagnostic framing* primarily concerns the diagnosis of an event or aspect of social life as problematic and needing alteration and further includes attribution of blame for or causality of the problem. Generally, consensus with respect to problem identification is more frequently realized and less problematic than is attributional consensus.

2) *Prognostic framing* primarily concerns the solution of the problem, i.e., specifying remedies and identifying strategies, tactics, and targets.

3) *Motivational framing* primarily concerns rationales for engaging in action, serving as a "call to arms". Agreement about the diagnosis and the prognosis of a particular problem does not automatically produce a motive for engaging in action. Action is thus contingent on the development of motivational frames that function as spurs to action.

The functions of diagnostic, prognostic, and motivational framing are central to understanding the multi-dimensional frames of climate change and the many possible ways to approach climate change. Following Snow and Benford (1988), I believe that frames are related to action but not in a linear fashion, so "dilemmas" may occur in terms of the relationship between frames and action. Dilemmas often occur when frames focus solely on negative consequences (Snow and Benford, 1988), such as when climate change is framed hopelessly in doomsday scenarios, giving rise to a sense of fatalism and powerlessness (Hulme, 2009; O'Neill and Nicholson-Cole, 2009). Dilemmas may also occur when attention is focused on the problem diagnosis to the extent that prognostic considerations are neglected, with the consequence that guidelines for action are unclear (Snow and Benford, 1988). A third type of dilemma occurs when both the diagnosis and

prognosis are framed in such a way that public debate and participation is undermined, for example, when problems are framed largely in technological terms, defining them as matters for experts. While the literature on climate change communication is often directed towards such dilemmas and, more specifically, towards the role of climate change communication in increasing engagement and behaviour change (e.g., Moser, 2010; Moser and Dilling, 2007; Nerlich et al., 2010; Whitmarsh and Lorenzoni, 2010), the present research does not intend to give advice on how such framing dilemmas can be overcome, but rather analyses the frames of climate change and how these are shaped, thereby illuminating *why* frame dilemmas may occur. From that starting point, I use the concepts of diagnostic, prognostic, and motivational framing to analyse the production and exchange of meaning (Fiske, 1990) among Swedish farmers (paper III).

3.3.3 Frame credibility

As argued above, any issue, including climate change, can potentially be interpreted in terms of multiple frames. Schön and Rein (1994) argue that, even so, not all frames are perceived as equally acceptable or valid, and that we generally seem to have implicit standards by which we judge the adequacy of various frames. Benford and Snow (2000) have suggested, for example, that whether a frame resonates with a particular audience is due partly to its perceived credibility. They argue that frame credibility is a function of three factors: *frame consistency*, *empirical credibility*, and the *credibility of the frame articulators* (Benford and Snow, 2000). *Frame consistency* refers to the correspondence between articulated beliefs, claims, and actions. This congruence may lead to inconsistency if there are contradictions among beliefs or claims or if there are contradictions between frames and actions. *Empirical credibility* refers to the perceived "fit" between frames and events in the world and concerns questions such as "Can the claims be empirically verified?" or "Is there something that can be pointed to as evidence of the claims embedded in the framing?" (Benford and Snow, 2000, p. 620). The empirical credibility of a framing thus concerns "evidence" substantiating diagnostic, prognostic, or motivational claims and raises the question as to what determines whether one set of claims is deemed more credible than another (Snow and Benford, 1988). The third factor informing judgements of frame credibility concerns the perceived *credibility of the frame articulators*. Benford and Snow (2000) hypothesize that frame credibility increases with greater perceived expertise of the frame articulator from the vantage point of the audience.

As noted above, in social movement studies, questions about frame formation and dynamics concern the perceived credibility of frames from the audience point of view (Benford and Snow, 2000). The analytical concept of frame credibility was central to the analysis of farmers' discussions of climate change information

(paper IV) and was a key to understanding why the farmers embraced or rejected particular frames. Hypothetically, if a frame is consistent and associated evidence claims and their articulators are deemed credible, the frame will harmonize with how an issue has been experienced, resonating with the audiences' cultural narratives, and the frame is likely to have a strong appeal.

In conclusion, based on my reading of the literature on frames and framing, I will in this dissertation, define frames as central organizing ideas (Gamson and Modigliani, 1987), what also can be called underlying assumptions that guide sense-making processes (Marková et al., 2007). In my view, frames are often not verbalized and only implicitly present. However, in interactional processes, frames can be explicitly formulated and negotiated, especially when there are tensions and conflicts between divergent views (i.e., Marková et al., 2007). I see frames as being formed by various framing devices, such as keywords, metaphors, prototypical examples, analogies, and distinctions, as a means to understand an issue, for example, climate change. Furthermore, I see frames, as wholes, as constantly in formation through dialogical processes, although they echo more stable and deep-seated underlying assumptions (see section 4.1.2).

3.4 Frames and climate change: challenges and calls for further research

Frames and framing are two increasingly used concepts in studies of climate change (see Figure 1. I conducted two systematic reviews, one to survey the literature on frames and climate change in broader terms and one in-depth review of publications using the term "frame analysis" or the like. In reviewing the framing literature concerning climate change, I identified two tendencies:

- a lack of theoretical conceptualization of "frame"
- attention to *frames* over *framing*, i.e., to content rather than process

The first review of the framing literature[3] in relation to climate change identified approximately 800 articles (see Figure 1). The review was designed to identify research articles containing the word "frame" or "framing" and "climate change".

[3] For information on search terms, see Appendix A.

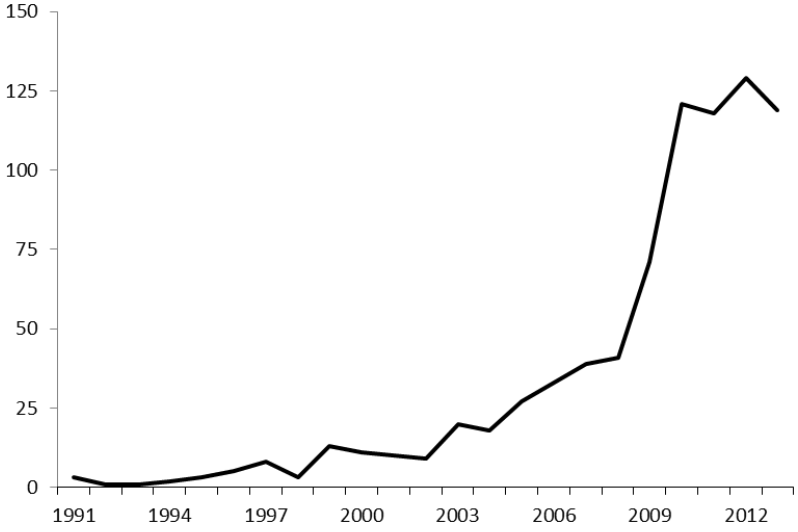

Figure 1. Number of publications per year on frames/framing and climate change.

Over a 17-year period, between 1991 and 2008, the number of publications treating frames/framing in relation to climate change increased slowly from a few articles per year in 1994 to around 40 per year in 2007. In 2009, that number almost doubled to 71 articles, which again almost doubled in the following year, to 121 in 2010. Since 2010, the number of articles has remained at around 120 per year. Through scanning 100 abstracts (31 abstracts from the 1991–2008 period and 69 from the 2009–2013 period identified through random sampling), I identified two main categories of articles: 1) those using "frame" in passing and 2) those using "frame" as an analytical concept. Although the authors use "frame" (or similar terms, such as "framing" or "framed") in the abstract, title, or keywords, the concept is not necessarily used as part of an analytical framework. Of one hundred abstracts, 67 used "frame" or variations thereof more or less in passing and with little attention to its meaning, as there were few or no indications of an interpretation of the terms in light of the literature on framing (e.g., in combination with *analysis*, *theory*, or key concepts such as *resonance* and *conflict*, or set in relation to climate change frames identified in other studies). I often found "frame" and "framing" to be treated in the various sentences of which they were part, as synonymous with words such as "see/n", "argue/d", "suggest/ed", "understand/ood", and "perceive/d". Many articles that contained the words "frame" and "climate change" seem to lack a theoretical conceptualization of frame, so it is used in very general terms to refer to a way of seeing the world, with little clarification as to its meaning, applicability, etc. This

suggests that the climate change literature in general is similar to the literature on other topics, supporting the observations of Scheufele (1999, p. 103), i.e., "research on framing is characterized by theoretical and empirical vagueness", and other reviewers (Entman, 1993, 2007; Scheufele and Tewksbury, 2007; Weaver, 2007).

Even so, I classified 18 of the one hundred articles as frame analyses of climate change.[4] This indicates that there is, indeed, a growing body of climate change literature using frame and framing in an analytical sense. To review how these articles use the frame and framing concepts, I performed a second round of keyword searches in Scopus (see Figure 2). I used various wordings of "frame analysis" and "climate change"[5] and retrieved 31 articles.

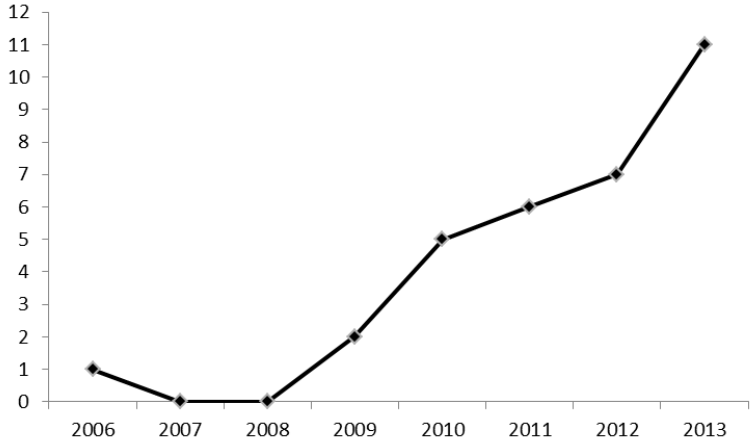

Figure 2. Number of publications per year on frame analysis and climate change.

To expose the analytical aspects of the articles concerning frame analysis and climate change, the following four questions guided my review:

- Is frame analysis theoretically conceptualized?
- What sources on frame analysis are used?
- What type of empirical material is studied?

[4] Furthermore, several articles also refer to "framework", although this understanding was expected to be excluded by the criteria used for the Scopus search. "Frame" was also treated as synonymous with "framework", i.e., analytical frame, in some articles. About 10% of the articles did not use the word "frame" or "framing" in their abstracts.

[5] For information on the search terms, see Appendix A.

- Is there a description of the analytical procedure?

From this review I concluded that, while some articles lack a theoretical conceptualization of *frame*, most of them present a theoretical departure point for frame analysis (e.g., Dirikx and Gelders, 2010; Koteyko et al., 2010; Lindahl and Westholm, 2012; O'Neill, 2013; Prior, 2013; Somorin et al., 2012; Söderberg and Eckerberg, 2013). Analytically, most articles draw on either Schön and Rein's (1994) or Entman's (1993) usage of the concept of framing, which implies the dominance of the policy and media approaches to climate change frame analysis (see section 3.1). Notably, these two sources are never combined, which again suggests that the concepts are often tightly linked to a particular field of study. Studies of climate policy concern either how climate policy, or its representatives, frame climate-related issues such as bioenergy (Söderberg and Eckerberg, 2013), or how key actors frame mitigation and adaptation policies (Juhola et al., 2011; Somorin et al., 2012). Media studies typically analyse how newspapers frame climate change (Dirikx and Gelders, 2010; Horsbøl, 2013; Mercado, 2012; O'Neill, 2013; Roosvall and Tegelberg, 2013; Semujju, 2013), while ignoring how audiences frame media messages on climate change.

