

Breaking the Ice: Slowly Warming to the Topic of Climate Change

Quantifying German Students' Perceptions of Climate Change and Testing Framing to Communicate the Topic

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Abstract:

As current approaches of climate change communication addressing the public have proven rather ineffective not triggering action on climate change, including behaviour changes in a more sustainable direction, this thesis seeks to lay the basis for prospective climate change communication strategies addressing German university students and therefore, to contribute to climate change communication science. Thus, the knowledge gained in this thesis can inform future research as well as practical approaches of climate change communication targeting German university students. The problem is approached in a two-fold way. In the first part, current perceptions of German students on the topic of climate change are assessed to gain a deeper understanding of the status quo. In the second part, three different frames to communicate the topic of climate change namely *alarmism*, *common human identity* and *uncivilization* are tested with regards to the emotional state that they create. This is done following a quantitative approach by conducting an online survey and analyzing the data statistically.

Findings suggest that there is a good point of departure for prospective climate change communication approaches to be effective. Overall the necessary conditions and favourable attitudes for change to occur are in place. German university students, who took part in the online survey, seem to be an easily accessible and receptive target audience once an appropriate climate change communication strategy is crafted. A majority, about 94,1% of the students having taken part in the online survey, thinks of climate change as a serious problem. Interestingly, also a plurality of them demands more information on the topic of climate change. Furthermore, interpersonal communication about the topic of climate change occurs when talking face to face, but almost never in the online space. An appropriate framing of the issue of climate change could not be found within this thesis. However, the results indicate that the *common human identity* framing is possibly the most suitable to bring the message of climate change across when targeting German students.

Keywords: Climate change communication, emotions, common human identity, alarmism, uncivilization, sustainability science.

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List of Abbreviations

AR5	Fifth Assessment Report
COP21	21st Conference of the Parties
IPCC	Intergovernmental Panel on Climate Change
SPSS	Statistical Package for the Social Sciences
UN	United Nations
WEIRD	The Western Educated Industrialized Rich and Democratic

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1 Introduction

1.1 Climate Change – An Almost Perfect Problem

The Intergovernmental Panel on Climate Change (IPCC) has continuously stressed the seriousness of the problem of climate change since publishing its very first report in 1990 (Barker, 2008). In its newest report, the Fifth Assessment Report (AR5), the IPCC (2014) once more emphasized the magnitude and high urgency of the problem of climate change. Information and scientific facts have piled up (Wong-Parodi & Bruine de Bruin, 2016), identifying climate change as one of the biggest challenges facing humanity in the 21st century, if not the biggest (Reese, 2016; Roeser, 2012). However, all these warnings seem to have fallen on deaf ears. Humanity has, in this period of time, by far not reacted sufficiently to stop global warming or at least to put a halt to it (IPCC, 2014). In Paris, at the United Nations (UN) 21st Conference of the Parties on Climate Change (UNFCCC COP 21), an agreement was made to keep the temperature rise *well* below 2 degrees. However, this seems now to be a goal that is very unlikely to be reached as already many tipping points have been passed or will be in the near future (Knutti, Rogelj, Sedláček, & Fischer, 2016; Stockholm Resilience Centre, n.d.).

Many scholars argue that it is the topic of climate change itself that hinders solutions to evolve and to get people actively engaged (Stoknes, 2014; Norgaard, 2011; Shome et al., 2009). Climate change is a very complex problem that entails many barriers and challenges when trying to deal with it. In fact, it directly activates barriers and biases in our brains, which in turn are very poorly equipped to deal with an issue like climate change (Stoknes, 2014). Taking this into account, climate change communication is a very complex undertaking, trying as it does to bring the message across and trigger behaviour change (Nerlich et al., 2010).

Overall, climate change communication over the last decades has become an increasingly important scientific (Pearce et al., 2015) as well as social issue (Nerlich et al., 2010). Emerging from the field of science communication (Pearce et al., 2015) it has developed into a highly interdisciplinary research area (Moser, 2016). Climate

change communication science has moved beyond the research disciplines that originally dealt with this topic and therefore, commonly defined the problem of climate change such as physical science and neoclassical economics (Stoknes, 2014). Now it is further dealt with in social and cognitive psychology, communication studies as well as the broad range of social sciences (Nerlich et al., 2010). This is an advantage as most of the communicators being physical scientists lacked a profound understanding of communication and behavioural science (Rayner & Minns, 2015). Communication research examines the interactions between science, media, politics and other stakeholders. Behavioural science, by contrast, studies such areas as the perception of risk, behaviour change and barriers that hinder action to be triggered (Nerlich et al., 2010). In particular, psychological research has influenced climate change communication science. Psychological studies examined ingrained tensions that have shaped the public climate change debate to date and thereby, focused on breaking widely held climate change myths or on expanding the dialogue about climate change (Pearce et al., 2015).

According to public surveys, there is a rising concern regarding the topic of climate change worldwide (Wike, 2016; Brüggemann, Neverla, Hoppe & Walter, 2016), with a majority of people, about 78%, of the global population believing that we are on our way towards an environmental disaster (Ipsos MORI, 2017). Despite this concern, it is not a top priority for most people (United Nations, 2017) and neither does it translate into action (Nerlich, Koteyko & Brown, 2010; Ereaut and Segnit, 2006). There is no will to support broad political and social changes as those would as well include immense changes of our current lifestyles (Geiger & Swim, 2016; Roeser, 2012). This suggests that current climate change communication strategies that aim at engaging the public more actively have proven to be ineffective (Corner & Groves, 2014; Whitmarsh, Lorenzoni, & O'Neill, 2012). Thus, there is a crucial and urgent demand for new climate change communication approaches to evolve now.

1.2 Aim of Research, Research Questions & Hypotheses

With this thesis it is intended to lay the basis for new communication strategies with regards to the topic of climate change targeting German university students and therefore, overall to contribute to climate change communication science. The term

climate change communication in this thesis follows the understanding of Rayner and Minns (2015) or Nerlich, Koteyko and Brown (2010) and refers here to the communication of climate change related information to society with the aim of ultimately triggering behavior change in a more sustainable direction.

My approach in this thesis to the problem is two-fold. In the first part of my thesis, I will investigate the perceptions of students on the topic of climate change to gain a deeper understanding of the status quo. Studies of public perceptions are considered basics in climate change communication as those provide indispensable knowledge about the targeted audience in order to tailor climate change communication strategies accordingly (Pearce, Brown, Nerlich, & Koteyko, 2015). Here climate change communicators who influence German students in their perceptions on the topic of climate change are considered all those who communicate the message of climate change to the wider public, including those without the aim of explicitly triggering behaviour change. So for example educational institutions, NGOs, governments, the media, etc. are considered climate change communicators. This definition of climate change communicators is employed due to the fact that students are influenced by all of them and I want to focus on the added impact by all of them in order to understand the current perceptions of German students on the topic of climate change. This knowledge of the status quo then provides the basis for improving climate change communication strategies with the final aim of motivating behaviour change.

The second part of my thesis is the solution-oriented part. Here, I will test three different frames, namely *alarmism*, *common human identity* and *uncivilization* in terms of their capability to provide a better departure point to trigger behaviour change when communicating the topic of climate change. The more favourable departure point in order to motivate a more sustainable behaviour will be measured in terms of emotions as the emotional state that is created through communicating climate change related information can be according to Roeser (2012) and Lu and Schuldt (2015) a decisive factor for climate change communication to be ultimately effective or not.

My contribution to climate change communication with this thesis can therefore be considered a first groundwork. With the knowledge gathered in this thesis about the current predominant perceptions of climate change among German students and about the capabilities of frames to create a different emotional state it is hoped to later on help climate change communicators craft improved communication approaches addressing German students in order to motivate behaviour change.

Therefore, my main research questions are as follows:

RQ1: What are the current perceptions of the topic of climate change among German students?

RQ2: What emotional effects can different framing of climate change create?

For the first research question, concerning the current perceptions of climate change among German students, I will test four hypotheses, which deal with the necessary conditions in order for behaviour change to take place, in detail with attitudes, particularly the concern, towards the topic of climate change, the perceived state of knowledge, the perceived impact of one's acting and the communication behaviour.

To classify the attitudes of students towards climate change I will use an audience segmentation developed by Maibach, Leiserowitz, Roser-Renouf & Mertz (2011a). According to the authors of the typology "audience segmentation is a process of identifying groups of people within a larger population who are homogeneous with regard to critical attributes (e.g., beliefs, behaviors, political ideology)" (Maibach et al., 2011a, p.1-2). Here variables coming from four subject areas (global warming beliefs, issue involvement, climate-relevant behaviors and preferred societal responses) were included. In the end, this typology groups participants according to their attitudes into six audience segments: the Alarmed, the Concerned, the Cautious, the Disengaged, the Doubtful and the Dismissive. These segments form a continuum and vary in the participants' beliefs about climate change, the participants' engagement with the topic, the degree to which participants act on the issue, and how participants would like the actions of governments, businesses and citizens to be in response to climate change (Maibach et al., 2011a). See appendix A for questions included in the

audience segmentation. The level of concern, which is a core dimension of this typology (Metag, Füchslin & Schäfer, 2015), is in so far important as it can be a necessary prerequisite for a response and ultimately action (Leiserowitz, 2007). The same is true for the perceived level of knowledge (*response efficacy*) and the perceived possible impact following one's actions (*self-efficacy*), which means it is sufficient to think one knows enough about the topic of climate change and one's action will actually have an impact to indeed get active (Bandura, 1977; Beck & Frankel, 1981; Cismaru, Cismaru, Ono, & Nelson, 2011; Maddux & Rogers, 1983 as cited in Geiger, Swim & Fraser, 2017). So here it is still assumed that the information-deficit plays a role when aiming at behaviour change in climate change communication. If people have enough information about the topic they will start acting on climate change so the assumption (Corner & Groves, 2014; Whitmarsh, O'Neill, & Lorenzoni, 2012). In contrast to the information-deficit assumption, however, which informed climate change communication strategies for many decades, it is not seen anymore as the only condition that is central. The level of information is much more one aspect among many and by far not the sole that climate change communication has to take care of. Furthermore, action is here understood as action on climate change, for example a more sustainable lifestyle including behaviour changes. As students are the target group this action has to be understood within the limits of the resources of this specific group. Therefore, action might overall include small behaviour changes as for example saving energy. However, those three aspects, the level of concern, *response efficacy* and *self-efficacy* are "necessary, but insufficient condition[s] to motivate an individual or collective response" (Leiserowitz, 2007, p. 4) and standing on their own it is therefore not given that action will actually follow.

To measure another step into the direction of action, I will concentrate on student's communication behaviour as many scholars argue discussions and above all interpersonal dialogue is the first step to change and thus, to actively get engaged (Geiger et al., 2017; Pearce et al., 2015). However, there is also the assumption of a *climate spiral of silence* by Maibach, Leiserowitz, Rosenthal, Roser-Renouf and Cutler (2016). This refers to "a socially constructed silence" (Norgaard, 2011, p.82) or a "pluralistic ignorance" (p.79) about the topic of climate change (Geiger and Swim, 2016, p. 79). Because people may not often hear others talk about climate change,

they will therefore according to Maibach et al. (2016) wrongly assume the overall concern about climate change is not very high. This in turn then leads to self-silencing. I will test this in the last hypothesis as part of examining perceptions of climate change among German students.

- *Hypothesis 1:* A great majority of German students is according to their attitudes towards climate change concerned about this issue.
- *Hypothesis 2:* German students think they are well informed about the topic of climate change (*response efficacy*).
- *Hypothesis 3:* German students feel that their actions on climate change will have an impact (*self-efficacy*).
- *Hypothesis 4:* Even though students show a great concern regarding climate change, communication in terms of speaking and online conversation is at a low level because students do not hear others very often talk about this topic. There exists a *climate spiral of silence* among German students.

For the second research question, I aim to test three different frames of climate change in terms of the emotions they create, namely *alarmism*, *common human identity* and *uncivilization*. Framing is vital as according to Scheufele (1999) and Lakoff (2010) it can provoke specific reactions among the targeted audience. Alarmism is a common tone in climate change communication. However, it is seen as rather hindering people to actively engage in the climate change combat as it creates an emotional basis that is not beneficial (Moser & Dilling, 2004; Lorenzi, Nicholson-Cole & Whitmarsh, 2007). Therefore, I will test if the *common human identity* frame and/ or the *uncivilization* frame is more successful in creating favourable responses in terms of emotions. Regarding the emotions, here I am particularly interested in fear as this feeling can provide a barrier (Moser & Dilling, 2004). Furthermore, I am interested in worry, interest and hope as those discrete emotions were identified by Smith and Leiserowitz (2014) to already have the ability to influence support for climate policies.

- *Hypothesis 5:* The *common human identity* frame and the *uncivilization* frame create emotions, which are more favourable (high levels of worry,

interest and hope; low levels of fear) in order to trigger action on climate change than the *alarmism* frame.

1.3A Note on Wording

Regarding the terminology, there is an ongoing debate on how to name the phenomenon; climate change or global warming, when communicating it. Whitmarsh (2009), Schuldt, Konrath & Schwarz (2011) and Leiserowitz et al. (2014) argue for example that people respond differently depending on whether they hear the phrase climate change or global warming. In this thesis, however, I will use the term climate change, as this is the most common phrasing in Germany. It is widely used in media when referring to this phenomenon (Spiegel Online, n.d; Zeit Online, n.d.) as well as by governmental departments such as the Federal Ministry for the Environment (Umweltbundesamt, 2016).

2 Background & Justification

2.1 Background

In 1988 the issue of climate change hit the headlines worldwide for the first time and started to gain the attention of the public. It was the year that was recorded to be the hottest since the middle of the past century and it was when the director of the NASA at that time stated that the greenhouse effect was affecting the climate (Christianson, 1999 as cited in Leiserowitz, 2007). Since then climate change awareness has been increasing globally (Brüggemann et al., 2016; Leiserowitz, 2007) even though it varies enormously from region to region as well as over time (Capstick et al., 2015; Lee, Markowitz, Howe, Ko & Leiserowitz, 2015).

While in recent years climate change has been considered a serious problem and concerns over it were rising in many countries until approximately 2007, in the next years to come this was followed by a period of significant drops in terms of public concern and belief until in 2010 a stage of stabilization was reached again (Capstick et al., 2015; Ratter, Philipp & Storch, 2012). In the 2000s, despite the increasing scientific evidence there was also an increase in public scepticism about climate change, especially in Anglo-American cultures (Engels, Hüther, Schäffer & Held, 2013; Ipsos MORI, 2014). To date, climate scepticism has entered mainstream culture in countries like the United States and the United Kingdom, but it has not spread much to other industrialised countries (Engels et al., 2013).

Recent polls show that climate change is an issue of mounting concern to a plurality of people on the globe. With a range from 54% to 85% of the median people taking part in a survey conducted in 40 countries say it is a very serious or rather somewhat serious problem (Stokes, Wike & Poushter, 2016). In 2016 in Europe people named climate change second out of eight when asked about the biggest threat they face (Stokes et al., 2016) and according to an Eurobarometer (2015) survey a vast majority of Europeans, about 91 %, classified the phenomenon as serious problem. Furthermore, most agreed that in order to combat climate change, changes in policy and their lifestyle would be indispensable (Stokes et al., 2016). This demonstrates that people in Europe seem to be increasingly aware of the issue.

In Germany, according to these new surveys the level of awareness and concern about the topic of climate change in general is above the European average but not at the very top (Stokes et al., 2016; Eurobarometer, 2015). The public debate about climate change is not a very controversial one in Germany (Schäfer, 2016) due to the prevalent opinion that climate change is happening and it has anthropogenic causes (Schäfer, 2016; Engels et al., 2013). Also the longstanding German environmental tradition might play a vital role here (Schäfer, 2016). This is confirmed by a study of Metag et al. (2015) who found that Germany has an especially large group of people alarmed about climate change; in fact, the biggest group in comparison to countries as the US, Australia and India. Moreover, the so called dismissive group of people who strongly doubt the existence of climate change or its anthropogenic causes could not be found in Germany (Metag et al., 2015) where climate change is a rather important topic also shown by a recent survey of the German Ministry for the Environment (Umweltbundesamt, 2015). In this survey 63% of those interviewed see a sufficiently protected environment and the combat against climate change as a must when trying to master future tasks like for instance globalization successfully. Furthermore, the majority of Germans are optimistic when it comes to their country's ability to fight climate change: around 60% tend to think they are rather part of the solution to climate change than part of the problem (Nicks, 2014). Thus, overall Germans are concerned about climate change but at the same time feel positively when thinking of the future.

2.2 Justification of the Target Group

Germany is an interesting case in many regards. Even though Germany has a strong environmental tradition (Schäfer, 2016) it is at the same time one of the high emitting countries, as it is a highly industrialized country. Furthermore, due to its location and comparatively small size it is not endangered in near future to be impacted greatly by climate change (Sharma, Hagen & Schwarz, 2016). Nonetheless, especially because of its high emissions Germany has a moral obligation to take action in the combat against climate change (Engels et al., 2013). The government has tried to make efforts and adopted a national action plan called "Energiewende" (energy transition) including ambitious measures to reduce its emissions. Therefore, it was recurrently

cited as an example of changeover en route to a low carbon society (Engels et al., 2013). However, at the current stage it seems that Germany will not be able to reach its objectives (Vahlenkamp, Ritzenhofen, Gersema & Kroppeit, 2017). All in all, Germany is a particularly interesting case because of this trade-off between its eagerness to fight climate change and its highly developed and highly energy-intensive industry with long-standing fossil fuel production and high levels of consumption. These contrasting interests and its attempts to bring them together bear a great potential of conflict (Schäfer, 2016; Sharma et al., 2016).

From the German population I chose students as my target group because the students of today will be the elite of tomorrow, taking the lead in industry and politics or as Wray-Lake, Flanagan & Osgood (2010) note “as they age, today’s young people will inevitably become national and global leaders with responsibility for environmental stewardship and sustainability” (p.2). It is this generation that faces the reality of climate change. According to latest studies (Corner et al., 2015) young people feel less fatalistic about fighting the changing climate than older people do. This is promising in so far as they consider the combat of climate change as still a doable task. Therefore, it is relevant to know what students think about and how they perceive the topic of climate change in order to shape climate change communication accordingly and enhance its impacts.

Moreover, there is only limited research available concerning the younger generation and their attitudes towards climate change (Wray-Lake et al., 2010; Corner et al., 2015) so it is even more important to conduct further studies on young people. In Germany there is some research on high school and primary students but most often it is rather about the understanding of the scientific background of climate change and misconceptions than about the perception of climate change as such (Schuler, 2009). However, recent studies show that young Germans have a slightly higher concern about climate change than elderly people but it is not their top priority (Kuckartz, 2009; Corner et al., 2015).

2.3 Relevance of a Sustainability Science Approach

Sustainability science according to Kates et al. (2001) “seeks to understand the fundamental character of interactions between nature and society” (p. 641) and further aims at creating knowledge for action (Cash et al., 2003) and therefore also at providing specific solution-oriented approaches (Jerneck et al., 2011; Kates et al., 2001). This thesis is thus guided by sustainability science principles as it aims at contributing to an enhanced understanding of German student’s connection to the topic of climate change while simultaneously is solution-oriented since it tries to build a basis for further climate change communication approaches.

Moreover, according to Clark (2007) “sustainability science is a field defined by the problems it addresses rather than by the disciplines it employs” (p. 1737). Here it is the issue of climate change communication, which is at the centre being a complex sustainability challenge. Sustainability science approaches might help identify possible solution pathways using an interdisciplinary approach. As Miller et al. (2014) suggest is a prerequisite in order to reach good knowledge for action. As social science and psychology have not been included for long in the field of climate change communication research the need to include more of those perspectives still exists (Nerlich et al., 2010; Moser, 2016). Additionally, considering that behaviour and especially behaviour change is of great importance in sustainability science a psychological point of view is beneficial. Since it is traditionally the discipline where behaviour is studied in-depth (Fernald, 2008). Hence, this thesis is informed by social science theory as well as psychology to broaden the perspective further.

3 Theory

3.1 Climate Change Communication

As current efforts in climate change communication have proven to be ineffective in terms of causing behavioural change and thus, not leading to a more environmentally friendly acting in response (Nerlich et al., 2010; Ereaut & Segnit, 2006) many scholars have called for new strategies to be adopted. There is a demand to move beyond the assumption of the deficit of knowledge in climate change communication, which implies that presenting more scientific facts about the topic will be sufficient (Corner & Groves, 2014; Whitmarsh, O'Neill, & Lorenzoni, 2012). This is because even if having enough information available and possessing the knowledge might be a prerequisite it is not enough to trigger a behaviour change (Jarreau, Altinay & Reynolds, 2017) as according to Kollmuss and Agyeman (2002) a gap between knowledge and action still exists.

Therefore, current climate change communication research highlights the importance of the understanding of affect, cognition and attitude in order for communication to be effective (Pearce et al., 2015; Rapley et al., 2014). As well as this, the relevance of a two-way dialogue has recently been recognized as vivid discussions (Pearce et al., 2015) and reflexive engagement (Nerlich et al., 2010) can further foster future changes. Yet, those calls have not been applied by using new communication strategies and leading to more public engagement (Corner & Groves, 2014). As Stoknes (2014) points out “a radical rethink of climate communications is necessary. But this requires a certain willingness to think differently and innovatively, as well as lots of determination and perseverance to experiment with trial and error” (p.166).

Interpersonal communication about the topic of climate change is a prerequisite for generating social change according to climate change communication scientists (Geiger et al., 2017). This is so as “change, then, occurs when a new way of talking replaces an old way of talking” (Barrett, Thomas & Hocevar, 1995, p.366) and so also “new ways of thinking about politics, power, and social structure are afforded by discussions of climate change” (Pearce et al., 2015, p.621). These new ways of thinking may lead to acceptance and support for broad public changes (Geiger &

Swim, 2016). Hence, climate change communication aims at triggering those private conversations. Nonetheless, climate change is not usually an issue up for discussion in private conversations (Geiger et al., 2017; Geiger & Swim, 2016) rather it is a topic that is surrounded by socially constructed silence (Marshall, 2014; Norgaard, 2011). People might not hear others talk about it often and therefore wrongly assume the overall concern about climate change is not very high (Leiserowitz, 2017). The pluralistic ignorance that is perceived by many does not exist and yet results in self-silencing as there is the fear to be challenged by others due to the assumption that the others do not share one's opinion (Geiger & Swim, 2016). Thus, Maibach et al., (2016) suggest that there might be a phenomenon called *climate spiral of silence*.

To ultimately achieve effective climate change communication, studies of public perceptions are indispensable since understanding the audience contributes to a better tailored communication strategy (Pearce et al., 2015). Nerlich et al. (2010) note "communicators can only be sure that their messages will be understood if they understand their audiences, their values, fears, hopes, and the situation of communication" (p.101) as only then it is possible to frame the topic of climate change accordingly (Corner et al., 2015) thus making the topic itself more meaningful and appealing to a specific audience (Nerlich et al., 2010). Thus, there is no general solution. Communication approaches always have to be adapted to a specific target group (Pearce et al., 2015). In my thesis, however, I will focus particularly on the perceived level of knowledge of the topic and the participants' belief to which degree they are able to trigger change as those two aspects, *response efficacy* and *self-efficacy*, determine the likelihood of participating in discussions about climate change and then could potentially lead to behaviour change (Bandura, 1977; Beck & Frankel, 1981; Cismaru, Cismaru, Ono, & Nelson, 2011; Maddux & Rogers, 1983 as cited in Geiger, Swim & Fraser, 2017). Thus it is assumed that enough knowledge of the topic leads to higher levels of awareness and then can contribute to an increased likelihood of adopting behaviour changes (*response efficacy*). The same is true for one's feeling that one's own action on climate change will be meaningful (*self-efficacy*).

All in all, according to Nerlich et al. (2010) climate change communication is such a complicated field since its “complexity is a double one, based on the complexity of climate change itself and on the complexity of the communication that is involved” (p. 98).

3.2 Emotion and Framing

3.2.1 Emotions drive people, people drive change

Emotions are often regarded as unreliable when it comes to decision-making processes. They are seen to befuddle the mind and thus, to entail a biased and irrational component. For this reason emotions are commonly ignored in climate change communication or political decision-making (Roeser, 2012). There is just one exception when emotional responses are desired and instrumentalized. This is when it comes to building support for a certain point of view (Roeser, 2012). Recent research, however, emphasizes the importance of the inclusion of emotions in those processes (Slovic & Peters, 2006). Especially for climate change communication emotions might play a vital role as Roeser (2012) points out: “Emotions might be the missing link in effective communication about climate change” (pp. 1033-1034). In the following section I will therefore describe in more detail why emotions are seen as a crucial aspect when addressing the topic of climate change.

Firstly, emotions are according to Meijnders, Midden, and Wilke (2001) no threat to rational decision making but a decisive aspect of it. Without emotions we would actually not be able to reach a rational decision. This is because emotions enhance and deepen our reflection and at the same time provide moral guidance (Roeser, 2012) or as Lakoff (2010) states, “without emotion, you would not know what to want, since like and not-like would be meaningless to you. When there is neither like or not-like, nor any judgment of the emotional reactions of others, you cannot make rational decisions” (p.72). That is why simply presenting facts to people does not help them in reaching the right decision (Lakoff, 2010).

Moreover, emotions have the ability to help in a two-fold way. Firstly, they can create higher level of awareness of the problem and secondly, also lead to increased motivation to actually act on the topic of climate change (Roeser, 2012; Baumeister,

Vohs, DeWall & Zhang 2007). Additionally, emotions are imperative for creating a sense of urgency and thus, to shorten the perceived distance between the problem of climate change and oneself. So all in all, we need emotions and we need to address them more often in order to finally enhance our motivation to adopt a more sustainable lifestyle than our current one (Roeser, 2012).

However, according to Loewenstein, Weber, Hsee and Welch, (2001) and Shome et al. (2009) this appeal to emotions must be done in a careful way as extreme emotions might lead to emotional numbing in the long-run. In the short-term people might pay increased attention to the issue of climate change. Yet, in the long-term it is quite challenging to keep those levels of interest up. The tendency then to use mainly fear and worry appeals as emotional stimulus poses the danger to result in emotional numbing when overused (Shome et al., 2009).

3.2.3 Motivational Emotions: Interest, worry, hope & fear

Smith and Leiserowitz (2014) found that emotions particularly discrete emotions such as worry, interest and hope were the best predictor for climate change policy support and responsible for more variance than cultural worldviews or socio-demographic factors. Worry was especially important as it had the biggest effect when explaining climate change policy support. This is because worry leads to long-term motivation to act and simultaneously initiates deeper thinking so that it ultimately results in more mental engagement with the topic of climate change (Smith & Leiserowitz, 2014). Although according to Linville & Fischer (1991) we possess a finite pool of worries, worry appeals in general seem to be a promising approach in climate change communication. Yet, extreme levels of worry should be avoided as those might lead to feelings of paralysis (Lorenzi et al. 2007).

Fear on the contrary might be counterproductive as several scholars suggest (O' Neill & Nicholson-Cole, 2009; Moser & Dilling, 2004, Lorenzi et al., 2007 & Ring, 2015). Fear might catch one's attention but it, if overdosed, may decrease the importance of the topic of climate change since individuals desensitize after some time (O'Neill & Nicholson-Cole, 2009). Further, the permanent use of fear can result in distancing oneself from the topic of climate change to avoid feelings of anxiety and depression

and additionally, in disengagement as a feeling of fatalism is provoked (Ring, 2015). Thus, in the worst-case fear appeals can create denial and apathy (Moser & Dilling, 2004; Lorenzi et al. 2007). Nonetheless, some fear might have positive impacts (Lorenzi et al. 2007). Low levels of fear might in fact have the ability to change the status of apathy into action. It can result in increased policy support and in gathering more information about the subject of ones' fear (Shome, et al., 2009; Smith & Leiserowitz, 2014).

3.2.3 Framing Climate Change

Framing focuses on and highlights certain aspect of an issue and not others (Myers, Nisbet, Maibach & Leiserowitz, 2012). According to Shome (2009) "framing is the setting of an issue within an appropriate context to achieve a desired interpretation or perspective. The intention is not to deceive or manipulate people, but to make [for instance] credible climate science more accessible to the public" (p. 6). Nisbet (2010) furthermore defines frames as "interpretive storylines that set a specific train of thought in motion, communicating why an issue might be a problem, who or what might be responsible for it, and what should be done about it" (p.15).