The empirical material ranges from technical reports, policy documents, and official statements to newspapers and websites, and the methods include experiments on message framing as well as interviews and participant observations. The analytical techniques or the procedures for identifying (or analytically constructing) frames were sometimes excluded from descriptions of empirical material and methods, while other articles mentioned them only in passing or elaborated on them more thoroughly (e.g., Hart, 2011; Koteyko et al., 2010; Mercado, 2012; Olausson, 2009; O'Neill, 2013; Porter and Hulme, 2013; Schlichting, 2013; Tutt, 2009; White, 2013). Based on the literature review, I conclude that there is a tendency to omit information on analytical procedures, which might result in a methodological "black box" and raise questions of how knowledge of frames can be acquired. Finally, the general tendency to study written materials raises methodological questions regarding how frames other than those conveyed in writing can be studied.

Generally, I found that the reviewed publications focused on *frame/s* rather than *framing*, i.e., the processes whereby frames are formed. For example, we learn about frames of climate change articulated by media or climate policy actors, but learn little of the media production of frames (or frame building, see de Vreese, 2005) or the formation of frames in policy contexts (except for controversies between fairly settled frames). In the few cases in which framing processes are explicitly acknowledged, typically in theory sections, framing processes often seem to be taken as starting points, but seldom analysed in combination with the study of frames as such. Due to the general focus on content rather than on how

content is shaped, many scholars, at least implicitly, treat frames as fairly settled entities – a view that has been criticized by Snow and Benford (1988, p. 204): "To focus only on the substantive content … runs the risk of creating a picture of frame alignment as an overly mechanistic, nondialectical process whereby mobilizing ideas are poured into or diffused among a passive, nonsuspecting population". Although the reviewed literature on the frame analysis of climate change generally focused on frames, a few studies discussed framing as dynamic processes. I found two main ways of conceptualizing framing processes: as sense-making processes or as policy processes:

- dynamic processes as sense-making processes including the use of rhetoric and style (Olausson, 2009; Tutt, 2009), framing devices (e.g., wording, examples, and catchphrases) (Koteyko et al., 2010; Schlichting, 2013), and images (O'Neill, 2013)

- dynamic processes as the policy processes of institutionalization (Juhola et al., 2011) and of conflicting frames (Ascui and Lovell, 2011; Lindahl and Westholm, 2012; Prior, 2013; Somorin et al., 2012)

Framing processes can come to mean different things reflecting the dynamics of different contexts and levels. When I speak of framing, I am referring to the use of various framing devices, for example, metaphors, analogies, distinctions, and (proto)typical examples, used in constructing a frame, thereby answering questions regarding frame formation in a more linguistic sense. The literature review in combination with frame analytical interpretations of focus group conversations raised the following question: If framing is a dynamic and dialectical process, how can it be studied, using what methods, analytical perspectives, and tools?

From this overview of how frames and framing are understood in various fields of research, I will proceed by presenting the methods used in studying climate change frames and frame formation in this thesis, as well as the empirical material for the thesis.

4 Methods and materials

This chapter will introduce 1) the methods used to analyse how climate change is framed in the Swedish agricultural sector and 2) the material used for this analysis. When I started to analyse how climate change is framed in the Swedish agricultural sector, I applied the basics of Entman's (1993) model of frame analysis to the empirical material comprising specialized media (see section 4.1). For the more qualitatively oriented analyses of group discussions, no such analytical framework template was available. Therefore, I strove to develop, if not a coherent framework for the frame analysis of qualitative data, at least an approach to analysing frames and the formation of frames in conversations such as group discussions. The analytical approaches to frame and frame formation in both materials are discussed below, followed by a discussion of the empirical material.

4.1 Analytical approaches

Based on my reading of the literature on frame analysis of climate change, I conclude that little guidance is available on methods for analysing frames (also recognized by Olausson, 2009). Entman's (1993) description of frames as being "manifested by the presence or absence of certain keywords, stock phrases, stereotyped images, sources of information, and sentences that provide thematically reinforcing clusters of factor judgments" (p. 52) may serve to operationalize frame analysis, by highlighting framing devices that serve as tools for composing and constructing frames (Pan and Kosicki, 1993). Other framing devices include new lexical combinations of, for example, carbon and other words such as budget, footprint, or morality (Koteyko et al., 2010), or communicative resources such as analogies, distinctions, metaphors, and prototypical examples (Marková et al., 2007). Framing devices are here seen as communicative tools that frame articulators such as specialized media and participants in group discussions use in communicating about climate change. Of particular analytical interest is how framing devices serve as tools for forming frames. The analytical focus of frames and framing devices varies throughout the articles that comprise this thesis (see Table 1).

Table 1. Analytical departure points per article.

Paper	Frames	Framing device(s)	Content	Material
I. Framings and coverage of climate change in Swedish specialized farming magazines	Frames, deductively derived from Nisbet and Scheufele (1999)	---	Content analysis	Farm magazines
II. Metaphors in climate discourse: an analysis of Swedish farm magazines	---	Metaphors, inductively derived	---	Farm magazines
III. "Do you believe in climate change?" Processes of joint construction of climate perceptions	Frames, inductively derived	Keywords, metaphors, prototypical examples, analogies, and distinctions	Thematic content analysis	Focus groups
IV. Credibility in climate change communication – Swedish farmers' perceptions	Frame credibility, inductively derived	---	Thematic content analysis	Focus groups

A content analysis gives an overview of what is explicitly being talked about or reported, while an analysis of framing devices highlights the process of framing and the construction of frames. Here frames are seen as implicit organizing ideas (Gamson and Modigliani, 1987). I recognize that (thematic) content analysis is essential in order to specify *what* the organizing ideas or assumptions refer to. Accordingly, I started the analytical process by conducting a content analysis of the empirical materials, followed by an analysis of how the dominant themes have been framed. This included how the themes of the agricultural contribution to GHG emissions, climate change impacts on Swedish agriculture, and climate policies are framed in specialized magazine coverage of climate change (paper I)

and how the central themes of the existence of climate change and climate change information were framed in the focus group discussions (papers III and IV). In addition, I have analysed what framing devices were used to form these frames (papers II and III).

4.1.1 Specialized media material

Three different analytical perspectives have been applied to the specialized media material, i.e., the theme, frame, and metaphor analytical perspectives. The thematic analysis was driven by curiosity about what aspects of climate change Swedish farm magazines chose to report on between 2000 and 2009, while the frame analysis focuses on the central organizing ideas that can be seen underlying a particular theme (paper I), and the metaphor analysis is oriented towards what aspects of climate change are covered, and potentially not covered, by the magazines (paper II).

4.1.1.1 Content analysis

In the content analysis, themes were identified in order to study what aspects of climate change were covered (paper I). I started the process by identifying the theme of an article by initially asking the question "What is this article about?" (Hellspong and Ledin, 1997, p. 118). This approach allowed very rapid content categorization, based on the title and first paragraph of the article. In the second step, I read through the article and identified topics relating to the identified theme. The criterion for a change from one topic to another was either a sudden and distinct shift to another subject or a transition to another focus. The changes of topic were sometimes aligned with the text's headline and first paragraph categorization, but not always. After identifying all the topics in the text, I reconsidered the theme of the text and finally chose the one theme that best represented the article as a whole. What I defined as the theme was the general subject of the article, the unifying theme running through the text. In this first step, I strove for an analysis that was close to the "raw material" and, as such, the themes reflect what is explicitly presented in the text. The intention was to identify themes in such a way that it is possible to understand the content of the article without having read it. As a result, I finally renamed some themes to a more detailed-levelled wording as well as categorized what was expressed using different wording but referred to the same issues (e.g., "safety net" or "funds for catastrophe") as one theme (e.g., crop insurance).

4.1.1.2 Frame analysis

In order to map not only the explicit content, but also implicit understandings of climate change, I analysed the farm magazines' use of climate change frames (paper I). I used a typology of climate change frames (Nisbet and Scheufele,

2009) as a starting point for the analysis (see section 2.1).

The frame analysis was conducted in relation to the themes identified. I analysed each theme more closely with a focus on the "central organizing ideas" (Gamson and Modigliani, 1987, p. 143) of each theme identified. The frames were identified primarily by noting the use of keywords that indicate a particular frame, such as the economy or conflict. Based on commonly used keywords, I also identified climate change frames that were not in the typology suggested by Nisbet and Scheufele (2009).

4.1.1.3 Metaphor analysis

By letting us experience one thing in terms of another, metaphors are said to structure how we perceive, think, and act and to help us understand unfamiliar abstract phenomena (Lakoff and Johnson, 1980). A metaphor substitutes one concept for another, linking the source and target conceptual domains (Katz and Taylor, 2008; Lakoff, 1993).

The analysis of metaphorical representations focused on identifying the metaphorical representations (i.e., the source domain/s) used to make sense of climate change (i.e., the target domain). Furthermore, as metaphorical structuring is partial (Lakoff and Johnson, 1980), the analysis particularly considered what dimensions of climate change were highlighted using metaphors. As I assume that headlines are written so as to attract reader attention, metaphors were sought in the headline and opening paragraph of each climate-related news article (paper II). The metaphors were identified by closely examining the linguistic choices made by journalists when reporting on climate change. In particular, words and expressions used in a non-literal sense were noted (Pragglejaz Group, 2007), for example, if climate change was perceived as a threat that needed to be combated – words more often associated with war-like situations. The analysis of metaphors may be seen as a search for metaphors that are more alive than dead (a dead metaphor is one that its users have forgotten is metaphorical), indicating their vivifying effect on language and language use (Lakoff and Johnson, 1980; Müller, 2008; Ricoeur, 1977; Simms, 2003).

4.1.2 Group discussions

The overall analytical approach to the focus group data is the same as for the media material, i.e., both explicit content and implicit frames are in focus in the analysis. However, as these empirical materials differ in their character – one being published text and the other being conversations – the analytical approach also differs. The characteristics of focus group material in terms of group-dynamic effects are central to the analysis of how climate change is ascribed meaning. That is, the frame analysis shifts to an analysis of framing processes and how frames

are constructed. This perspective implies an analytical focus on how participants in the focus groups generate and circulate ideas and understandings. The analysis of focus group data comprises three steps: 1) descriptive analysis of what has been said in the focus groups, 2) analysis of implicitly shared themata, and 3) analysis of framing devices. Accordingly, the following chapter is split into three sections, each intended to make the analytical procedure and consequently the results transparent to the reader.

4.1.2.1 Thematic analysis

I used a two-level approach to the thematic content analysis in which topics and themes are the central analytical concepts (papers III and IV). I treated the focus group transcriptions as one text, examining recurrent themes in the entire material, rather than seeking similarities and differences between the groups (Krueger, 1998b). The focus groups were brought together to discuss the issues of 1) climate change (paper III) and 2) information on climate change (paper IV). In focus group discussions, participants highlight various aspects, called topics, of the issue in focus (Marková et al., 2007, pp. 135–139). I started the analytical process by drawing boundaries between the various topics in the focus group transcriptions, meaning that I divided the transcribed discussions into sequences determined by where the discussion shifted to another topic. Boundaries between topics were identified by noting abrupt changes of topic, for example, when participants or the moderator moved on to talk about something else, or when the topic fades away in chains of minimal responses, pauses, laughter, etc. All topics were assigned labels or identifying phrases, such as consumers, policies, and markets. At this level, the coding results in a rough, largely non-theoretical, list of what participants talked about.[6]

The next analytical step consisted of going through the lists in search of recurrent topics, which were grouped into "themes". By recurrent I mean a topic that recurs in at least two groups. To continue with the above topic examples, the consumer, policy, and market topics were subsequently grouped into the single theme, general influences on agri-production. However, even if a topic recurs several times, this does not mean that it is always talked about in the same way. Therefore, variants and differences of ideas were noted, to explore whether the structure of themes was the same in all groups (indicating a widespread shared understanding) or differed between them (indicating variants or the absence of shared understanding). I also noted overlapping speech, listener support, pauses, and other indications of shared, or not shared, understanding.

[6] See Marková et al. (2007), chapter six, for an extensive description of thematic content analysis.

4.1.2.2 Themata and frames

At this stage in the analysis, the material consists of topics and themes reflecting the various ways in which climate change is discussed. Ultimately, one would want to summarize the major patterns exhibited in the focus group transcripts, including the underlying assumptions that participants in the groups use as sense-making resources; "themata" is a term Marková et al. (2007, p. 167ff) use to describe such underlying assumptions. Furthermore, these assumptions are typically not verbalized and only implicitly present, in which case they are called proto-themata, because they are not directly articulated in language. When a proto-thema becomes explicitly formulated and negotiated, it is transformed into a thema. This means that when proto-themata are transformed into themata, discussants no longer think and speak "from" them but "about" them. The shift from proto-themata to themata is also an indication of what is seen as problematic by participants in a conversation, as proto-themata enter into discussant awareness when there are tensions and conflicts that call for attention (Marková et al., 2007). With its content no longer taken for granted, the proto-thema begins to facilitate the transformation of existing meanings. A proto-thema becomes a thema when it emerges from unreflected common-sense thinking, rising to the level of active consciousness. Furthermore, underlying assumptions (as either themata or proto-themata) are suggested to have their roots in relational categories such as danger/safety, moral/immoral, trustworthy/untrustworthy, and cold/hot (Marková et al., 2007, p. 168ff). In relation to focus group participants' talk about climate change, such assumptions could be rooted in views of nature (e.g., mastery, pristine, and stability) and the role of human views of knowledge (e.g., certain and reliable) (Hulme, 2009). The relational categories on which participants' discussions are based, including tensions and shifts between explicit themata and implicit proto-themata, guide me towards identifying a frame. Frames are also identified by noting whether a particular idea or way of understanding climate change (paper III) or climate change information (paper IV) is supported by the same or similar framing devices.

4.1.2.3 Framing devices

Previous studies have demonstrated that metaphors and prototypical examples are used to conventionalize and concretize climate change (Cohen, 2010; Fletcher, 2009; Höijer, 2010; Nerlich and Koteyko, 2010; Wibeck, 2014). I started the analytical process by identifying these framing devices, but as it soon became apparent that these were not the only ones used by focus group participants, I started a process of identifying what framing devices were used instead, such as keywords, analogies, and distinctions. Consequently, the analysis of communicative resources is based on a mixture of what has previously been identified in the literature and more empirically driven elements. Overall, I have

analysed how participants use the following communicative resources, i.e., keywords, metaphors, prototypical examples, analogies, and distinctions, as means for understanding climate change (paper III).

Keywords: Recurrent uses of certain words were noted and grouped if they were used to support the same arguments.

Metaphors: Metaphors were identified by closely examining the linguistic expressions of participants when discussing climate change; see section 4.1.1.3 "Metaphor analysis" for further details.

Examples: Another class of communicative tools used in sense-making is examples (Wästerfors and Holsanova, 2005). Examples were identified through the participants' explicit use of: the words "for example" and "for instance"; more implicit references such as "as", "like this", and "like when"; the complementary version when the opposite is emphasized using "but"; and verbs such as "see", "look at", and "take". Some examples may be used recurrently in the groups and represent prototypes of climate change or its aspects (similar to what Kitzinger, 2000, refers to as media templates). A special focus on participants' use of prototypical examples enables an analysis of common reference points that inform how participants make sense of climate change.

Analogies and distinctions: In analysing analogies and distinctions, the process started with identifying when climate change, or its aspects, was considered similar or analogous to something else. Analogies can be expressed as "X is similar to Y", where X is understood as climate change or its aspects, and "is similar to" also can be expressed as "is like", "reminds me of", and "is the same as"[7] (Marková et al., 2007 p. 140ff). Similarly, distinctions were identified when climate change, or its aspects, was considered different from, in contrast to, or opposite some other thing. Such distinctions are expressed in the form of "X is different from Y" where X refers to the issue, such as climate change, and "is different from" can also be expressed as "it's not the same" or the like (Leiserowitz et al., 2013). Analogies and metaphors are somewhat similar, as both are figures of speech that express resemblance between objects, but I found that analogies were often used explicitly by participants in sense-making processes, while the use of metaphors tended to be more implicit and potentially reflecting an unconscious system of thought.

4.2 Materials

The empirical materials are derived from two Swedish farm magazines: *ATL* and *Land Lantbruk*, and eight focus group discussions with Swedish farmers.

[7] In Swedish, analogies can be conveyed using expressions such as "*liknar*", "*påminner om*", and "*är samma som*", while distinctions are expressed using "*skiljer sig från*" or "*det är inte samma sak*".

4.2.1 Farm magazines

Information in farm magazines often represents a central component in agricultural decision making (Paper IV; Brunn and Raitz, 1978). An analysis of farm magazine coverage of climate change therefore gives insights into how climate change is made sense of in an agricultural context. The sample for the analysis of Swedish farm magazines covered the ten-year, 2000–2009 period, a period that witnessed an overall increase in attention to climate change in Swedish news coverage (Westander et al., 2008). The following magazines were chosen for the analysis of climate change-related reporting: *ATL Lantbrukets Affärstidning (ATL)*, and *Land Lantbruk.*

ATL and *Land Lantbruk* were chosen since they target farmers in general, independent of production type and geographical location. Given this thesis' focus on how climate change is framed by actors in the Swedish agricultural sector, these broader magazines were selected, rather than specialized farm magazines directed to narrow groups of producers (e.g., *Husdjur*, *Nötkött*, *Småbrukaren*, *Ekologiskt lantbruk*, *Lammproducenterna*, and *Fjäderfä*) or magazines focusing on regional reporting (e.g., *Jordbruksaktuellt*). *ATL* and *Land Lantbruk* also had the largest national circulation at the time of the study, 51,700 and 118,700, respectively (Swedish Magazine Publisher Association, 2010). *ATL* was distributed twice a week while *Land Lantbruk* was distributed once a week, so the articles for analysis were chosen from approximately 1500 issues of these magazines.[8] All articles on climate change that were featured on the front page or that formed part of a series of articles were included in the corpus. This means, of course, that I did not consider other articles that may have been published in the magazine but not featured on the front page. In an agricultural magazine, weather-related articles are common. Words such as drought, flooding, rain, and heat are frequently used, but for an article to qualify as related to climate change, one of the following keywords had to be on the front page or in the contents (*Land Lantbruk* 2000–2003): climate change/gas(es), global warming, greenhouse effect/gas(es), and carbon dioxide/emissions. Due to the sectoral focus on agriculture, articles primarily aimed at the forestry sector were not included in the sample.

4.2.2 Focus groups

I chose focus group discussions for the study of climate change frames and frame formation because the method enables me as a researcher to study interactive

[8] *ATL* is distributed twice a week and *Land Lantbruk* once a week and the analysis focuses on articles published between 2000 and 2009. A brief calculation gives 104 issues/year + 52 issues/year × 10 years, minus double editions and reservations for changes in the number of issues/year, yielding about 1500 magazine issues.

sense-making. Focus groups are a qualitative research method and as such generate a rich understanding of participant experience and beliefs (Kitzinger, 2005; Morgan, 1988). Unlike other qualitative methods, such as individual interviews or participant observation, focus groups are *organized group discussions* that explore particular subjects. They differ from individual interviews in that one does not learn as much about each individual; attention is instead directed towards the added value of group dynamics in terms of input from group interaction processes. Focus groups differ from participant observations because, instead of being spontaneous discussions, a focus group is convened by the researcher. Although less time is spent on each individual, the group dynamics offers data in terms of the give-and-take of discussion, and the opportunity for participants to share, compare, and explore ideas. Focus groups are claimed to be useful in exploring interaction between participants, especially in examining how knowledge and ideas develop and operate (Kitzinger, 1994; Wibeck et al., 2007).

Although focus groups are organized groups, convened by the researcher to discuss a particular issue, focus groups can be organized as more or less structured conversations (Guest et al., 2013; Wibeck, 2010). To address the dynamics of framing processes, I chose an unstructured focus group design in which the group carries on a conversation with as little interruption from the moderator as possible (for further discussion, see Guest et al., 2013; Krueger, 1988a; Wibeck, 2010). In an unstructured conversation, frames are seldom ready-made, as in mediated material, but are instead developed, generated, contested, and elaborated on. Consequently, to take such interaction and dialogue into account, my analysis of the focus group data draws on dialogical theories of sense-making, as outlined in section 3.3.1. Specifically, this means that, first, I treat dialogue as interaction between participants (Linell, 2009; Marková et al., 2007) and, second, I consider dialogue as interaction among ideas, thoughts, and arguments developed in the focus group discussions. In the analysis, I concentrate on how content is constructed and how focus group participants generate and circulate ideas and understandings to explore climate change framing processes.

In this section, I will present the focus group planning process, particularly as concerns the group format, i.e., group size, group composition, and total number of groups (Table 2). The selection criteria for focus group participants were based on an interest in including as many perspectives and ideas on climate change as possible, meaning that new focus groups were added until the material reached theoretical saturation (Glaser and Strauss, 1967). As type of production is a factor considered relevant to climate change mitigation and adaptation in the agricultural sector (SOU, 2007:60), I tried to include farmers engaged in various types of production, of both crops and livestock. Moreover, perception studies of environmental values generally find that age and gender are variables influencing attitudes (Eurobarometer, 2008; McCright and Dunlap, 2011; Pew Research

Center, 2012; Poortinga et al., 2011), so I have also tried to include participants of different ages and genders. While one group was homogenous in terms of production but heterogeneous in age and gender, another was homogenous in age but heterogeneous in production background. The different product types included wheat, barley, oats, rye, sugar beets, potatoes, oil seeds, carrots, grass, dairy, suckler cows, beef, hen eggs, ewes and lamb meat, and sows and pig meat. Product types e.g., tomatoes and cucumbers and the open-land cultivation of many vegetables and fruits (e.g., lettuce, cabbage, strawberries, and apples) were not included.

Table 2. Group format of eight focus group discussions with Swedish farmers.