Moreover, no information is unframed (Shome et al., 2009). Frames are everywhere and the way each topic is framed determines how we perceive it. We cannot escape frames particularly not from predominant ones, which we are exposed to most of the time and that are especially hard to get rid of (Lakoff, 2010). In this sense, "truth must be framed effectively to be seen at all. That is why an understanding of framing matters" (Lakoff, 2010, p.80).

The issue of climate change was traditionally framed in environmental terms though currently it is more often also framed as political issue (Myers et al., 2012). Nisbet & Scheufele (2009) describe more precisely the framing of the issue of climate change in terms of *scientific uncertainty*, *conflict*, *economic development*, *Pandora's box*, *public accountability* and *moral and ethics*. Also Lakoff (2010) argues that the environment itself is not a separate issue from how we conceptualize the topic right now but rather interrelated with many different fields such as economics, energy, food, health, trade or security and therefore has to be framed accordingly. Nisbet (2009) notes importantly that frames serve as "general organizing devices [and]

should not be confused with specific policy positions; any frame can include pro, anti, and neutral arguments” (p. 16). Thus, it depends which aspects of the different frames of climate change is stressed most.

Furthermore, frames and emotions interact. They are strongly interwoven with each other (Lu & Schuldt, 2016) as many frames directly relate to the parts of the brain where emotions are handled (Lakoff, 2010). Likewise, emotions play a crucial part in establishing a new frame and in fact the frame must make emotionally sense in order to work (Lakoff, 2010). If we are emotionally too distant with our existing schema about a topic the frame will not thrive. We need to incorporate existing predispositions and perceptions in order to make a different framing thrive (Nisbet and Scheufele 2009; Scheufele 1999). Hence, each time we try to come to a rational decision we actually use unconscious processes including frame structures and emotions in order to do the right thing. In order to trigger a change in thinking about our individual involvement with climate change and our personal relevance to it we need to make use of different and emotive framing.

At the moment most people do not grasp the predominant scientific frame and its implications for their future life right (Nisbet, 2009). In the current use of climate change communication there are more adequate non-technical frames missing although those exist in scientific research (Dewulf, 2013; Fresque-Baxter & Armitage, 2012, as cited in Lorenzoni & Whitmarsh, 2014). One example is the health frame of climate change, which according to many scholars such as Ring (2015) and Myers et al. (2012) offers a promising communication approach. It makes the topic of climate change one of personal relevance and creates emotions that are favourable in terms of motivating action.

To sum up, in order to trigger individual's behaviour into a more sustainable direction emotions and frames will make a vital component in climate change communication since as Lakoff summarizes (2010) “real reason is: mostly unconscious (98%); requires emotion; uses the “logic” of frames, metaphors, and narratives; is physical (in brain circuitry); and varies considerably, as frames vary. And since the brain is set up to run a body, ideas and language can't directly fit the world but rather must go through the body” (p. 72).

3.2.4 Investigated frames: Alarmism, Common Human Identity and Uncivilization

In the following section, I will present the three different frames I chose to investigate. The *alarmism* frame, the *common human identity* frame and the *uncivilization* frame. I decided to concentrate on the *common human identity* frame and the *uncivilization* frame as both of these topics are relatively new to research in this area. Up to now scholars suggest that both might contain elements that are suitable for effective climate change communication (Reese, 2015; Batailha and Reynolds, 2012; Adams, 2016). On the contrary, the *alarmism* frame long used in climate change communication will serve as a baseline to compare results and find out if there are any significant effects.

Alarmism:

Currently the *alarmism* frame is the narrative dominating public discourse about climate change widely (O'Neill, Nicholson-Cole, 2009; Ring, 2015). It includes fear appeals wrapped by an undercurrent of alarmism. The alarmist's repertoire consists generally of catastrophic and shocking scenarios inspired by death, doom, heaven and hell (O'Neill, Nicholson-Cole, 2009; Ereaut & Segnit, 2007; Stoknes, 2014). And thus, the message brought across is one of a tremendous problem beyond human control.

The alarmist's language is especially predominant in the media shown for instance by Hulme (2007) who studied newspapers in the UK. Even though the IPCC was not using alarmism in its reports to communicate the issue of climate change, or at least not using words like 'catastrophic', 'shocking', 'terrifying', or 'devastating' according to Hulme (2007) those terms belonging to the alarmist's repertoire were nonetheless, widely used in newspapers articles. Moreover, it has become so widespread that it is also used in children books when explaining the phenomenon of climate change (Sedgwick, 2001, as cited in O'Neill & Nicholson-Cole, 2009).

Since this frame does not offer solution strategies it provokes feelings of anxiety and panic (Moser & Dilling, 2004). In the worst case, as explained above this frame can lead to the denial of climate change (Lorenzi et al. 2007). For these reasons, it is not

considered to be an appropriate communication strategy for the issue of climate change.

Common human identity:

The *common human identity* frame is based on social identity and self-categorization theory. Individuals build their identity according to the social group they belong to. Identifying oneself with a certain bunch of people and thus, as a group member can lead to acting more in line with the group's interest and therefore, to enhance the common or overall welfare of the group. The stronger the feeling of belonging to a certain group the bigger the effect of commitment to reach their group's goals (Reese, 2015).

Climate change communication could take advantage of this effect when bringing across the message of climate change and thus potentially better promote environmental behaviour. Identifying oneself with the human in-group could so lead to higher awareness of environmental issues. Studies suggest that it is in everyone's interest to take good care of ones' home, planet Earth (Reese, 2015). So according to a study of Reysen and Katzarska-Miller (2013) identifying with the common human in-group might lead to higher levels of concern about sustainability issues as those pose a substantial threat to the home of the whole of humanity. Also Rosenmann, Reese & Cameron (2016) found that this can lead to more worrying about the environment in general.

Therefore, the *common human identity* frame promises to be a good tool in order to create higher levels of motivation for pro-environmental behaviour (Reese, 2015). Indeed, the inclusion of this aspect could according to Batailha and Reynolds (2012) be the missing link to common action against climate change.

Uncivilization:

The *uncivilization* frame follows the ideas of the Dark Mountain Project, which pictures itself as "a network of writers, artists and thinkers who have stopped believing the stories our civilisation tells itself. We see that the world is entering an age of ecological collapse, material contraction and social and political unravelling, and we want our cultural responses to reflect this reality rather than denying it" (The

Dark Mountain Project, 2017). This mirrors the assumption that to continue with business as usual and to hope for the best is not an option anymore for humanity. Rather this only aggravates our current situation. Therefore, in a first step Kingsnorth and Hine (2009), the founder of the Dark Mountain Project, demand to accept the situation as it is and stop denying it pretending things can get better. Moreover, the Dark Mountain Project does not suggest solution approaches but rather encourages us to confront the doom of civilization as we know it today.

Embracing reality as Kingsnorth and Hine (2009) request can have several benefits. According to Adams (2016) "the Dark Mountain Project's emphasis on narrative resonates with a growing body of literature: work across a range of disciplines that declares an interest in the power of storytelling and narrative frames in conveying the realities of ecological degradation and a warming climate, not least as a tool for mobilising people to act" (p.177). Furthermore as Edström (2012) points out in contrast to the presentation of climate change as an abstract issue by the media this approach with "its layers of metaphors and its dramatic language engage[s]" and can be something to hold onto when dealing with the topic of climate change as it empowers "to up-hold 'truth' and 'beauty' in a time when these values are often seen as mere commodities" (p.38).

Thus, the *uncivilization* frame reconciles alarmism with the embracement of reality and therefore, even if it does not offer solution strategies it provides the possibility for people to deal with realistic future scenarios. It offers acceptance giving a pause to inner restlessness when panicking because of prospective horror scenarios communicated through alarmist language. So as it has a soothing effect and since it proved very successful among artists (Adams, 2016) I think it might also be a suitable frame for climate change communication addressing students.

4 Methodology

4.1 Ontology & Epistemology

The research in this thesis is guided by postpositivism as metatheoretical stance. Postpositivism relates according to Creswell (2003) to "the thinking after positivism" (p.7). It does not recognize anymore the common positivistic assumption that there is an absolute truth. Instead it posits that knowledge about reality will always remain imperfect as it is based on human conjecture. Nonetheless, it still follows the positivistic thinking about the existence of universal rules and theories that should be examined further and deeper in order to be able to explain the world. Thus, the knowledge that is created with a postpositivistic view depends on analysing "the objective reality that exists "out there" in the world" (Creswell, 2003, p. 7). The researcher is supposed to be as objective as possible and reliability and validity have high priority in this theory of knowledge.

The ontological and epistemological view I follow is critical realism. This is because even though I employ a very postpositivistic approach using quantitative methods, the concept of frames I also make use of builds on a constructivist perspective. In fact it is perceived to be the basis of social constructivism (Scheuffele, 1999). Critical realism tries to bridge both in some way. It recognizes the constructivist assumptions about a socially constructed understanding of the world while at the same time acknowledges the postpositivistic thinking about physical constraints and phenomena as for example the reality of climate change (Bryman, 2012).

4.2 Research Design

An empirical-analytical method approach is employed. Based on quantitative research it follows deductive reasoning, which means that the hypotheses tested in this thesis are deduced from general theories in the literature. Data was collected to measure attitudes with an online survey, which also included a part of experimental design where data was gained before and after the treatment. Afterwards this data was analyzed using a statistics software named Statistical Package for the Social Sciences (SPSS) in order to test the hypotheses derived from theory.

A quantitative approach was chosen as this approach is especially suitable when quantifying social phenomena, testing hypotheses and examining statistical correlations (Creswell, 2003). Another advantage offered by this approach is the existence of many standardised and calibrated measuring instruments, such as the questionnaire with a manual by Maibach et al. (2011b), which was used to calculate an audience segmentation for climate change. Furthermore, as a large sample could be attained, the external validity of this study was strengthened.

4.3 Survey

4.3.1 Online Survey & Participants

I conducted my study via Unipark (www.unipark.de), which is a fee-based software tool to perform online surveys. It provides the layout for the survey including for instance different types of questions and different features to design the survey appropriately including filters or regulation of quotas for example. It is a widely used tool for surveys among academics in Germany and was especially useful to me due to its easy handling (Unipark, n.d.a).

The online survey was completed by a total of 1313 participants. When preparing the data for the analysis I excluded participants who were younger than 18 years and older than 32. Students that were older than 32 dropped out as I was interested in typical students who still have their career ahead of them and therefore, are able to make an impact in the future. Also participants under the age of 18 were removed as the earliest age to become a student in Germany is typically around 18 years. In addition, only participants with complete values were taken into account. Furthermore, as the 3 groups, assigned each to one frame, differed in their number of participants I reduced the number of participants further to gain the same number of participants in each group. Thus, as the frame with the least participants consisted of 361 individuals, I randomly selected 361 participants from each of the other two frames. Thus, the number of participants was reduced to a total of 1083. The sample comprised of 731 women, 346 men and 6 who considered themselves neither female nor male. The average age was around 23 years ($m=22,87$; $SD= 3.145$). Moreover, the participants originated from a broad range of study programs with the largest group being students with a background in law, economics and social sciences

(classified according to Statistisches Bundesamt, 2015). See figure 1. However, this study is not representative for the whole German student population.

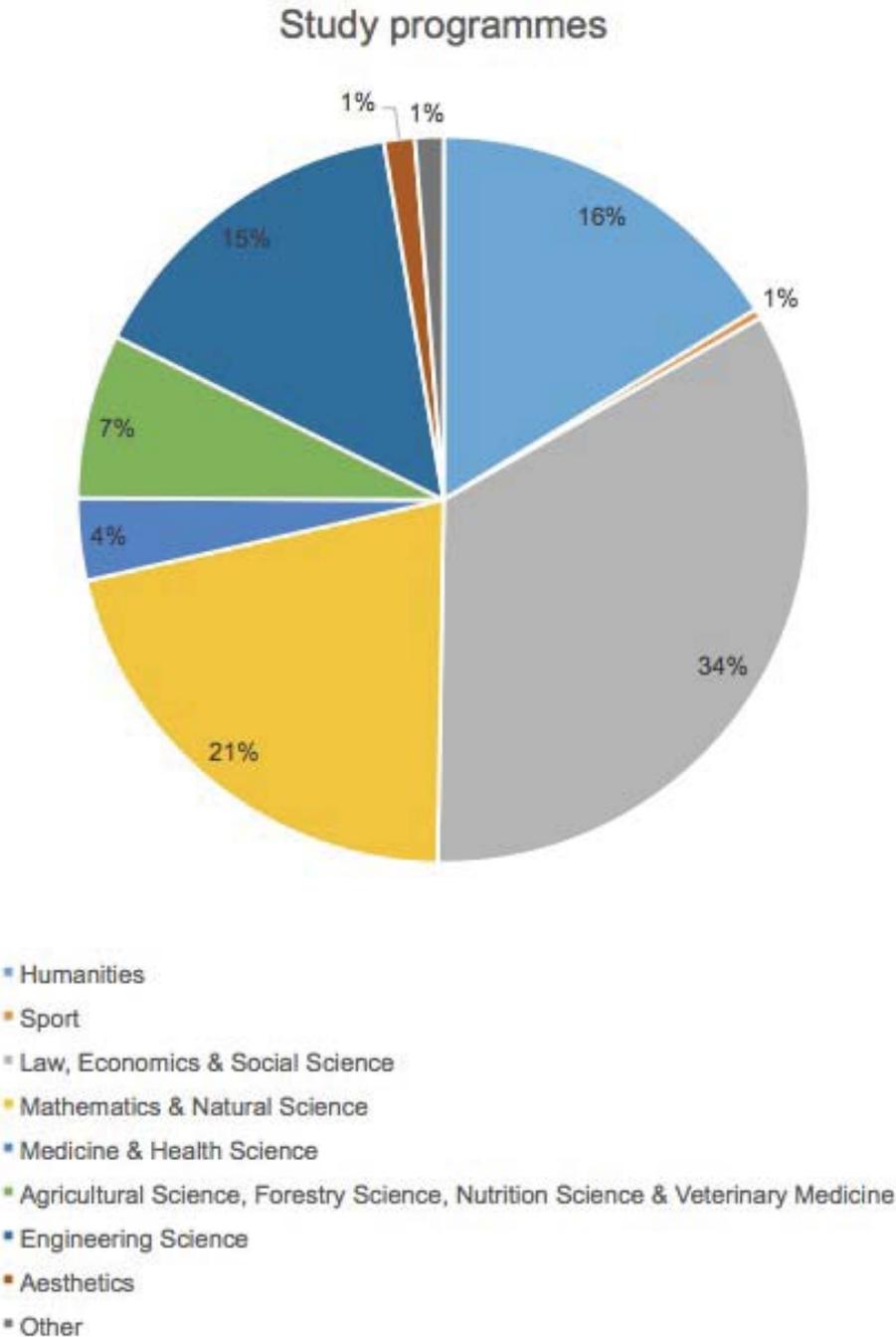


Figure 1. Participants grouped according to field of studies.