Group	Group composition	Group size	Age	Geographical location	Discussion length
1	Combination of forest, crop, and livestock production	1 woman 5 men	30–60	Östergötland	77 min
2	Combination of forest, crop, and livestock production	6 men	50–70	Östergötland	74 min
3	Predominantly livestock production	6 women	20–70	Gävleborg	46 min
4	Crop production	3 men	30–40	Östergötland	103 min
5	Combination of crop and livestock production	3 women 4 men	20–40	Skåne	~ 60 min
6	Crop production	1 woman 6 men	30–70	Skåne	71 min
7	Combination of crop and livestock production	3 men	30–80	Skåne	51 min
8	Combination of crop and livestock production	6 men	20–30	Mälardalen	67 min

Group participants were recruited with the help of contact people found through the website of the Federation of Swedish Farmers (LRF). These key informants helped me organize a group based on the criteria of heterogeneity within the group in terms of type of production, age, or gender. The advantages of using

local farmers as key informants were their peer networks, contacts with fellow farmers, and, hence, their ability to recruit farmers who might otherwise be hesitant to participate in research projects. The disadvantage is that I had little insight into what farmers were recruited in terms of their type of production, age, and values. After three focus groups, I appeared to have reached what Glaser and Strauss (1967, p. 61) call "theoretical saturation" and was surprised by the homogenous discussions and views of climate change. Based on how climate change is discussed in national policy, Swedish media, and Swedish agriculture debates, I believed there to be other perspectives on climate change that I had not managed to capture in the recruitment process. As a result, I recruited new participants and turned directly to key informants of a younger generation of farmers while still recruiting to ensure diversity in production. The four initially planned focus groups turned into eight before I had the sense of having fully covered the topic of the study.

The discussions primarily took the form of conversations between group members, and I tried to be involved as little as possible in the discussions, in order not to steer the discussions. I believe that listening to the participants and to the give-and-take of the discussions provided insights into how the participants made sense of climate change (see Krueger, 1988a, on moderating focus group discussions). My interview guide consisted of open-ended questions intended to create a free-flowing discussion (see Appendix B). I used a predetermined set of questions asked in all groups, to which I added questions according to participant interests. The focus group conversations were audio recorded and transcribed verbatim: that is, all identifiable words, including repetitions, etc., were noted in the transcriptions, the lengths of pauses were indicated, and support from listeners who were not currently speaking was noted in brackets within the speech flow (Linell, 1994). Conventional spelling was used. Unfortunately, due to technical problems, focus group number five was not recorded, so I allocated time immediately afterwards to reconstructing as much of the conversation as I could remember.

5 Results and analyses

Following calls for more case-specific and audience-specific research (Moser, 2010; Whitmarsh and Lorenzoni, 2010), the overall aim of this thesis is to analyse the formation of climate change frames in Swedish agriculture. The analysis of topics, themes, frames, and framing devices was conducted using two sets of empirical material, i.e., farm magazines and focus group discussions, so my main results will be presented and discussed accordingly. The results are also interpreted in relation to theories of framing. In addition, the results are discussed in light of previous studies of media representation and the public perception of climate change.

5.1 Specialized media: farm magazines' frames of climate change

In the largest Swedish farm magazines, *ATL* and *Land Lantbruk*, the content analysis of climate change coverage between 2000 and 2009 indicated that the most common themes were: 1) agricultural contribution to GHG emissions, 2) climate change impacts on agricultural production, and 3) climate change politics (paper I). The theme of agricultural contribution to climate change concerned GHG emissions from agricultural activities, such as methane production by ruminant livestock and, to a lesser extent, pea cultivation and greenhouse-grown tomatoes. The theme of climate change impacts concerned local opportunities, such as higher demand for energy crops, and local challenges, such as insufficient drainage capacity due to increasing precipitation and more pronounced snowmelt, rather than global vulnerability. The theme of climate change politics elaborated on the consequences of national, European, and global climate politics for Swedish and global agriculture. National politics was seen to affect Swedish agriculture, but the general opinion was that national climate policies would help neither the climate nor agriculture. Regarding international politics, articles paradoxically reported that the outcomes of the UN Climate Conference would not affect Swedish agriculture, while simultaneously claiming that "failure in negotiations would benefit Swedish agriculture" (*Land Lantbruk*, 2009a).

While these themes concern contributions to and effects of climate change, the analysis of underlying frames revealed a somewhat different pattern. Underlying each theme were understandings of climate change as *conflict*, *scientific certainty*, and *economic burden*. Each theme was characterized by one frame:

- agricultural contribution to GHG emissions – *conflict*
- climate change impacts on agricultural production – *scientific certainty*
- climate change politics – *economic burden*

The theme of the agricultural contribution to GHG emissions is communicated by

contrasting production systems, such as ecological versus conventional, large-scale versus small-scale, or Brazilian versus Swedish production systems, and by contrasting the agricultural with the transport sector regarding their GHG emissions. This alerts us to the presence of a *conflict frame*, exemplified by the following headlines appearing in *Land Lantbruk*: "Large farms best for the climate" (2008) and in *ATL*: "The car or the steak? You decide!" (2009a). The conflict frame proposes comparisons between alternatives seen as distinct from each other and mutually exclusive. As one of the two alternatives is presented as better or at least more acceptable in terms of GHG emissions, hypothetically that alternative is seen as necessitating less mitigation action than is the alternative considered worse or unacceptable. As a result, the *conflict frame* that underlies reports on agricultural contribution to GHG emissions may also legitimize parts of agriculture's GHG emissions.

In the second theme, climate change impacts on agricultural production, climate change is framed in terms of *scientific certainty* as exemplified by the following headlines in *Land Lantbruk*: "How a changed climate affects the farm" (2009b), "Kalix not as cold as before" (2009c), "The heat makes soy grow" (2009d), "Maize cultivation spreads with milder weather in Sweden" (2009e), and "Four years of drought has made Samuel rethink" (2009f), and in *ATL*: "With warmer weather both corn and winter wheat creep northwards" (2007a), "Greatly increased yields in the north when the climate changes" (2007b), and "Rapeseed is already blooming in Skåne" (2008). These headlines illustrate how climate change impacts were framed as unquestionable evidence, little attention being paid to its uncertainties. The farm magazines focused less on projected future challenges and opportunities than on telling stories about local farmers' observations of climate change, contributing to the overall scientific certainty frame.

The theme of climate change politics was often accompanied by reports on economic losses and increased taxes for Swedish farmers, drawing on an *economic burden* frame as illustrated by the following headlines: "The new climate taxes hit hard" (*Land Lantbruk*, 2009g), "Higher taxes will cost Håkan 150,000 per year" (*Land Lantbruk*, 2009h), and "We experience tax shock, and we do not understand the purpose" (*ATL*, 2009b). While the 2009 UN Climate Change Conference in Copenhagen was clearly a focal event that was attended to, the magazines draw no firm conclusions as to whether and how international climate politics would affect the local context. However, as illustrated above, they were clear in framing climate change or, more precisely, national climate policies as entailing economic costs for Swedish farmers.

Taken together, the frames of conflict, scientific certainty, and economic burden may be seen as central organizing ideas (Gamson and Modigliani, 1987) that confer meaning and suggest what climate change is about. By lending greater

weight to certain arguments and details over others, for example, highlighting economic risks and downplaying economic opportunities, or by representing climate change as a conflict over mutually exclusive realities, climate change is thought of as a phenomenon that potentially excludes certain forms of agricultural production, in terms of both their non-acceptable levels of GHG emissions and the increased costs of their production inputs.

Frames of scientific certainty, conflict, and economic burden were accompanied by certain metaphors used by the farm magazines. I found that climate change was linked to the *greenhouse*, *war*, and *game* metaphors to explain its physical science basis and elaborate on the role of farmer engagement in responding to climate change (paper II). The greenhouse metaphor is probably the most common metaphor in climate change discussions. It is used to concretize climate change processes, emphasizing increased warmth in the atmosphere, in which GHGs are understood as the glass covering a greenhouse, causing an increase in global mean temperatures. However, although the farm magazines explicitly used the word "greenhouse", the reader was given no guidance on how to interpret the greenhouse metaphor in the context of climate change as a problem. No explanations were offered as to how climate change resembles a greenhouse, indicating that the meaning of the metaphor was assumed to be understood. While the greenhouse metaphor highlights temperature change, as used in the farm magazines it does not fully address other meteorological phenomena such as the amount, intensity, frequency, and type of precipitation and wind. Similarly, others argue that the greenhouse metaphor makes it difficult to associate climate change with extreme weather events and negative images such as desertification, cyclones, cold snaps, and excessive heat (Carolan, 2006; Lake, 2001). In addition to the greenhouse metaphor, climate change was also described in more action-oriented terms. Climate change was described with war-like metaphors using words such as *threat*, *hit*, *loss*, *death*, *combat*, and *eliminate* either to highlight heroic efforts on part of farmers or to ascribe responsibility for climate change mitigation to others:

> The meat farmer or the motorist. The sugarcane farmer or the wheat grower. Who should be *eliminated*? Who will *save* us from the climate *threat*? Eleven experts submit their climate advice to the government on Monday. (*ATL*, 2007c; emphasis added)

The above quotation illustrates how, by invoking the conflict frame, the farm magazines' use of war metaphors simultaneously alludes to mitigation activities while not ascribing responsibility for such activities but merely suggesting

alternatives. While strongly affirming that climate change is a *threat* that will *hit* the earth and result in *loss* and *death*, the farm magazine reporting was less certain or emphatic in attributing responsibility to respond to climate change. Dichotomous war-associated alternatives such as *combat* or *surrender*, *save* or *be saved* highlight both active and inactive response behaviours. For example, saving others differs greatly from being saved oneself. Such frames seem to cast most humans as inactive, while climate change as an issue seems to coalesce around specific active actors.

Similarly, there were two contrasting uses of game metaphors in the material: one emphasized GHG emission reduction in agriculture and called for individual action, while the other singled out the farmer as a winner and thereby provided little motivation for individual action and mitigation strategies. The game-related metaphors, on the one hand, identified farmers as *key players* in the *climate game* to draw attention to the need for mitigation measures. On the other hand, when game metaphors were supported by words such as *challenge*, *key role*, and *winner*, these also highlighted the positive effects of climate change on Swedish agriculture, for example, higher yields for farmers, increased income, and new climate-related market initiatives, such as climate-labelled milk.

In sum, the farm magazines elaborated on the meanings of climate change by using often emotionally loaded war and game metaphors. At the same time as the farm magazines provided readers with various interpretations of climate change, they also set up a rhetorical contest between the metaphorical images presented. Is it possible to view climate change as a life-or-death battle and simultaneously as a game one can choose to play? Should the divergent messages of the metaphors employed be interpreted as parallel representations reflecting heterogeneous, complementary ideas or as evidence of dysfunctional, inconsistent, and confusing perspectives? The use of such contrasting metaphors may result in conflicts and disputes (Schön, 1993); on the other hand, communication using multiple metaphors allows one to convey several parallel representations and worldviews that are not necessarily mutually exclusive.

5.1.1 Diagnostic, prognostic, and motivational framings

Taken together, framing climate change in terms of conflict between production systems, national or sectoral contributions to GHG emissions, scientific certainty about climate change impacts, and economic burden (paper I) accompanied by greenhouse, game, and war metaphors (paper II) suggests a range of problem definitions, proposed solutions, and motivations for action (Snow and Benford, 1988). Diagnostic framings range from identifying climate change as a problem in need of management strategies, to describing climate change as a rather pleasant phenomenon – not problematic at all. Evidently, a diverse problem definition

entails diverse ideas as to the attribution of blame or causality, ranging from little motivation to blame anyone or anything, to attributing the causes of climate change to other sectors, particular production systems, and particular countries.

Prognostic framings that propose solutions to the problem are similarly multidimensional. War and game metaphors both suggest tactics of acting or not acting. On one hand, farmers are encouraged to engage in climate change mitigation as they are *key players* who should engage in *combating the climate threat*. On the other hand, depictions of farmers as *winners* or representations of the tactic of *surrender* imply frames conveying that nothing needs to be done, at least from the perspective of agriculture. Moreover, if the causes of climate change are attributed to "others", then "others" also have a duty to respond. In sum, the multidimensional identification of solutions, strategies, and tactics points to many variations in prognostic frames. The analysis of Swedish farm magazines' coverage, frames, and metaphorical illustrations of climate change (papers I and II) indicates that a particular frame does not necessarily determine a particular position on an issue, and that many positions may be consistent with a single given frame, thereby supporting the findings of Snow and Benford (1988) and Rein and Schön (1991). Given the many ways in which climate change is conceived, the rationales for engaging in action can be assumed to vary endlessly. However, frames arguably relate to action, though not in a linear sense, as agreement about the causes of and solutions to a particular problem does not automatically generate action, but instead concerns issues of motivation (Snow and Benford, 1988). Regarding motivational framing, the farm magazines provide two motives, or rationales, for why farmers should engage in climate-related action: to avoid increased costs and to avoid being seen as climate villains (paper I). The economic burden frame that underlies coverage of climate change politics suggests economic losses and increased taxes due to stricter climate policies. Thus, adapting to climate change means adapting to climate policies, and the underlying motivation for such behaviour is the priority to earn profit. Second, the concern over the reputation of farmers as "environmental villains" has produced a motive for engaging in action. Farmers were depicted as *environmentally aware* and *climate smart* in media texts that encouraged emission reductions. It can then be concluded that action can be incentivized by a desire to avoid a perceived negative outcome, such as being seen as an environmental villain.

5.1.2 Climate change frames in Swedish farm magazines and in global mainstream media

In comparing the climate change frames found in worldwide mainstream media and the dominant frames found in Swedish farm magazine coverage of climate change, I found that mainstream media worldwide far more often used dystopian scenarios in covering climate change. Stories about impacts and consequences

portraying climate change as a serious problem in tones of misery and doom dominate worldwide media representations of climate change (Ambler, 2007; Boykoff, 2008, Doulton and Brown, 2009; Hibberd and Nguyen, 2013; Kenix, 2008; Liu et al., 2008; Taylor and Nathan, 2002; Zamith et al., 2013) – what Nisbet and Scheufele (2009) term the Pandora's box frame. The Western media also tend to frame climate change impacts as an impending catastrophe for the developing world and inhabitants of low-lying islands (see, e.g., Doulton and Brown, 2009; Farbotko, 2005). The Swedish farm magazines, however, depict the impacts of climate change as less serious, and as presenting both challenges and opportunities for Swedish agriculture. Opportunities were seen in terms of energy crops, tourism, and increasing yields, while news items about challenges emphasized drainage problems and increased pest risks. Rather than highlighting severe and far-reaching consequences of climate change, the studied farm magazines employed less urgent tones in reporting on impacts. However, adaptation or mitigation options were not necessarily covered in the farm magazines' reporting on climate change.

Underlying the reports on both positive and negative impacts of climate change on agriculture, the studied farm magazines employed an overall frame of climate science as certain and definite. The same frame of scientific certainty can be found in Swedish media (Olausson, 2009) and other European media (Brossard et al., 2004; Painter and Ashe, 2012; Weingart et al., 2000) as well as in Brazilian, Chinese, and Indian media (Painter and Ashe, 2012), but not in US media (Akerlof et al., 2012; Freudenburg and Muselli, 2010; Painter and Ashe, 2012) and at times the UK media (Carvalho and Burgess, 2005).

A frame found both in worldwide mainstream media and the studied farm magazines is that of conflict; however, different media describe climate change as a conflict between different groupings. Media have been found to depict the climate change issue as entailing conflict over the uncertainties of anthropogenic climate change and whether climate scientists agree or disagree about the human contribution to increased GHG emissions (McIlwaine, 2013). The conflict frame is not only central to media depictions of the conflicting causes of climate change but also underlies coverage of the relative winners and losers from climate change (O'Brien and Leichenko, 2000). For example, Billett (2010) found that the Indian press frames climate change using arguments of "us" versus "them" across North–South lines, portraying the South as a single, homogenous entity threatened by global climate change and creating a discourse of international "carbon colonialism". Others suggest that climate change coverage easily lends itself to reporting using various levels of confrontation, ranging from people versus nature, business versus environmentalists or government regulation, to parties clashing over preferred actions or regulations (Dotson et al., 2012) including attributions of mitigation responsibilities (Waitt et al., 2012). In the studied farm magazines, it

was primarily the agricultural sector's GHG emissions that were discussed in the frame of conflict. Through contrasting agricultural production systems, sectors, and national contexts regarding their GHG emissions, the magazines implicitly or explicitly ascribed mitigation responsibilities.

While the economic burden frame is rarely used by the general media, Nerlich and Koteyko (2010) found that business magazines used economic development frames and "gold rush" and "wild west" metaphors in news items on carbon trading and offsetting. Similarly, the Swedish farm magazines occasionally used an economic opportunity frame in relation to climate change impacts and perceived increasing yields while, in contrast, using economic burden frames in relation to climate change policies, due to perceived stricter regulations and taxes for farmers, and, hence, economic losses.

Metaphorical representations were common in the farm magazines' coverage of climate change. Studies of linguistic repertoires in media coverage of climate change are limited, making comparison difficult. However, when analysing emotional representations of climate change, Höijer (2010) found that Swedish media communicate a mixture of fear, hope, guilt, compassion, and nostalgia. Along the same lines, Koteyko et al. (2010) identified the emergence of new metaphorical terms, such as "carbon finance", "carbon tax", and "carbon sinner", in on-line discussions of climate change mitigation. Furthermore, it has been suggested that climate change communication has been influenced by the language used by various science disciplines (Howe, 2009). As these disciplinary linguistic repertoires differ, Howe (2009) concludes that the perceptions of and responses to climate change of each discipline also differ. While these studies are limited in scope, they suggest that climate change is communicated through various linguistic repertoires that signal multiple understandings. It has been argued that future research should seek to employ better-honed tools, such as linguistic repertoires, to gain a more nuanced understanding of media coverage of climate change (Zamith et al., 2013).

5.2 Focus group participants' frames of climate change and climate change communication

Given that climate change was found to be communicated by farm magazines to farmers generally in terms of the agricultural contribution to GHG emissions, climate change impacts on agricultural production, and climate change politics, framed in terms of conflict, scientific certainty, and economic burden, how, then, is climate change understood among farmers?

The thematic structure was similar in all groups, indicating that, although there are various ideas regarding the themes, there is a shared understanding of the aspects seen as relevant in discussions of climate change. Themes that recurred in at least

six out of eight focus group discussions of the issue of climate change include: 1) existence of climate change, 2) climate change impacts on agricultural production, and 3) general influences on agricultural production. The theme of the existence of climate change concerned discussions of whether participants believed that the climate change was happening or not. The theme of climate change impacts on agricultural production ranged from local impacts such as longer growing seasons to global vulnerability. The third theme, general influences on agricultural production, concerned discussions of influences other than climate change on agricultural production, such as consumer behaviour, markets and price setting, and politics. Although it is interesting that discussions of climate change and its effects were generally followed by discussions of other factors considered to influence agricultural production, the analysis focused on frames of climate change and how they were shaped in the discussions. These findings are discussed in section 5.2.1.

The interview guide included questions on both climate change and climate change information. Regarding climate change information, focus group conversations treated the following themes: 1) knowledge production, 2) frame articulators, and 3) message character. The knowledge production theme concerned discussions of the empirical foundations of climate change, for example, "the climate curve" (FG 2), observations, and measures. The frame articulators theme involved views of various information sources and their influence on agricultural practices, while the message character theme included discussions of conflicting perspectives and truth. All three themes – knowledge production, information sources, and message character – concerned issues of credibility. These findings are discussed in section 5.2.2.

5.2.1 Framing devices

While the discussion of climate change explicitly concerned the existence of climate change and climate change impacts on agricultural production, the analysis of underlying frames and their formation reveals a complex pattern in which farmers relate to and understand climate change through their own experience coupled with non-experience-based arguments (see Table 3).

As illustrated by the two following excerpts, everyday experiences seemed to be a knowledge base from which to make claims about climate change:

Excerpt 1[9]:

[9] Transcription conventions: (.) denotes a micro-paus, (2 s) denotes a timed paus, * * indicate laughter in the speaker's voice, (name mm) denotes listener support, XX denotes speech that cannot be deciphered and [...] that a short sequence have been omitted (Linell, 1994).

Moderator	What do you associate with climate change?
Will	I think of (.) I've farmed since, well, what is it, 72 I started. So it has changed, the climate. That, I think of. The growing season is longer today than it was in 1972. (FG 2)

In excerpt one, the moderator starts the discussion of climate change by asking "What do you associate with climate change?" One participant, Will, directly cites his experience of growing season length. He particularly distinguishes between today's growing season length and that of the 1970s, claiming that today's growing seasons are longer, which he takes as evidence of a change in the climate. In contrast, the next excerpt illustrates how experiences can be used to draw the opposite conclusion regarding weather events:

Excerpt 2:

Colin	And I have had personal experience of weather for 40 years. The first thing you do in the morning is look at the sky, and you have extensive experience of weather. As a farmer you remember some years. In the 1950s, you have a reference year when it was very, very hot at 30–35 degrees, huh. You remember the snowy winters in the 80s maybe, then green winters in the 1990s, and then one remembers the last two snowy winters. For 12–13 years, we had no snow at all. And then ask you the question – personally I do not feel that there has been climate change. (FG 6)

Excerpt two illustrates how experience can be used to indicate, according to the participant himself, that "there has been no climate change". Central to the argument is the analogy between variations occurring during different time periods, such as between the 1950s, 1980s, and 1990s, exemplified by high summer temperatures in the 1950s, snowy winters in the 1980s, but green ones in the 1990s and snowy winters again in 2009 and 2010. Experience of weather and agricultural practices since the 1950s is used as a knowledge base from which to make claims about climate change. Excerpts one and two highlight the relevance of experience in the formation of climate change frames. As the excerpts suggest, similar observations can be used to draw very different conclusions, as arguments based on experience both supported and countered frames of human-induced

climate change. The frames of both natural and human-induced climate change co-exist in the data, although the natural climate change frame was more often invoked. The excerpts also illustrate how the farmers frequently used framing devices such as examples and comparisons (i.e., analogies and distinctions) based on their own experience to support or counter an idea or argument. Their experiences are verbalized as comparisons between perceived variations in growing season length and as examples of temperature and precipitation patterns. Hence, climate change frames were formed by using experiences, which in turn were expressed through examples, analogies, and distinctions.