4.3.2 Benefits of an Online Survey

I chose an online survey as this kind of survey offers numerous advantages. Firstly, as my target group consisted of students, who comprise mainly young people who

nowadays spend a lot of their time on the internet (Ellison, Steinfield & Lampe, 2007) especially social network platforms as Facebook (Ramo & Prochaska, 2012) seemed to be the most appropriate place to easily contact them and get them engaged. Moreover, an online based survey secures fast and efficient data collection (McDonald & Adam, 2003).

Furthermore, as I was interested in the input of students all over Germany, an online survey provides the benefit of rendering geographical distance meaningless; it is no barrier to data collection anymore. As an online survey is not place-bound the scope of the survey increases and therefore, also the number of potential participants of the total sample rises, which is important in terms of representativity of the study (Carlbring, 2007; Wright, 2005).

Furthermore, Heerwegh (2009) argues that social desirability is not much of a problem in online surveys in comparison to face-to-face or telephone interviews and thus, it is more likely to get an unaltered result as there is a higher probability that also sensitive information is shared by the participants.

Besides, Unipark offers some more specific advantages. Firstly, the loss of data can be minimized in online surveys as the data gained is automatically saved and stored with the program. Here Unipark also guarantees data safety. In addition, as Unipark offers the possibility of transferring data directly to SPSS, errors can be reduced in comparison to typing data in by hand. Also, Unipark allows for permanent monitoring when collecting data (Unipark, n.d.b). This facilitates the process of recruiting participants since I always knew if I had to advertise my survey more or if it was sufficiently advertised. And lastly, with Unipark online surveys can also be filled out easily when using mobile phones or tablets (Unipark, n.d.b).

4.3.3 Structure of the Questionnaire

The questionnaire consisted in total of three parts: introduction and demographic information, a section testing the frames and a section with general questions about the issue of climate change. See figure 2.

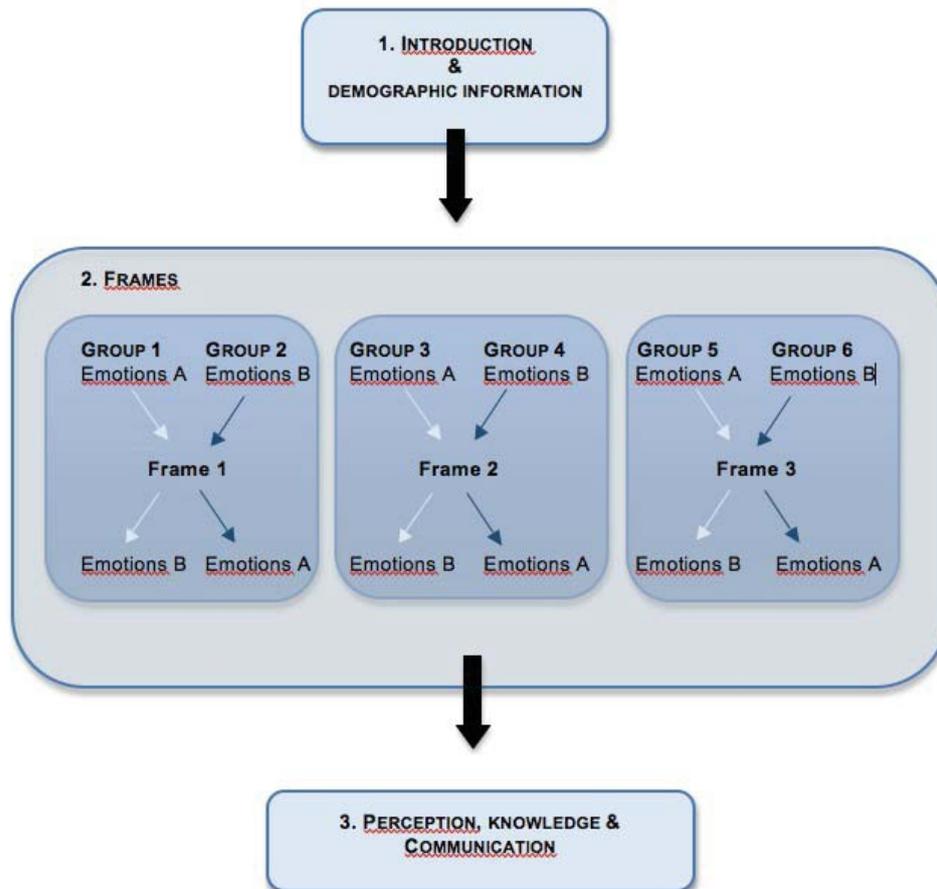


Figure 2. Structure of the questionnaire.

The survey started with a small introduction welcoming the participants and thanking them for their support and further telling them about the anonymity of the study, the rather short time needed to fill in the survey, about 11 minutes, most importantly about the non-existence of good or bad answers and the request to answer honestly. Telling the participants their anonymity will always be preserved was crucial since this leads to higher rates of participation. The same is true for stating a rather short length of the survey in the introduction (Yan, Conrad, Tourangeau & Couper, 2010). After this the participants were asked to fill in some demographic information, such as for example age, university and study program. Sensitive data such as political orientation was left out in order to keep the number of participants taking part in the survey at the highest level possible (Lumsden, 2007). This was followed by some general questions about the current mood of the participants and their overall concern about climate change.

The second part of the questionnaire dealt with the testing of the frames. Here the participants were split into groups in order to prevent the *acquiescence bias* (the tendency to give the same answers) (Schriesheim & Hill, 1981). In total there were six groups whereby always two groups were allocated to one frame. Before the frames were introduced consisting of written text each group was asked to answer questions about climate change and their associated emotions. For each question about climate change feelings had to be ranked from *not at all* to *very*. After having introduced the frames the same questions were asked again, though with different emotions in order to prevent the *acquiescence bias* (Schriesheim & Hill, 1981). See figure 2.

This was followed by a last section of questions about knowledge, perceptions and communication about the topic of climate change. Here also the questions of the audience segmentation by Maibach et al. (2011) were included. The survey then ended by thanking the participants for their participation and encouraging them to send an e-mail for further information, alongside any critique or suggestions.

The final questionnaire consisted of 45 pages in total, while each of those pages included only one question or a matrix. This was important as Toepoel, Das and van Soest (2009) suggest that the less questions are on one page the higher the number of participants that continue with the survey. Furthermore, this leads to a stronger concentration on each question. Additionally, a bar display shown at the top of each page of the survey indicated the progress participants made when completing the survey. According to Yan et al. (2010) this has a positive impact on the dropout rate; it decreases.

4.3.4 Questions included in the Survey

All questions included in the survey except for the demographic information were taken from surveys of the Yale Climate Communication Project in the United States (Leiserowitz, Maibach, Roser-Renouf & Feinberg, 2013; Leiserowitz & Smith, 2010; Maibach et al., 2016) and furthermore, closed questions. Closed questions provide the disadvantage of more easily creating a tendency to give the same answer all the time, called *acquiescence bias* (Schriesheim & Hill, 1981). To prevent participants

from sliding towards this specific bias the answer options were randomized whenever possible. Therefore, the response options were randomised where there was no scale used whose order is important for logical reasons to not confuse participants. Furthermore, each question in the questionnaire was a mandatory question. Thus, it was not possible for participants to continue with the survey if they did not want to answer a question.

Concerning the section examining frames and emotions, I created the frames myself and used questions about the emotional state from a survey of the Yale Climate Change Project (Leiserowitz, Maibach, Roser-Renouf, Feinberg & Rosenthal, 2015). For the frames, which consisted of written text, I initially looked for already existing text parts to be included in the survey. But as I wanted them to be as similar as possible in their structure and in their statements to make them comparable, I could not find any that fit those criteria. Thus, I wrote them myself using keywords and text fragments from existing statements about climate change. The first frame that was written was the one about *uncivilization*. Here I used the the dark mountain manifesto (Kingsnorth & Hine, 2009) and an newspaper article written by Kingsnorth (2010) where he explained his ideas regarding the project. I used some of the parts of the article and included them in the uncivilization frame emphasising that there is a crash to come and we should stop pretending. Then I wrote the *alarmism* frame following a similar structure making statements about the same aspects of climate change as in the uncivilization frame used but applying the alarmist's repertoire of death and doom (O'Neill, Nicholson-Cole, 2009; Ereaut & Segnit, 2007). Here I included scenarios such as the disappearing of islands, the destruction of ecosystems and the uninhabitability of some parts of the world in the near future stressing that it soon will be too late if action is not taken now. And lastly, the *common human identity* frame was developed following the same procedure. Here the emphasis overall was on *us humans*. Furthermore, I incorporated a statement from an advertisement by the German ministry of Environment shown in cinemas saying: "Nature doesn't need humans. Humans need nature" (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, 2015). For the questions testing the emotions before and after each frame I followed the questions about emotions and climate change by

Leiserowitz et al. (2015) including their scale to test the emotional level of participants. See appendix B for frames.

For the section of the survey asking about perceptions, knowledge and communication in terms of climate change, as stated above, already existing and tested questions were included. The basis for the audience segmentation was formed by a manual called “Global Warming’s Six Americas Screening Tools” (Maibach et al., 2011b) providing instructions for coding and data treatment plus the questions to create a typology for attitudes towards climate change. This typology uses variables coming from four subject areas: global warming beliefs, issue involvement, climate-relevant behaviors and preferred societal responses, to group participants accordingly on a continuum into six different types (Maibach et al., 2011b). See appendix A for all questions of this typology. Further questions examining knowledge and communication were taken from other surveys of the Yale Climate Communication Project in the US, which investigate the effects of climate communication among the US American population (Leiserowitz, Maibach, Roser-Renouf & Feinberg, 2013a; Leiserowitz & Smith, 2010; Maibach et al., 2016). It was chosen to include those questions, although originally developed for the US American population, as those are also widely used for different nations, such as India (Leiserowitz, Thaker, Feinberg & Cooper, 2013b) or Germany (Metag, Füchslin & Schäfer, 2015). Therefore, those survey are not considered to be specifically adopted for the US American context, rather according to their authors they are thought more of as a universal tool for examining perceptions of climate change worldwide (Maibach et al., 2011b). As all those questions were in English I translated them into German. Using existing questions provides the benefit of having questions that provide a certain quality. Those questions are precise in their formulation extensively tested in their effect and therefore, mostly high in validity, thus leading to higher data quality (Bulmer, Gibbs & Hyman, 2006). See appendix C for whole questionnaire.

4.3.5 Pilot Study and Distribution of the Survey

The study was pre-tested among 14 participants comprising friends and friends of friends. To provide for more validity I pretested the section about frames particularly

thoroughly with some additional qualitative interviews. The interviews conducted via Skype revealed that each frame worked in provoking the intended associations. Additionally, participants gave me feedback on the whole questionnaire about typos, the structure, length, the formulation of the questions, etc. The structure and length was commonly considered as appropriate. Mainly some formulations of specific questions were criticized, possibly due to the translation from English to German and my attention was called to some typos. So afterwards, all useful and constructive criticism and suggestions were incorporated in the online survey.

The finished survey whose participation was voluntarily and not rewarded in any way was then distributed among German students I knew. They were further requested to share this online survey with their fellow students. This thus made use of the snowball effect. Furthermore, as this was not tremendously successful in terms of numbers of participants the survey was posted on popular German blogs and heavily advertised in Facebook groups, see figure 3. Facebook in particular proved to be a good recruiting place. To make the most of this social networking website, I posted strategically following a list of German universities and higher education institutions (Hochschulkompass, n.d.). For each city I looked for Facebook groups that especially attracted students, such as for instance party groups, student job markets, student accommodation groups, student sports or university groups. Additionally, I made use of food sharing and flea market groups such as *free your stuff* groups since students are usually very active in these kinds of Facebook groups. Moreover, I followed an alphabetical list of study programmes in Germany (Studis online, n.d.) and looked for Facebook groups here too, with the aim to include as many students with different study backgrounds as possible.

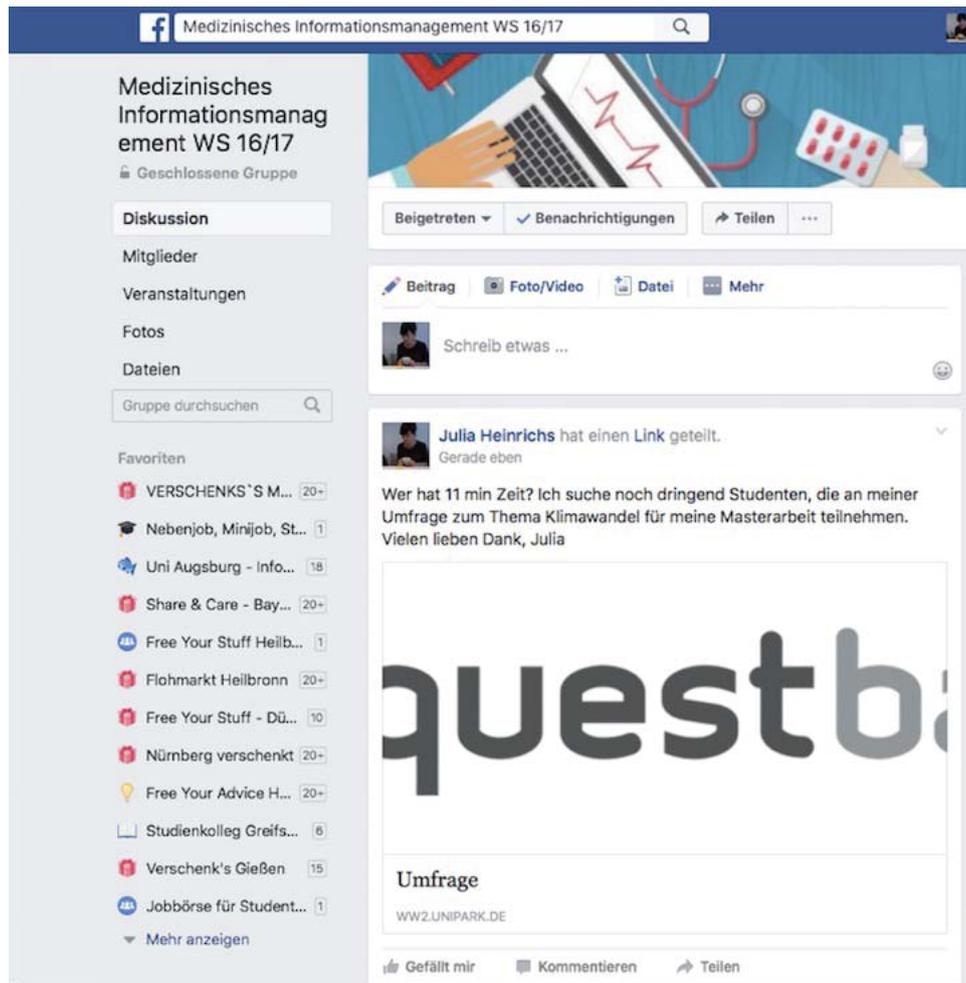


Figure 3. Post on Facebook advertising the survey saying "Who has 11 minutes of free time? I'm in need for students who want to participate in my online survey about climate change. The survey will be used for my master thesis. Thank you very much, Julia".

4.4 Limitations

A weakness of this thesis is that I created and composed the wording of the frames myself. Even though I pre-tested them and conducted qualitative interviews to ensure that the frames performed well I did not have an external criterion. This could have influenced the criterion validity (Bulmer, Gibbs & Hyman, 2006).

Furthermore, while the online survey was voluntarily in terms of participation it was also selective as there might have been a topic bias (Ferschke, Gurevych & Rittberger, 2013). Students could have been influenced by the topic meaning that those who were more interested in and more concerned about climate change were possibly also more likely to participate in the survey.

Moreover, I am aware that this is a study of the WEIRD, the Western Educated Industrialized Rich and Democratic. It is another study of the already dominating Western studies and therefore, not suitable for drawing conclusions about other regions in the world (Henrich, Heine, & Norenzayan, 2010). My results will only be relevant for a very small part of the world. Nonetheless, I consider my study of German students particularly with regards to climate change communication as highly relevant for the reasons explained above.

5 Results and Analysis

5.1 Hypothesis 1

- *Hypothesis 1:* A great majority of German students is according to their attitudes towards climate change concerned about this issue.

To test hypothesis 1, I carried out an audience segmentation using the manual for SPSS provided by Maibach et al. (2011b.) This hypothesis can be confirmed with 94.1% ($n = 1019$) either being alarmed (19.7%, $n = 213$), concerned (58.2%, $n = 637$) or cautious (15.6%, $n = 169$). See figure 4.

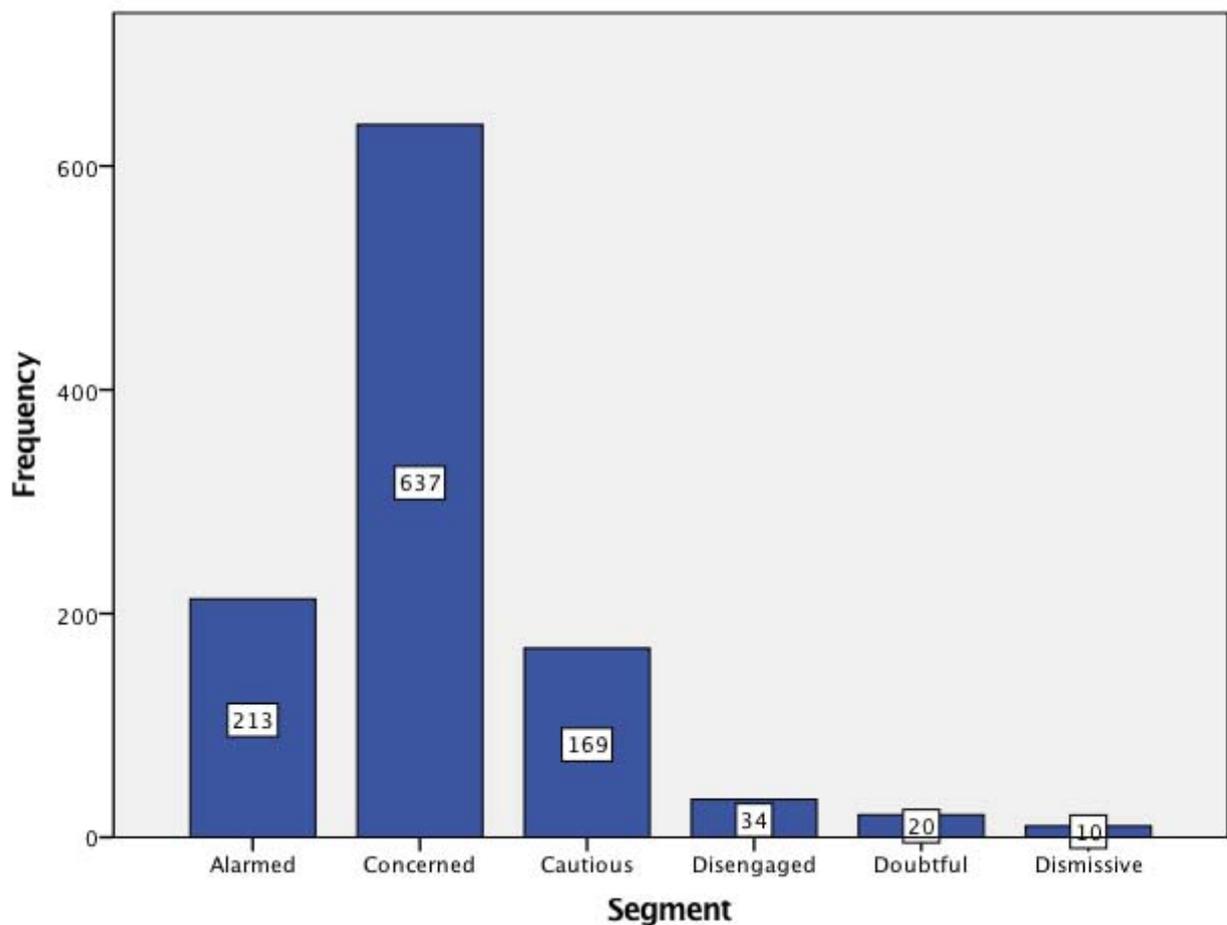


Figure 4. German students grouped according to the audience segmentation by Maibach et al. (2011b).

5.2 Hypothesis 2

- *Hypothesis 2:* German students think they are well informed about the topic of climate change (*response efficacy*).

Applying descriptive statistics hypothesis 2 cannot be confirmed as a majority of German students, about 81.2 % (n = 847), think that they need some (57.3%, n = 621) or a lot more information (20.9%, n = 226) about the topic of climate change. Only 4.9 % (n = 53) stated that they are in no need for further information and 16.9% (n = 183) requested just a little more. See figure 5.

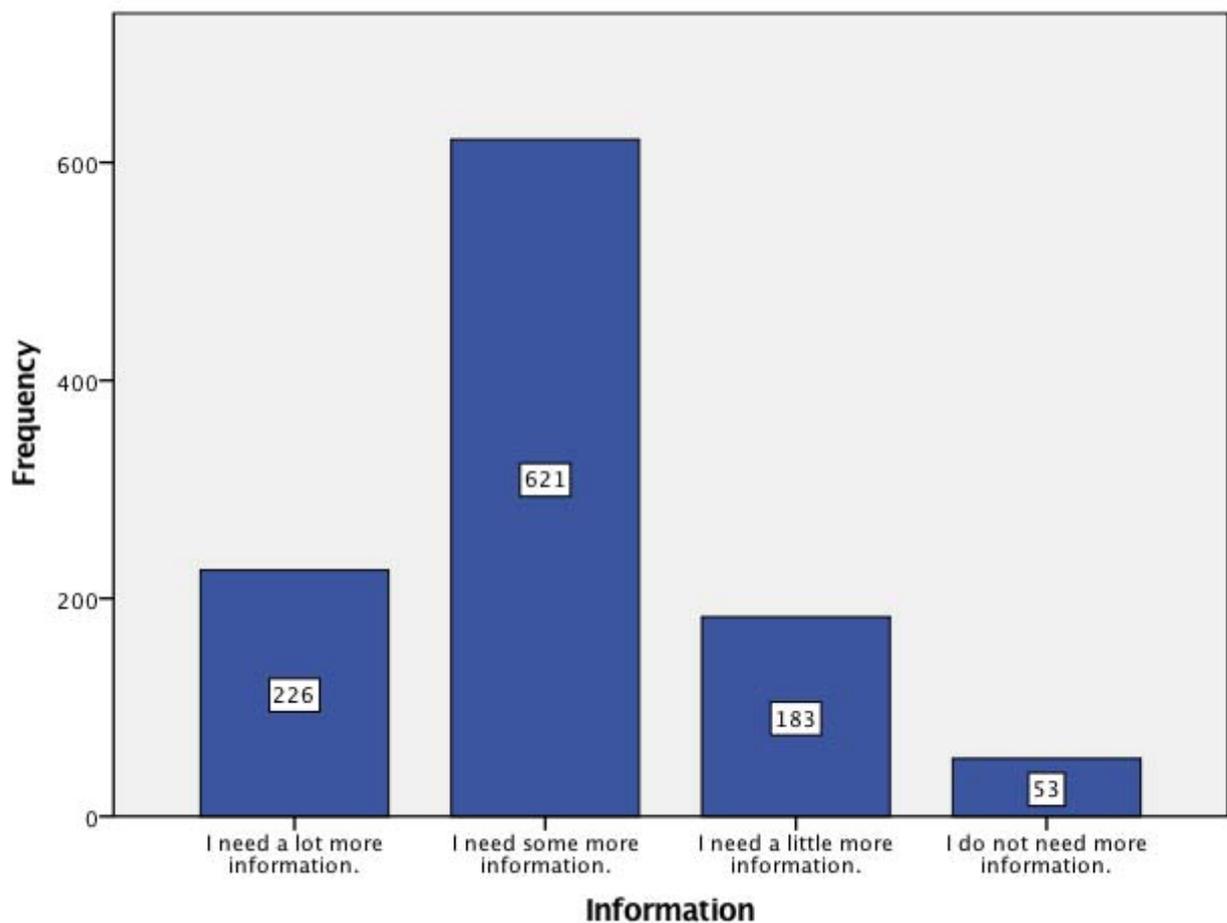


Figure 5. The need of German students for information on the topic of climate change.

5.3 Hypothesis 3

- *Hypothesis 3:* German students feel that their actions on climate change will have an impact (*self-efficacy*).

Hypothesis 3 was tested on half of the total sample as the question about action was part of the block of questions about frames. Here, I also utilized descriptive statistics to examine the hypothesis.

A majority of about 77.3% ($n = 426$) of students is either very (26.7%, $n = 147$) or moderately (50.6%, $n = 279$) worried about their actions on climate change. See figure 6.

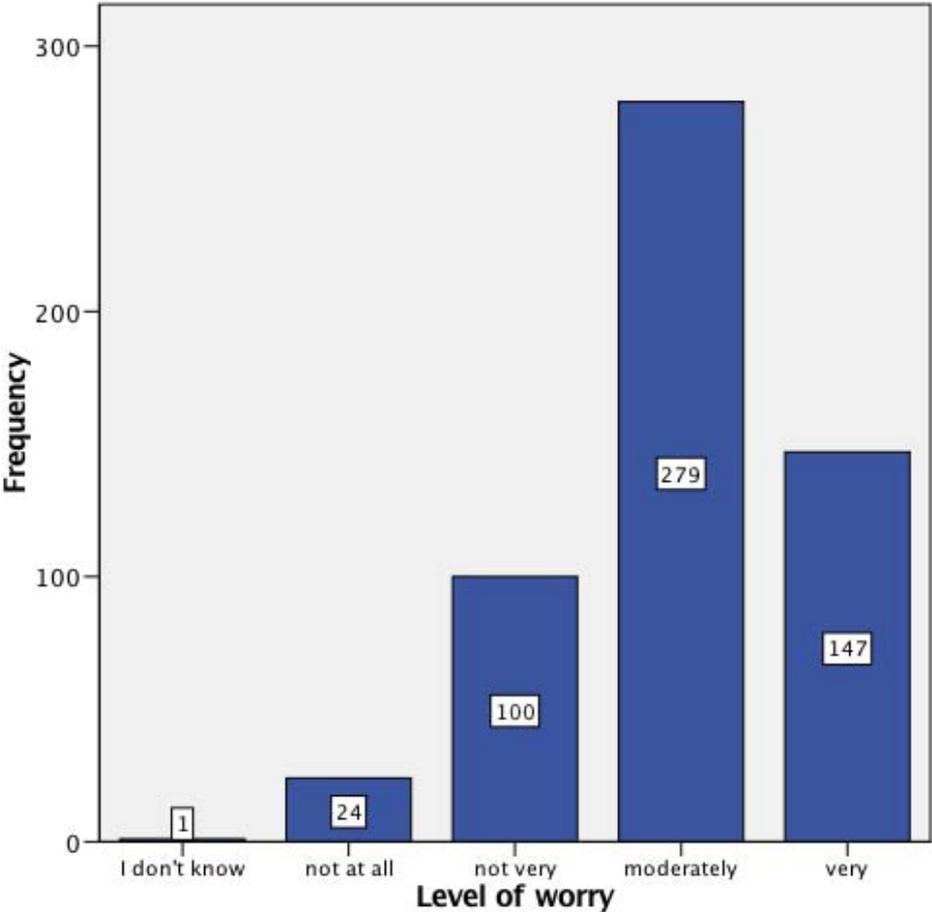


Figure 6. Level of worry among German students with regards to their action on climate change.