The use of one's own experience was coupled with non-experience-based arguments in discussions of climate change. Such arguments were sometimes based on what was heard or written, although references to the precise sources were rare. Unlike experience-based framing devices, framing devices used in combination with non-experience-based arguments seemed to be more associative than those drawn from one's own experience. The use of experience and experience-based framing devices as well as non-experience-based arguments and framing devices was combined into a web of arguments supported by keywords, analogies, distinctions, and metaphorical representations, all of which could be seen as circulating in the discussions of climate change. As the above examples indicate, ideas regarding climate change as either natural or human-induced were sometimes verbalized and sometimes implicit and not directly articulated. When implicit ideas (proto-themata) become explicitly formulated and negotiated (themata), according to Marková et al. (2007), this indicates tensions and conflicts between different views. When assumptions were explicitly formulated, the meanings of climate change were no longer taken for granted but discussed, elaborated on, and negotiated. Table 3 makes explicit the various framing devices underpinning certain interpretations or frames:

Table 3. Framing devices underpinning frames of climate change as natural and human-induced

	Keywords	Time metaphors	Prototypical examples	Analogies and distinctions
Natural climate change	Cycles, variations, fluctuations, shifts, alterations, and recurring patterns	Characterized by long-term perspectives – typically several centuries, thousands of years, "always" – and slow changes	• ice ages as recurrent phenomena/ periods *(general)* • grapes, wild or domesticated *(context-specific)*	Analogy: Between experiences of weather and agricultural practices since 1950 compared to today's experience
Human-induced climate change	Change, temperature increase, human impacts, something new	Characterized by shorter-term perspectives, typically up to 150 years, and rapid changes	• melting of glaciers • changed direction of Gulf Stream	Distinction: Between experiences of weather and agricultural practices since 1950 compared with today's experience

Keywords such as cycles, variations, fluctuations, and recurring patterns were frequently employed words in natural climate change frames. In contrast, keywords that formed the frame of human-induced climate change included change, temperature increase, human impacts, and something new.

Time metaphors characterized by long-term perspectives and slow changes were employed to support the frame of natural climate change, while human-induced climate change was understood from a shorter-term perspective and in terms of rapid change. These metaphors highlight climate change as either gradual or catastrophic.

Prototypical examples served as common framing devices to support one's argument. As a general example, previous ice ages were frequently used as a prototype of natural climate change, along with the more context-specific example of grapes having been grown in Sweden in the past. The importance of ice cover was also seen in the frame of human-induced climate change, but with a focus on melting glaciers and, in addition, the possible change in direction of the Gulf Stream.

Analogies to experienced variations in weather between different time periods, such as the 1950s, 1980s, and 1990s, partly formed the frame of natural climate change. At the same time, *distinctions* between the perceived growing season length in the 1970s and today partly formed the frame of human-induced climate change. As illustrated by excerpts one and two, experiences of the same event can be used as arguments supporting the frames of both human-induced and natural climate change.

The implication of such different diagnostic framings of climate change as exclusively or at least primarily caused either by natural or anthropogenic processes is that not only did the suggested appropriate courses of action differ, but it could be questioned whether climate change itself was a problem. In the frame of natural climate change, climate change was generally not viewed as a problem, so most prognostic and motivational framings were deemed unnecessary. For example, climate change mitigation was seldom a topic of discussion unless the moderator put it on the agenda, though participants spontaneously raised the topic of adaptation to climate change. When climate change was understood as a natural process that had always affected agricultural production, adaptation strategies were seen as important to general agricultural productivity. When climate change was framed as human-induced, greater attention was paid to human activities and suggested solutions included both mitigation and adaptation measures. However, as the frame of human-induced climate change was often met with counterarguments, detailed discussions of mitigation and adaptation strategies were lacking. The analysis of the empirical material demonstrates that the same course of action – adaptation measures – may sometimes be associated with not just one frame but be consistent with quite different frames, for example, both anthropogenic and natural climate change. In other cases, the same course of action – mitigation measures – is mostly associated with one frame, that of anthropogenic climate change.

5.2.2 Frame credibility

Framing can be seen as a dynamic and dialectical sense-making process, in which the substance of the frame is constantly negotiated between various claims and frame articulators. However, such processes may occur at several levels. For example, following the assumption that framing processes are involved in all thinking (Lakoff, 2010), in different ways we are all frame articulators, as were the farmers in the focus groups. In a wider information landscape, the farmers can be seen as merely an audience of frames – frames that are already articulated and then presented to audiences in and through communication processes. Although the farmers can be seen as an audience of certain frame articulations, this does not mean that they were inactive receivers of a message. On the contrary, the appeal of any particular frame used in communication is influenced by the extent to

which it resonates with the worldviews of its audiences (Snow and Benford, 1988). Accordingly, the farmers' interpretation of climate change information continues to (re)form the frame.

The focus group discussions of climate change information concerned three aspects of credibility: consistency, empirical credibility, and the credibility of the frame articulators (Benford and Snow, 2000; paper IV). Discussions of consistency concerned different views of whether conflict- or consensus-oriented information landscapes constitute credible information. Discussion of empirical credibility referred to knowledge production and knowledge claims. The credibility of the frame articulators concerned the credibility of various information sources. Each of these is discussed as follows:

Consistency – The analysis of consistency revealed two possible views of what constitutes credible information in terms of consistency between articulated claims: the conflict-oriented information landscape versus the consensus-like information landscape. In a conflict-oriented frame, an information landscape consisting of a plurality of perspectives on an issue was deemed more credible. While multidimensional frames and contradicting claims of climate change were simultaneously called for, farmers participating in focus groups viewed such multidimensional landscapes as confusing.

Generally, though, the farmer participants seemed to share the view that a credible information landscape should contain a plurality of perspectives – i.e. they preferred for a conflict frame of communication. This shared understanding was identified through the analysis of various group-dynamic effects, for example, listener support (articulated via words such as "mm", "yeah", "I agree", and "true") and turn-taking. For example, when new participants entered the discussions of what constitutes a credible information landscape, they provided arguments supporting previous arguments or experience-based examples supporting what was previously said. Arguments supporting the conflict frame of communication were responded to with echoing repetitions and agreements but few counter-arguments or opposing views.

Various framing devices were also seen as contributing to the formation of the conflict frame of communication. *Keywords* such as "biased" partly formed an understanding of climate change information as credible when conflicting perspectives appeared. At times, participants found climate information biased and unbalanced, reflecting only part of a story that the farmers believed to have many facets. *Examples* served as a common framing device supporting the conflict frame of communication. The importance of a plurality of perspectives in securing balanced and impartial decision making was exemplified by the negative effects of decisions informed by only one person and perspective. As a safeguard against harmful decisions, for example, when changing management practices results in economic losses, farmers stressed the need to consider several

perspectives on the same issue. Hence, experience-based arguments and examples can be seen as supporting a conflict frame of communication. The greater and more transparent the contradictions between claims, the greater the feeling of having a sufficient knowledge base for farm-level decisions and actions. By using the conflict frame of communication, farmers criticized the perceived uniformity of Swedish frame articulators' communication about climate change and instead emphasized the need for contradicting claims and multidimensional frames of climate change.

The conflict frame of communication may be seen as an audience-specific frame used to make sense of information relating to agricultural practices. The farmers participating in the focus groups seem to relate to information and knowledge in a particular way, as they expressed that their information portfolio is credible when it contains manifold perspectives and contrasting claims. This potentially audience-specific way of relating to information challenges the interpretation of climate change information, and specifically the scientific consensus regarding human influence on the climate system (IPCC, 2013) as consensus is lost in the search for inconsistency between climate change claims. When approaching climate change information on the basis of the credibility principles of inconsistency and contradictory claims, consensual views of climate change are dismissed. Furthermore, the conflict frame of communication seems to focus solely on the number of conflicting perspectives, while agreements based on one perspective seem to be ignored. The number of contradictory views in relation to the consensual view is overlooked and all perspectives, no matter their scale, are treated as equal.

The issue of consistency concerned not only views as to what constitutes credible information landscapes but also views of agricultural production. The farmers experienced a perceived inconsistency in the contradictions among articulated claims regarding agricultural production in relation to climate change and farmers' own beliefs as to what constitutes viable agricultural production. In the focus group material, farmers contend that the dominant claims about human-induced climate change and related mitigation efforts made by multiple actors (conveyed in national climate science, policy, and media) are inconsistent with their views of profitable agricultural production. This inconsistency raised arguments such as:

Excerpt 3:

Camilla	I would like to say one thing, though I know it's a bit sensitive. I think it's very important that we have

> support from politicians and higher up – government, provincial government, the Board of Agriculture, and the EU – for different reasons in different ways, none mentioned, none forgotten. But I think that part is a part that many, both individuals but also groups of farmers, sometimes have to struggle with. Or that different businesses in agriculture may struggle with. This in turn proves itself in profitability. Demands made, various regulations, laws, rules, and so on. Many are very good – they have a function – but sometimes they cancel each other out and things get worse. So I think this is a very important aspect where we need support from the top. (FG 6)

This excerpt suggests that the farmers' view of the profitability of agricultural production clashes with others' articulation of climate change frames. The perceived inconsistency between farmers' claims as to what constitutes viable agricultural production, and science, policy, and media claims regarding the mitigation of GHG emissions from agricultural production may explain why farmers ascribe low credibility to the dominant climate policy frame of mitigation.

Empirical credibility – Underlying the farmers' understanding of what qualifies as legitimate knowledge were various views of the extent to which knowledge is practically or analytically based. There were two main ways in which the credibility of knowledge production was judged. Climate change information was seen credible when "evidence" was 1) based on practical knowledge or 2) based on a mixture of practical and analytical reasoning. Farming colleagues were generally seen as the frame articulators with practical knowledge and experience. Agricultural extension services (organizations advising farmers) were by some perceived as rooted too little in agricultural practices (typically when extension officers were young) and by others perceived as rooted too much in practical knowledge (typically when extension officers were older). Extension services were also, as this excerpt illustrates, perceived as knowledge brokers linking scientific research to agricultural practices:

Excerpt 4:

> Carl: Well, it is really like this. There is theory and practice. What is said in a farming magazine – "Sow this and your yield will be so many tonnes per hectare" – that's theory. And then many of the experts present here [i.e., in an agricultural extension firm], none of them works

practically … you've got a situation where you need to adapt to your own conditions and your own machinery, the type of soil you have, and so on (M mm) and such things, that, yes, an answer is not always right, but it provides me with a basis for making a decision. Or (Andy mm) am I wrong?

Six turns omitted

Owen: The agricultural extension officers are way better at combining theory and practice than we are. There are those [farmers] who can do that, but they [i.e., the agricultural extension officers] are able to do that. The first and best step in changing yourself is to accept advice from agricultural extension officers. I would say so. (FG 4)

The excerpt illustrates issues of empirical credibility. Participants shared view on the important role played by extension services for changes in agricultural production is shown by both listener support (Andy mm) and arguments (Owen's supporting Carl's argument). In this excerpt, extension services are ascribed credibility due to their perceived ability to combine theory and practice. Hence, the analyses suggest that questions of epistemology underlie issues of credibility, and particular relevance were ascribed to practical and experience-based knowledge.