Furthermore, most students (55.8%, $n = 308$) are either very (8.3%, $n = 46$) or moderately (47.5%, $n = 262$) hopeful in regards to acting on climate change. Nonetheless, about slightly more than a third (37.6%, $n = 207$) is hardly hopeful when thinking of their actions and climate change. See figure 7.

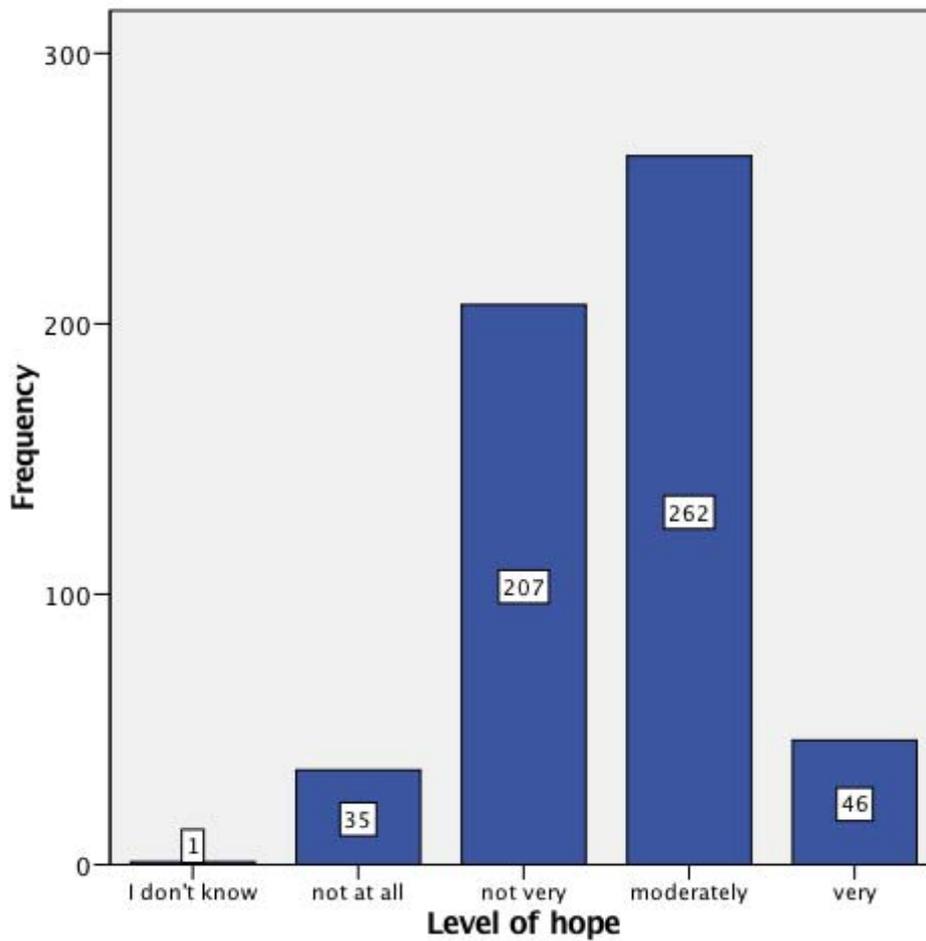


Figure 7. Level of hope among German students with regards to their action on climate change.

A great majority, about 89.6% ($n = 494$) of students, think of interest when considering action on climate change with 43.9% ($n = 242$) being very interested and 45.7% ($n = 252$) somewhat interested. See figure 8.

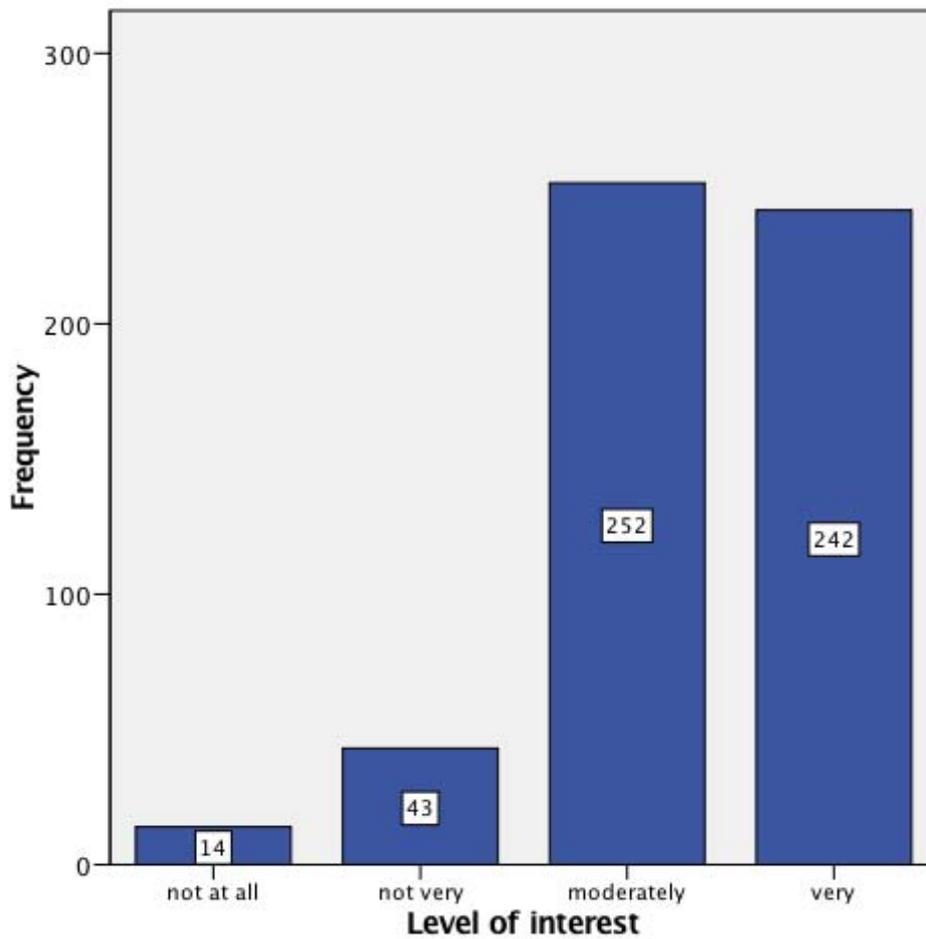


Figure 8. Level of interest among German students with regards to their action on climate change.

However, the feeling of helplessness is also very pronounced as about two thirds (66.5%, $n = 354$) feel either very (26.7%, $n = 142$) or moderately (39.8%, $n = 212$) helpless. See figure 9.

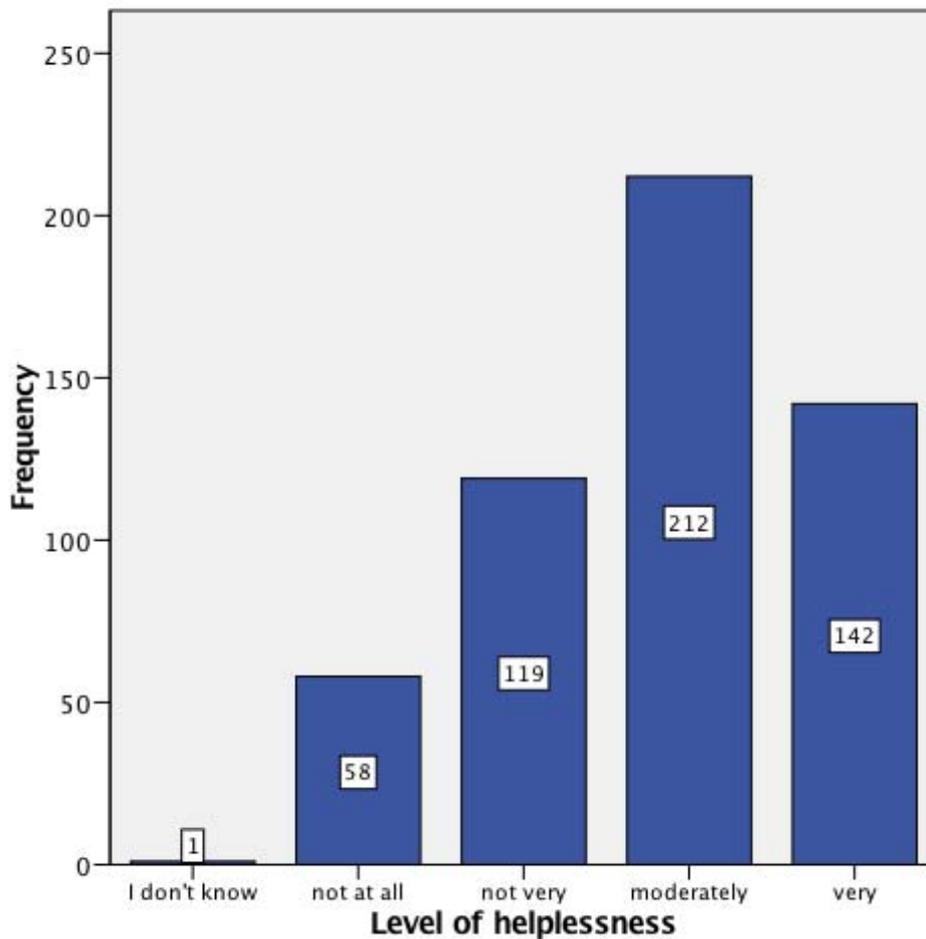


Figure 9. Level of helplessness among German students with regards to their action on climate change.

These results are not very explicit as students have mixed feelings about their actions on climate change. Therefore, this hypothesis cannot be confirmed nor discarded.

5.4 Hypothesis 4

- *Hypothesis 4:* Even though students show a great concern regarding climate change, communication in terms of speaking and online conversation is at a low level because students do not hear others very often talk about this topic. There exists a *climate spiral of silence* among German students.

Hypothesis 4 was tested by employing descriptive statistics as well as bivariate correlations. The Spearman correlation was used as the Kolmogorow-Smirnow-Test assumed no normal distribution for the sample (Sachs, 2013).

About half of the students, 50.3% ($n = 545$), state that they converse sometimes (45.3%, $n = 491$) to often (5%, $n = 54$) about climate change within their family. The other half, about 49.7% ($n = 538$), talks rarely (36.6%, $n = 396$) to never (13.1%, $n = 142$) about this topic within their family. See figure 10.

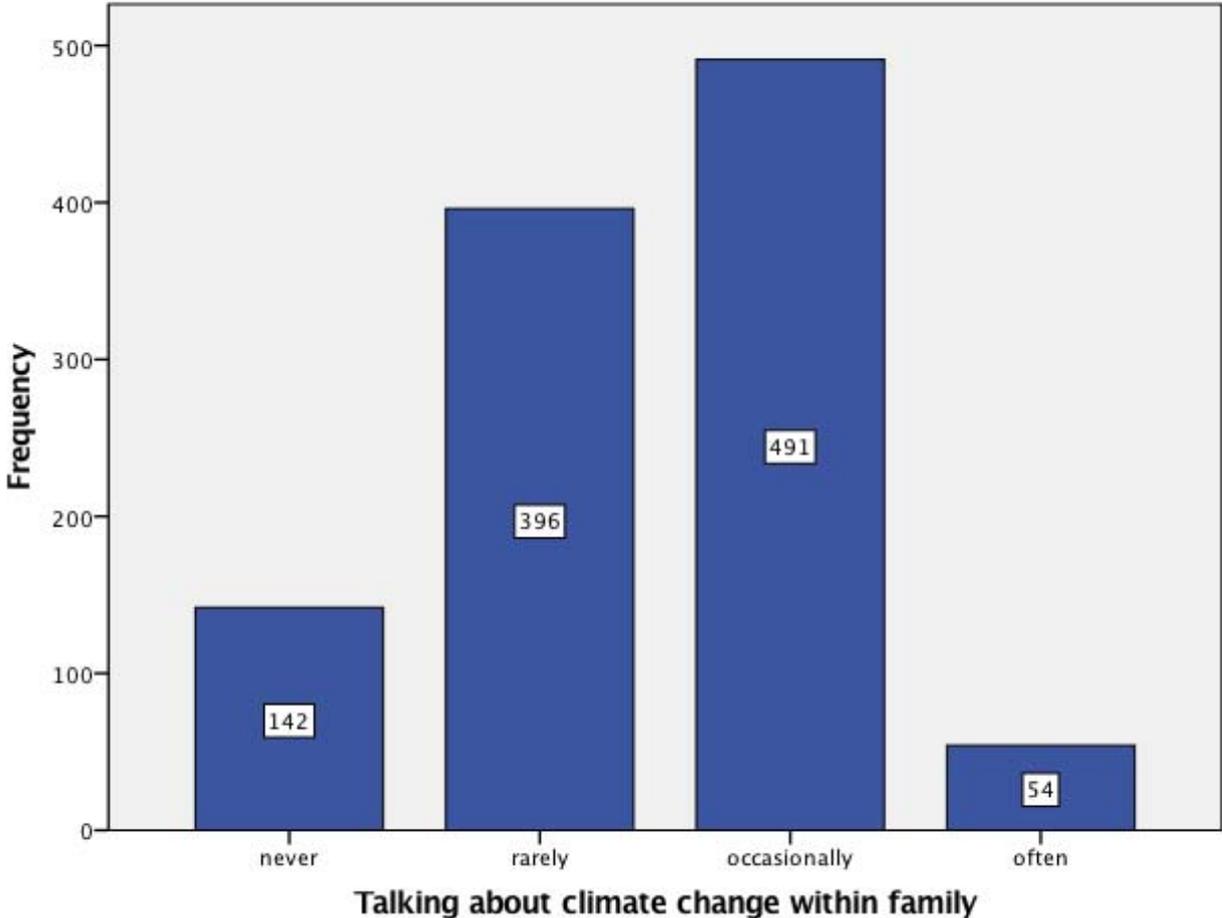


Figure 10. Frequencies of students talking about climate change within families.

The same pattern emerges for talking among friends: about half, 49.9% ($n = 540$) indicate that climate change is sometimes (40.9%, $n = 443$) to often (9%, $n = 97$)

mentioned among their friends. 51.1% ($n = 543$) speak about this issue with their friends rarely (38.4%, $n = 416$) to never (11.7, $n = 127$). See figure 11.