Credibility of the frame articulators – I found farm magazines, news media, extension service firms, and colleagues to be the most important sources of information guiding farmers' decision making in general and, more particularly, regarding the issue of climate change. The two dimensions of consistency and empirical credibility appeared to underlie the farmers' judgment of frame articulators: first, to what degree knowledge production is analytically versus practically produced and, second, aspects of whether claims were perceived as aligned or conflicting with consensual views. In frames in which empirical credibility was attributed to practical knowledge, colleagues, farm magazines, and extension services were seen as more credible but mainstream media and science as less credible. Frames emphasizing the mixture of analytically derived and practical experience typically put more trust in extension services, while colleagues and science came second, and both mainstream and specialized media were viewed as the least trustworthy.

For those farmers who perceived the conflict frame of communication as credible, media reports on climate change were perceived as biased, reflecting only frames of anthropogenic climate change and paying no attention to frames of natural

climate change. In the conflict frame of communication, scientists were believed to be motivated by underlying vested interests. Descriptions related to conspiracy, such as climate science as a hoax or sustained swindle, partly formed the conflict frame of communication.

To sum up, I found that the underlying dimensions of credibility – analytical versus practical knowledge and conflict-oriented versus consensus-like information – shaped perceptions of what was deemed a credible climate change frame. Generally, the focus group participants found colleagues and extension services to be more trustworthy than scientists and media: taken together, the plurality of the voices of colleagues and extension agents was seen as a prerequisite for their credibility. The collective action frame of human-induced climate change, as found in the Swedish information landscape surrounding farmers, including in news media (Olausson, 2009), farm magazines (paper I), and official Swedish agricultural policy (among others SBA, 2007, 2013), appeared low in credibility to the farmers participating in the focus groups in several respects: first, due to the abstract and analytical reasoning underlying scientific knowledge of climate change; second, due to the consensus-like coverage of climate change; and third, due to the low credibility of many of the frame articulators of climate change. The frequency, extent, and intensity (Krueger, 1988b) of issues of credibility in the discussions of climate change communication indicate their importance as key determinants of whether a frame resonates with an audience.

5.2.3 Climate change frames and framing processes by Swedish farmers and by the general public

While I conclude that specialized media in the form of Swedish farm magazines differ from general media in their depictions of climate change, I see no such trend when comparing the frames of climate change I found in discussions among farmers with those found in public perception studies. On the contrary, frames of climate change as a natural versus anthropogenic phenomenon (paper III) seem to be prevalent in various segments of the public. While studies have concluded that the general public in Western countries understands climate change as caused to varying degrees by natural processes and/or human activities (Leiserowitz et al., 2013; Pew Research Center, 2012; Poortinga et al., 2011; Shuckburgh et al., 2012), the findings of paper III suggest that such frames are formed during interactions and discussions in which participants jointly construct and negotiate various meanings. Paper III exposes the various framing devices underpinning a certain interpretation or frame. My study also found that elaborations and interpretations of experience were central to the sense-making processes of

climate change. The importance of experience for environmental and climate perceptions has been recognized more recently (Akerlof et al., 2013; Howe et al., 2013; Myers et al., 2012; Olausson, 2011; Ryghaug and Solli, 2012; Weber, 2010; Weber and Stern, 2011). Some studies demonstrate, for example, that laypeople may interpret changes in weather as evidence of climate change (Akerlof et al., 2013; Ryghaug and Solli, 2012). Similarly, in investigating the extent to which perceptions of local climate change correspond to historical climate data, Howe et al. (2013) found that respondents who perceived a recent warming trend were more likely to have been exposed to higher mean temperature anomalies at both the national and local levels than those who perceived a cooling trend or no trend. However, paper III problematizes such findings by demonstrating that experience of the same event, such as changed local temperatures, can be used to frame climate change in different ways and support contrasting arguments, for example, being used as evidence both for the existence of human-induced climate change and for climate change being a natural process.

Climate change communication from the point of view of specific audiences is under-studied, and the results of paper IV suggest that research into how a particular audience makes sense not only of climate change but also of climate change information and communication is crucial in order to understand reactions and responses to messages on climate change.

6 Discussion and concluding remarks

People arguably differ in how they conceptualize and understand a changing climate. This thesis set out to analyse the formation of climate change frames in Swedish agriculture, addressed through questions of what frame articulations of climate change are potentially available to farmers and are discussed by them. The thesis has also addressed questions of how framing devices are used to form climate change frames and how the credibility of frame articulations of climate change can be judged. Key results propose that climate change sense-making processes are complex, involving associative thinking and experience-based knowledge in forming interpretations of climate change. Associations and personal experiences were found to underlie the many framing devices that formed climate change frames and, consequently, the support or rejection of diagnostic and prognostic claims. Climate change sense-making processes were also found to be complex as suggested by the many ways in which climate change information was understood. The research design, which sought to analyse a particular audience view of both climate change and climate change information, yields insights not only into audience-specific sense-making processes of climate change but also into audience-specific ways of making sense of climate change information.

The studied farm magazines covered themes of the agricultural contribution to climate change, climate change effects on agricultural production, and climate politics, but implicitly employed frames of conflict, scientific certainty, and economic burden in communicating climate change to their readerships. The farmers themselves instead ascribed meanings to climate change using the frames of climate change as natural or as human-induced. In and through the communication processes, frames of climate change were formed with keywords, metaphors, examples, analogies, and distinctions. Generally, then, this thesis contributes empirical findings to support theories that emphasize the importance of experience-based and associative thinking rather than analytical thinking for sense-making processes (Kahneman, 2011). The study contributes to the fields of media and communication studies, environmental sciences, applied climate change communication in the agricultural sector, and frame analysis and its applications.

6.1 Media and communication studies

The main empirical contribution of this research to the field of media and communication studies of climate change is its examination of what could be understood as a "public in particular" (Michael, 2009), namely, the study of climate change communication processes for and among farmers. When it comes to media studies of climate change, the empirical basis generally comprises

mainstream media, be it broadcast media or print media such as high-quality newspapers or tabloids (e.g., Akerlof et al., 2012; Dotson et al., 2012; Nerlich et al., 2012; Vestergård, 2011; Waitt et al., 2012; Zamith et al., 2013). However, little attention is paid to specialized media targeting particular groups of people. For communication studies of climate change, such groups would typically be selected based on their relevance to contributions to and impacts of climate change. The present analysis of Swedish farm magazines suggests that specialized media differ from mainstream media in their coverage of climate change (paper I, II). In Sweden, for example, farm magazines focus less on dystopian scenarios of climate change and more on agricultural contributions and effects (see section 5.1.2). This thesis specifically pinpoints two aspects relevant to the field of climate change communication.

First, the study of media and communication needs to broaden its scope so as not to risk lack of balance in the choice of empirical material. As mainstream media disseminate information via the largest distribution channels to large segments of the population at the same time, they are often studied because they represent what most media consumers are likely to encounter. Following the argument that the public is diverse and can be segmented in many ways and for different purposes (Barnett and Mahony, 2011), the information presentations on climate change directed to these particular publics supposedly differ from each other. Hence, unbalanced empirical material favouring mainstream mass media is likely to ignore the diversity of publics and media targeting specialized audiences. It follows that the mediation of climate change and the study of it should cut across not only national lines, but also cultural groupings – cultural, in this context, being broadly interpreted as referring to a group of people sharing one or several aspects of life – as already suggested in 2006 by Lorenzoni and Pidgeon (2006) and affirmed in 2010 by Nerlich and Koteyko (2010) and Moser (2010).

Second, there is also a need for media and communication studies to broaden re/per/ception studies to include questions of how (specialized) media messages and climate information are perceived by particular publics. To date, studies of perceptions of climate change communication from an audience perspective have been rare. Given the many potential sources of information on climate change and the multidimensional frames of climate change possibly employed by them, there is a need to study how media messages and climate information are perceived, in order to deepen the current understanding of climate change communication. For example, this raises questions of how audiences relate to and make sense of sometimes conflicting frames. In analysing focus group participants' framing of climate change communication, I found contradictory views of what constitutes credible climate information (paper IV). Preferences for consensus and conflicting frames of communication appeared in the material, though with an emphasis on the latter (see section 5.2.2). The conflict frame of communication, in which

information is seen as credible when it presents conflicting messages, contradicts the current understanding that the greater and more transparent the contradictions are, the *less* resonant the frame (Benford and Snow, 2000). Empirical investigations of audience perceptions of climate change information are clearly crucial in order to gain a comprehensive understanding of climate change communication.

6.2 Environmental sciences

To the field of interdisciplinary environmental sciences this dissertation contributes with an understanding of how climate change is communicated and understood in a sector highly sensitive to the impacts of climate change, while its activities also contribute to such changes. The present empirical results emphasize that Swedish farmers' understandings of climate change do not always conform to those conveyed by either the specialized or mainstream media, suggesting that perceptions of an issue are not automatically linked to information on the issue – a matter long discussed in much more detail elsewhere (see, e.g., Bauer et al., 2007; Irwin and Wynne, 1996; Reddy, 1979).

For example, this thesis concludes that the main themes reported by farm magazines were agricultural GHG emissions, effects of climate change on agricultural production, and climate policies (paper I). The main theme treated in the focus group discussions was the existence of climate change, while GHG emissions were rarely mentioned and the effects of climate change and climate policy were talked about only in passing (paper III). The empirical materials also differed in their implicit frames. While farm magazines depicted climate change using frames of conflict between different production systems, national agricultural contexts, or sectors, frames of economic burden due to stricter climate policies, and frames of scientific certainty (paper I), these frames were not as apparent in the focus group discussions (paper III). During the discussions with farmers, climate change was, in contrast to the certainty frame found in farm magazines, framed primarily as natural, with little or no human component (paper III). The farmers understood climate change as variations, cycles, and recurring patterns more than as change. The differences in articulations of climate change *to* farmers and how it was communicated *among* farmers remains when taking the wider information landscape into consideration. While Swedish news media have depicted climate change as a social problem calling for collective action, both transnational and national (Olausson, 2009; Shehata and Hopmann, 2012), such a framing of climate change seems inconsistent with a discussion of whether climate change can be seen as natural or human induced (paper III). Even though Sweden may exemplify a media landscape defined by relative consensus as to the certainty, extent, and effects of climate change, the farmers participating in the focus groups seem to resist such a consensual frame.

This study suggests two reasons why understandings of climate change differ in the media (general news + specialized media) and among farmers participating in the focus groups: 1) the farmers' interpretations of their own experiences (paper III) and 2) the view that a credible information landscape should contain a plurality of perspectives (paper IV). First, during the focus group discussions, participants often recalled the weather of recent decades but drew different conclusions. While some saw changes in growing season length as signs of climate change, it was much more common for such events to be interpreted as evidence that variations in climate were "natural". The same experienced phenomenon, for example, longer growing seasons, was used to draw conclusions in either direction, being treated as evidence of human-induced climate change or of "natural" climate change. Experience, therefore, seems to shape the farmers' perceptions of climate change, and their interpretations of their own experience were often used to support the frame of natural climate change, so activities to respond to climate change were accordingly dismissed. Second, issues of credibility seemed to underlie perceptions of climate change information. The farmers seemed to be skeptical of any message that was too homogeneous. Drawing upon how they make decisions in general, the farmers in the focus groups repeatedly stressed that the greater and more transparent the contradictions between claims, the greater the feeling of having a sufficient knowledge base for farm-level decision and action. As Hulme (2009) reminds us, climate change has multiple social meanings, and the dominant collective action frame, including the dominance of mitigation over other aspects of climate change in Swedish media and policy, is understood as lacking in plurality. It was found that both news media and climate science had low credibility, as their messages were perceived as biased and one-sided, not conveying the whole spectrum of ideas believed to exist. News media and climate science were also judged as less credible due to their perceived lack of practical agricultural experience. On the other hand, colleagues and agricultural extension services were found to be credible primarily due to their perceived practical knowledge base.