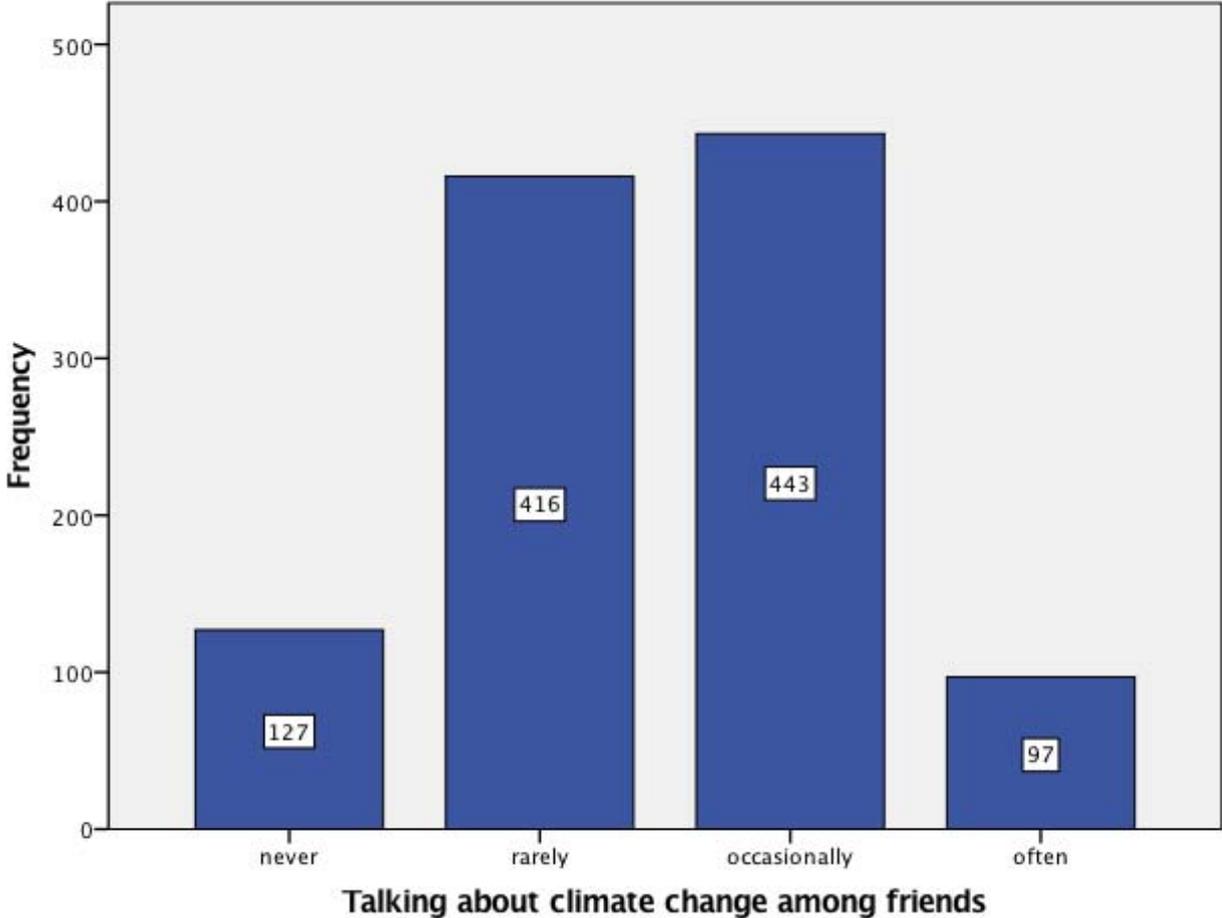


Figure 11. Frequencies of students talking about climate change among friends.

When it comes to hearing others talk about climate change a majority remains in the middle with 66.5% ($n = 721$) hearing the topic of climate change at least once per month (34.5%, $n = 374$) or several times per year (32%, $n = 347$). 16.6% ($n = 180$) hear about the topic of climate change at least once a week, 6.9% ($n = 75$) hear about the topic once a year or less and 4.7% ($n = 51$) never hear someone mention it. See figure 12.

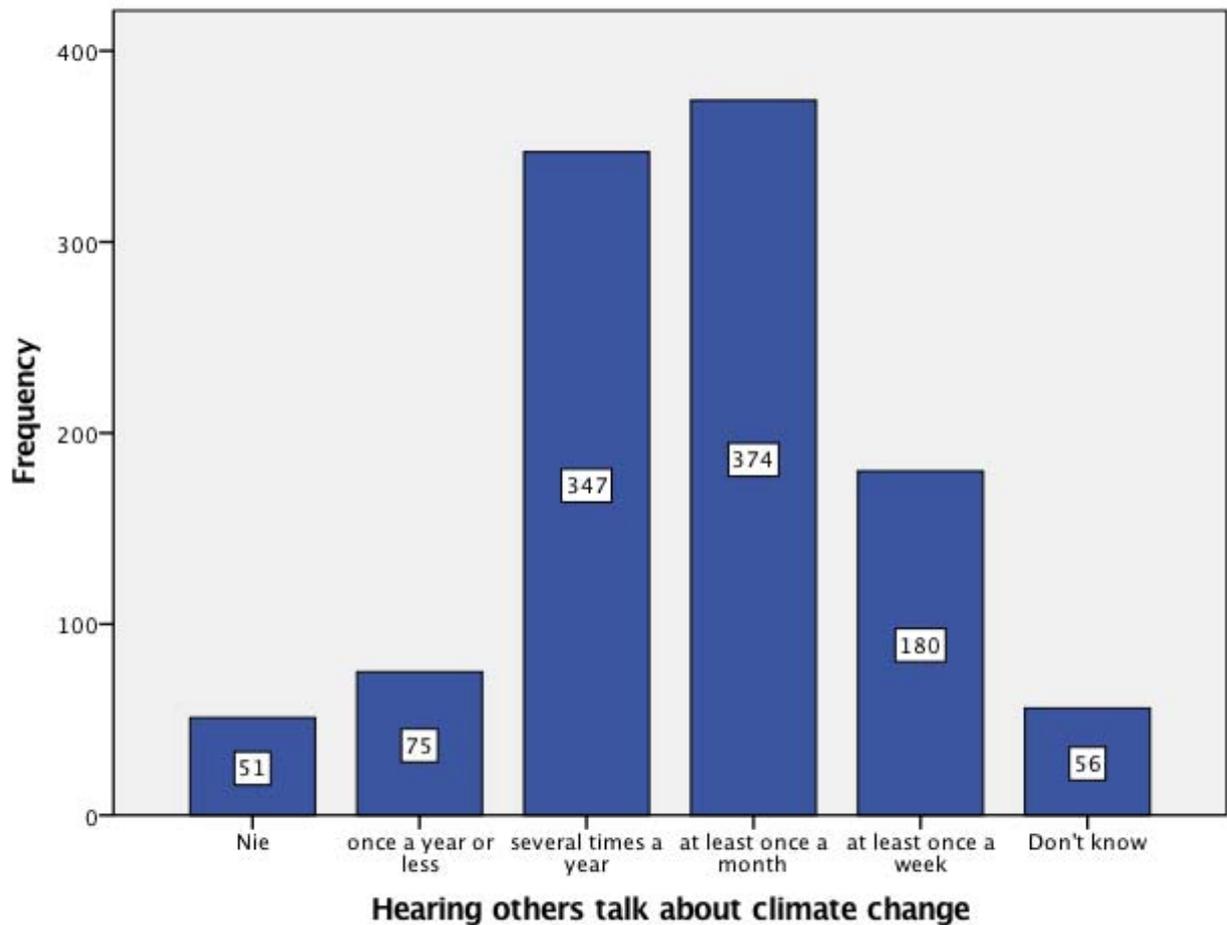


Figure 12. Frequencies of students hearing others talk about climate change.

Regarding communication behaviour such as giving a speech about the topic of climate change, sharing information on Twitter or Facebook about climate change, posting an online comment, writing an e-mail or letter to a newspaper or magazine about the issue or just writing an e-mail with regards to the subject of climate change, the same pattern emerges all over: a great majority of students never does these kind of things. Ranging from 63.3% ($n = 686$) (sharing information on Twitter or Facebook) to 92.2% ($n = 999$) (writing an e-mail or letter to a newspaper or magazine). See figures 13, 14, 15, 16 and 17.

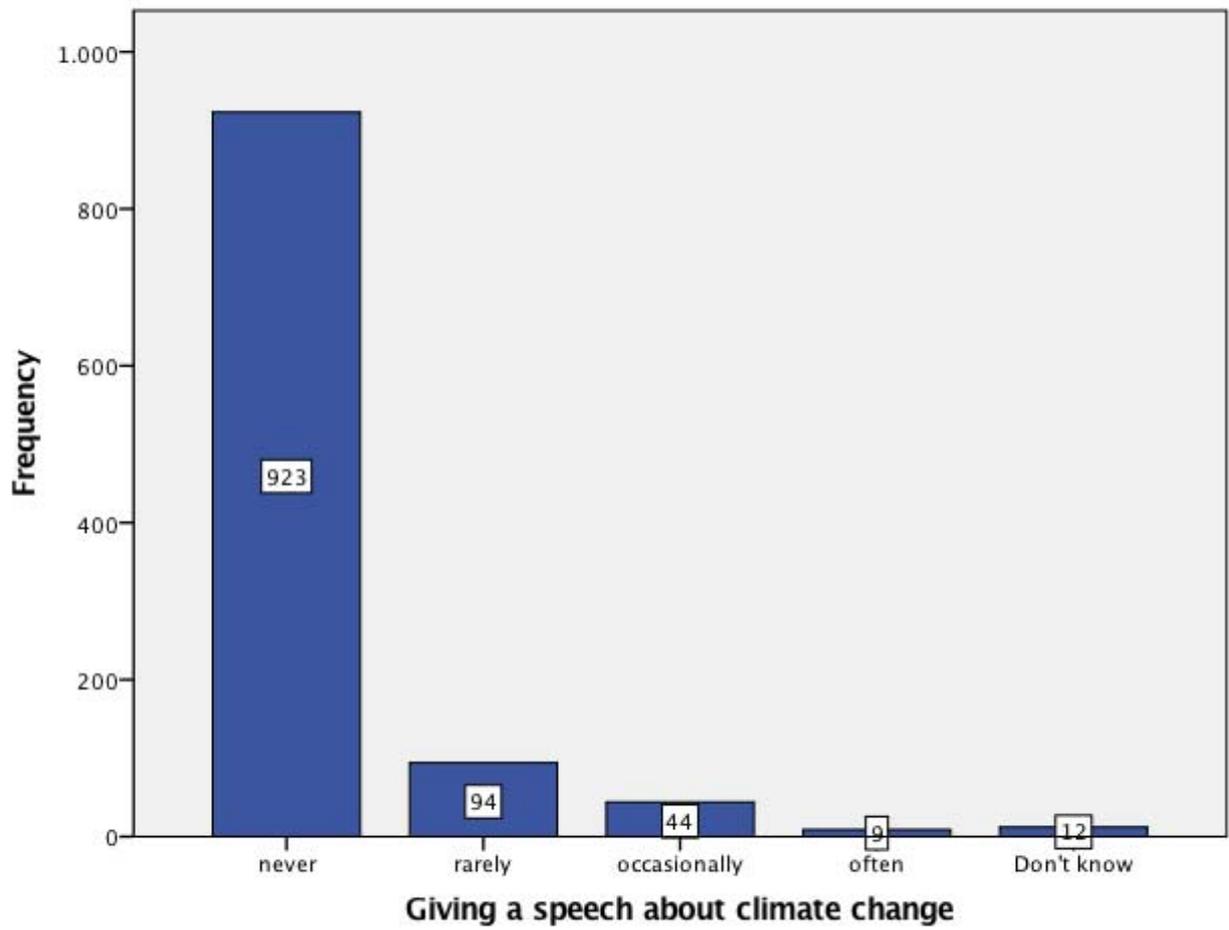


Figure 13. Frequencies of students giving a speech about climate change.

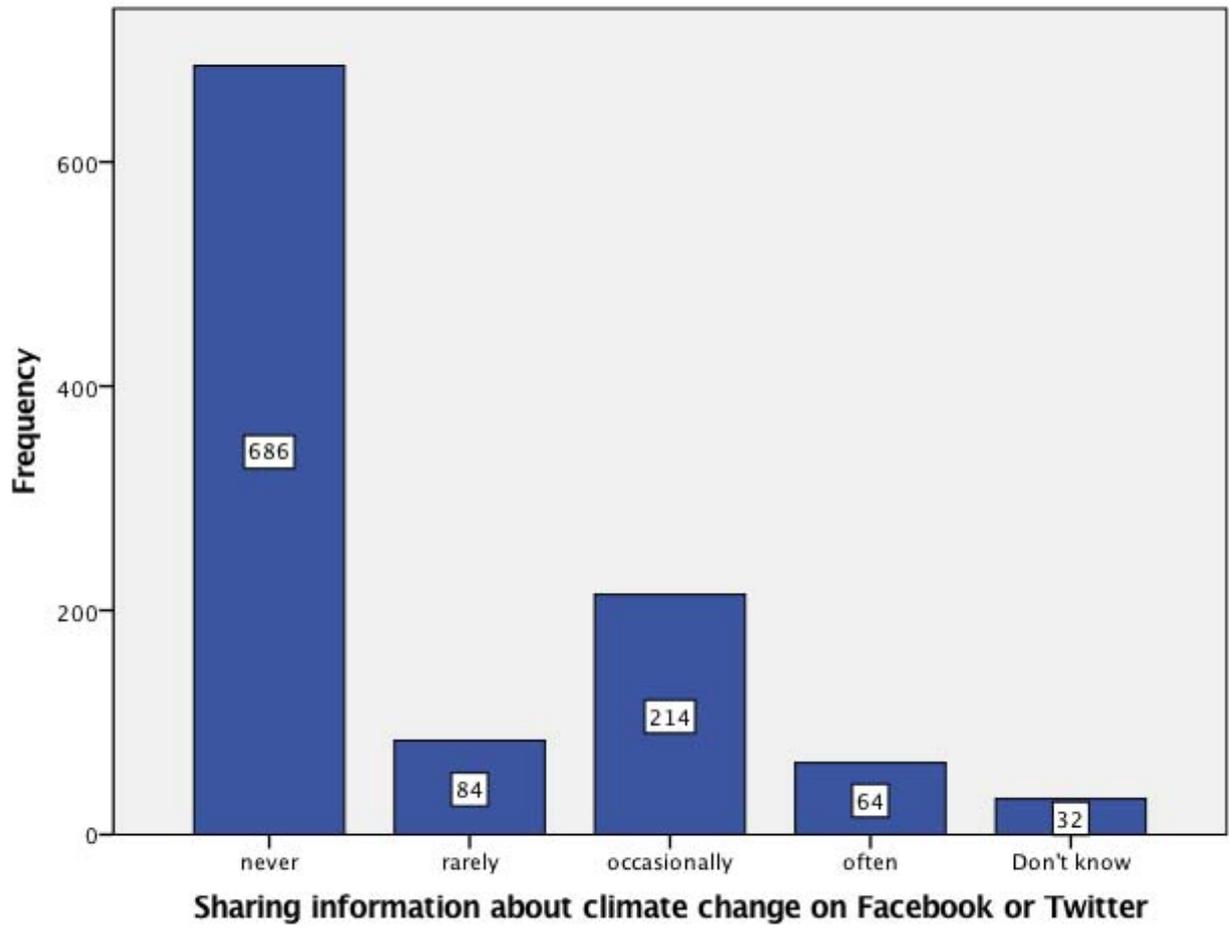


Figure 14. Frequencies of students sharing information on Facebook or Twitter.