Although limited in their scope, the results of this thesis suggest that the links between the coverage and climate change frames used by (specialized) media and the frames upheld by their audiences are marked by complex processes, and that assumptions as to causal links should be questioned. These results are in line with trends in communication theory arguing that messages are seldom transmitted in a linear fashion, but are usually grounded in dialogue and contextual understanding (Craig, 1999; Irwin and Wynne, 1996; Linell, 2009). These results stand in contrast to the "conduit model", which holds that simply supplying more information on an issue will convince the public to change its behaviour in a supposedly "right" way (Reddy, 1979). The conduit model assumes public deficiency: citizens lack either enough or the right kind of knowledge, and thus fail to display sufficiently receptive attitudes (Bauer et al., 2007). This thesis has

demonstrated that climate change communication is a much more complex process than simply filling assumed knowledge gaps on the part of public, because it includes interpretation processes formed by associative thinking and experience-based knowledge.

6.3 Applied climate change communication in the Swedish agricultural sector

As the credibility of climate change information is judged by how knowledge of climate change is produced (see section 5.2.2, paper IV), the very concept of climate change is embedded with challenges. Defined by statistical measures, climate change comprises long-term changes identified through, in the words of the IPCC, "analyses from observations of the climate system, paleoclimate archives, theoretical studies of climate processes and simulations using climate models" (IPCC, 2013, p. 4). Scientific knowledge claims tend to be theoretically and analytically derived and may be seen as less credible than everyday experiences. However, agricultural extension agents were generally regarded as trustworthy by the farmers in the focus group discussions and may therefore become important "knowledge brokers" (Meyer, 2010). At the same time, it should be remembered that it is not just a question of *who* should communicate about climate change, mitigation, and adaptation, but also *how* –with what frames and communicative tools? In accordance with Hulme's (2009) argument that climate change has shifted towards becoming a social phenomenon with multidimensional frames, the farmers repeatedly stressed that climate change communication should include a plurality of perspectives to be seen as credible. Frames presenting climate change in terms of consensus and scientific certainty were believed to be biased. Therefore, for credible climate change communication, there is potentially a need to open up the discussion of climate change, discuss natural and anthropogenic climate change, and show the complexity of GHG emissions and their sources, not separating global and local scales but illustrating their linkage. Even though it may be hypothesized that a conflict-oriented communication model would increase the credibility of climate information, it must be pointed out that there is a lack of research into the relationship between conflicting climate change messages and understandings of climate change.

Furthermore, in climate change communication activities, framing devices such as metaphors and prototypical examples can be used to signal certain frames, whether framing climate change as an impending catastrophe with the help of war metaphors (paper II) or as an economic burden (paper I). In every society, major social issues have such reference points that inform how we make sense of the world (Kitzinger, 2000). Therefore, the conscious use of climate change frames and their framing devices, along with awareness of what they emphasize but also

hide, could facilitate climate change communication initiatives. As the audiences of such initiatives may be diverse in their beliefs about climate change, regarding both its causes and what are seen as appropriate responses, a greater focus on what motivates action – whether mitigation or adaptation – may also facilitate dialogue. Such motives may include more than just physical climatic changes, such as the influence of national and international climate policy on agricultural production, consumer and market trends, and media depictions of farmers.

6.4 Frames and frame formation

Although theories suggest a dividing line between laypeople's associative and experience-based thinking in contrast to researchers' analytical thinking (Kahneman, 2011), the use of the picture frame metaphor to concretize frame definitions such as "the organization of experience" (Goffman, 1974), or "central organizing ideas" (Gamson and Modigliani, 1987, p. 143), suggests that metaphorical structuring is central to analytical thinking as well. As metaphors are said to structure how we perceive, think, and act, the use of the frame metaphor to concretize interpretation and sense-making processes needs careful reflection. Through metaphor theory, we learn that the perception of one thing (i.e., target) in terms of another (i.e., source) helps us understand abstract phenomena. By linking the two conceptual domains, "frame" and "sense-making processes", the more concrete frame may possibly explain the more abstract processes of sense-making. What, then, are the advantages and disadvantages of using the metaphor of a frame for the analysis of sense-making processes?

Treating the frame as a metaphor for sense-making guides how we understand sense-making. For example, phrases such as "inside and outside" are common in the language of frame analysis. While the metaphor of a picture frame, whose framed contents change if the frame is reoriented, helps concretize the idea that an issue can be understood in many different ways and from various angles, metaphors always risk being treated as equivalent to the entities they describe – what Hamington (2009) calls "the metaphoric fallacy". Such a fallacy occurs if we treat sense-making processes as if they *were* a frame rather than *like* a frame. For example, the metaphorical reference to a frame invites a view of sense-making as fixed, stable, static, and predetermined. While the metaphor of a picture frame directs one's thoughts towards the content within the frame, less attention is paid to the frame itself and how it came to be. From a dialogistic viewpoint, sense-making processes are much more complex and contain many more dimensions than the frame metaphor conveys. From this perspective, sense-making processes are dynamic processes in which meanings are constructed, negotiated, and formed, so frame analysis treats a snapshot of frames at a particular time, in a particular context, even though they might, as this study demonstrates, echo cultural assumptions.

I argue that the disadvantage of the frame metaphor is that it may lead us to understand interpretation and sense-making as static entities, and that frame analysis is easily reduced to an analysis of the variety of perspectives on an issue. From such a starting point, analyses tend to focus on the effectiveness of a message, and in the field of climate change, communication analysis focuses on how the frame of anthropogenic climate change is best communicated in order to induce people to change their behaviour (see, e.g., Moser, 2010, Moser and Dilling, 2007; Nerlich et al., 2010). Such a model of communication implies a rather static and monological view of senders, receivers, and the conveying of messages. In contrast, interactional frame analysis (Benford and Snow, 2000; Dewulf et al., 2004, 2009; Gray, 2003, 2004) highlights the dynamic processes of framing. This thesis contributes to interactional frame analysis by adding a dialogistic point of departure to frame analysis. From such a starting point, meaning is created when we interact with others and the world, as it is believed that no human being is autonomous from others; on the contrary, we are strongly interdependent with others (Linell, 2009). In contrast to a reading of frames as fixed, stable, and static, this thesis considers how participants in group conversations interact to shape frames, how framing devices such as keywords, examples, metaphors, analogies, and distinctions are used in argumentative chains, how frames circulate in the material – how the frames come and go, enter and disappear, or co-exist in parallel. This thesis pinpoints that frame analysis needs to carefully reflect upon the analytical, yet metaphorical representation of a frame, so as not to risk treating the analytical frame as equivalent to a picture frame.

This thesis has analysed climate change frames and frame formation from an audience-specific departure point. In doing so, the research highlight questions regarding the extent to which frames can be seen as issue-specific – that is, particular to an issue – and audience-specific – that is, particular to an audience. Are there frames that are specific to climate change? To what extent do climate change frames differ from the frames of other issues? Furthermore, are there any trends in how particular segments of the public frame climate change? To what extent do various audiences frame climate change differently from other issues? Similarly, to what extent are framing devices such as metaphorical representations of climate change linked to particular audiences? An audience-specific perspective on climate change communication revitalizes de Vreese's (2005) distinction between "issue-specific frames" that need only be pertinent to particular topics or events, and "generic frames' intended to transcend thematic limitations, often over time and across cultural contexts. Despite claims of wide-ranging applicability, and thus greater comparability, Porter and Hulme (2013) argue that generic frames often go untested, particularly beyond national boundaries. In an analysis of British media frames of geoengineering, Porter and Hulme (2013) sought issue-specific frames but found that journalists tended to use

generic frames drawing, for example, on underlying assumptions about the nature–human relationship. Taken together, the present findings and those of Porter and Hulme (2013) indicate that there are frames that seem to move beyond particular issues to become more generic. In parallel, the finding of war, lottery, and game metaphors in the studied farm magazines (paper II), and the finding of "gold rush" and "wild west" metaphors in business magazines, Nerlich and Koteyko's (2010) suggestion that climate change sense-making processes and frames differ among segments and contexts. However, as there is a limited amount of relevant research, further research into issue- and audience-specific frames and framing devices is needed to deepen our current understanding of frames and frame formation.

7 References

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Appendices

Appendix A: Search terms for reviews of framing literature in relation to climate change

Both reviews were conducted using the Scopus Database, a multidisciplinary database covering more than 20,000 journals from more than 5000 international publishers. For more information, see http://www.elsevier.com/online-tools/scopus.

Search terms used for general review of frames and climate change

((TITLE-ABS-KEY(fram*) AND TITLE-ABS-KEY("climate change") AND NOT TITLE-ABS-KEY("framework*") AND NOT TITLE-ABS-KEY(framboid*) AND NOT TITLE-ABS-KEY("time frame*") AND NOT TITLE-ABS-KEY("fram strait"))) The search was made 2013-09-17.

The first identified article was published in 1991. Of the 805 identified articles, 247, which correspond to 31% of all articles, were published between 1991 and 2008. Between 2009 and 2013, 558 articles were published, which corresponds to 69% of all published articles in the period. One hundred abstracts were chosen for screening, using the Excel random number generator.

Search terms for specific review of "frame analysis" or the like and climate change

Your query: (TITLE-ABS-KEY("climate change*") AND TITLE-ABS-KEY("fram* analys*") OR TITLE-ABS-KEY("analys* of fram*") OR TITLE-ABS-KEY("fram* concept*") OR TITLE-ABS-KEY("concept* of fram*") OR TITLE-ABS-KEY("fram* theor*") OR TITLE-ABS-KEY("theor* of fram*") AND NOT TITLE-ABS-KEY(framboid*) AND NOT TITLE-ABS-KEY("framework*") AND NOT TITLE-ABS-KEY("frame work*") AND NOT TITLE-ABS-KEY("time frame*")). The search was made 2014-03-11.

Appendix B: Interview guide for focus group discussions

Opening

- Ask each farmer to share: What is your main product and what is the best thing about being a farmer?

Climate change

- What comes to mind when you hear the words "climate change"?

  Depending on what participants bring to the discussions, see that the following questions are addressed (explicitly or implicitly):

  - What is climate change?
  - Mitigation: Should we prevent climate change? Why?
  - Responsibility: Should you, as a farmer, [attempt to] mitigate climate change? Why? How are others responsible?
  - Adaptation: Do you think changes in precipitation patterns and temperature may affect your production? If yes, how would you adapt?

Knowledge, information, and decision-making

- If you think that you have to do something about climate change, where do you get your information/where do you turn?

  Depending on what participants bring to the discussions, see that the following questions are addressed (explicitly or implicitly):

- How do you acquire knowledge? From where? Why from there? Credibility?
- What information do you need? To what extent is that information available today?
- What role do agricultural extension services play?

Ending

- Of all aspects we have raised in this discussion, which is the most important? Do you have anything else to add?

Papers

The articles associated with this thesis have been removed for copyright reasons. For more details about these see:
http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-105997