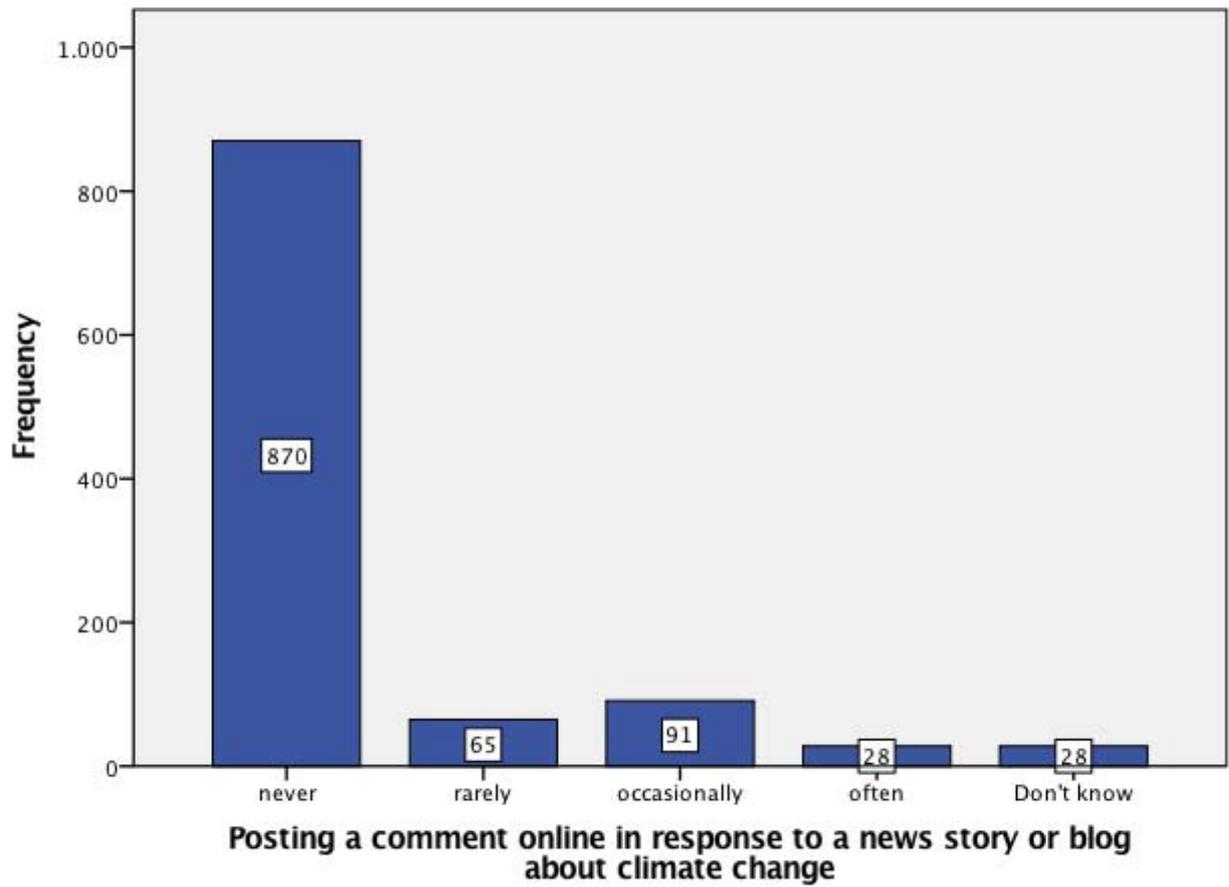


Figure 15. Frequencies of students posting a comment online in response to a news story or blog about climate change.

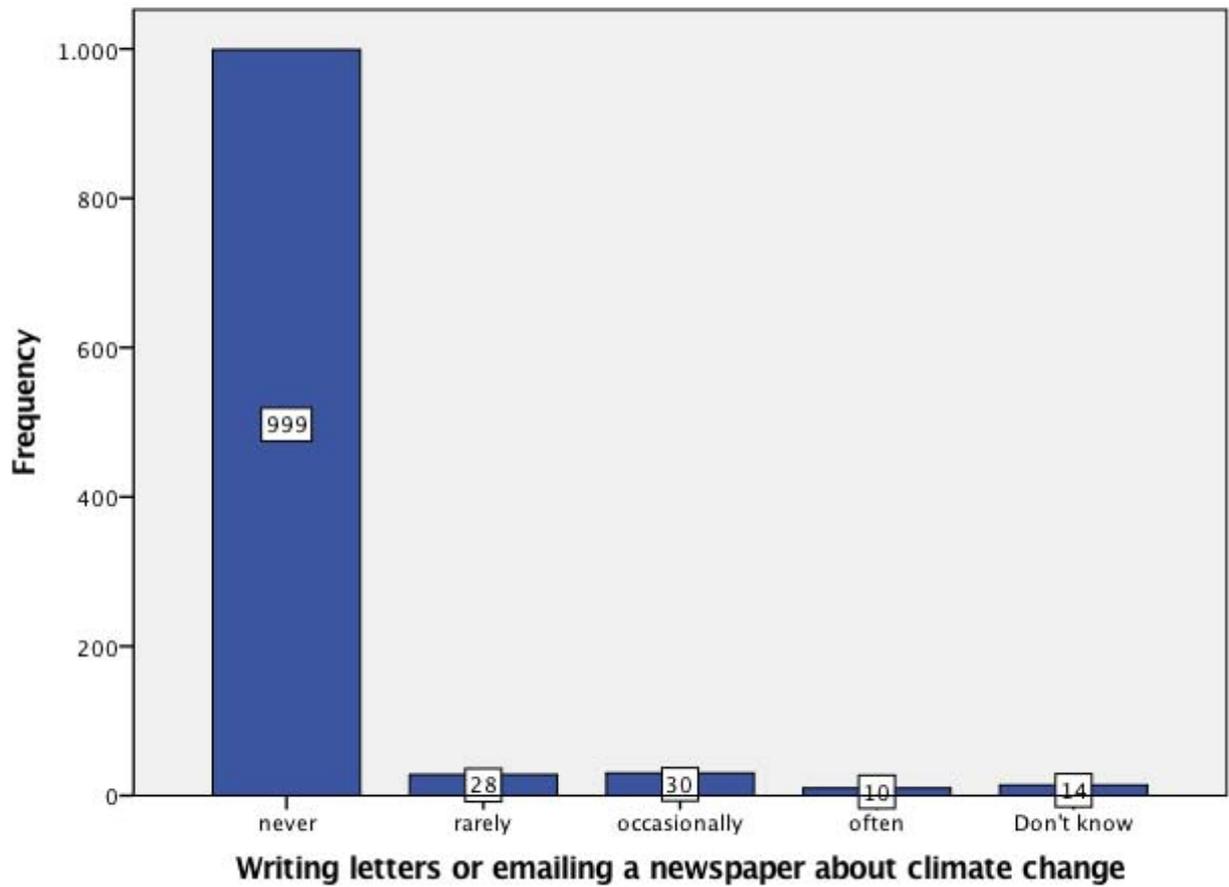


Figure 16. Frequencies of students writing letters or emailing a newspaper about climate change.

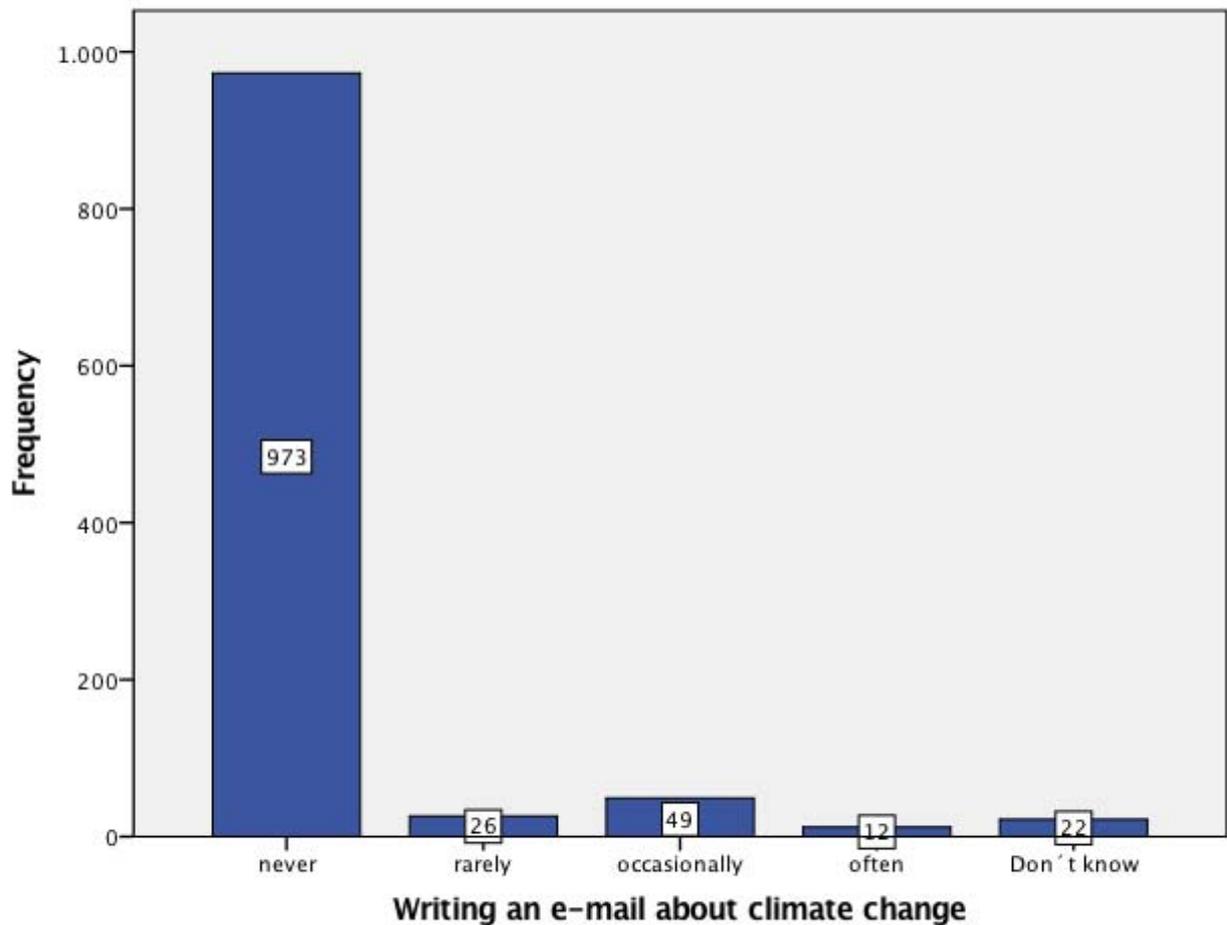


Figure 17. Frequencies of students writing an e-mail about climate change.

Furthermore the assumption that there is a correlation between hearing people communicate about the issue of climate change and their talking oneself can be confirmed. The analysis shows a significant positive correlation between students hearing others talk about climate change and their conversations about the issue with their families ($r_s(1081) = .46, p < .000$) as well as their friends ($r_s(1081) = .50, p < .000$). Also there exists a significant correlation with regards to hearing about climate change for sharing information on Twitter and Facebook about the topic ($r_s(1081) = .30, p < .000$), giving a speech on the subject ($r_s(1081) = .13, p < .000$), posting an online comment ($r_s(1081) = .16, p < .000$) and writing an e-mail on climate change ($r_s(1081) = .21, p < .000$). The only item, that was not significant, and can therefore be neglected, was writing an e-mail or letter to a newspaper or magazine.

Thus, the assumption of a *climate change spiral of silence* for discussions within families and among friends cannot be confirmed for the German students having taken part in the survey as about half of them talk sometimes to often about this topic. Yet, a *climate spiral of silence* might be the case for online communication as for the vast majority in this space climate change is not a common topic.

5.5 Hypothesis 5

- *Hypothesis 5*: The *common human identity* frame and the *uncivilization* frame create emotions, which are more favourable (high levels of worry, interest and hope; low levels of fear) in order to trigger action on climate change than the *alarmism* frame.

Hypothesis 5 was tested by using t-tests as well as ANOVA calculations including post-hoc tests (Rasch, Friese, Hofman & Nauman, 2010a; 2010b).

To compare emotions within one frame, t-tests were used. There was no significant effect for any emotion in the three different frames found. To compare the effects between the three frames for interest, worry, hope and fear one-way ANOVAs were conducted. The results show no significant effect. See appendix D.

However, when taking a closer look at the three frames by comparing means the *common human identity* frame was found to create the best emotional basis. It created slightly increased levels of hope while at the same time reducing fear. Levels of interest and worry, however, also decreased. Concerning the *uncivilization* and *alarmism* frame, the levels of all emotions dropped. See appendix D.

6 Discussion

6.1 Perceptions of Climate Change

All in all, the results of the perceptions of climate change are a good basis for climate change communication approaches as I will describe in the following section. To summarize shortly, the findings show that German students overall believe in the existence of climate change, feel that they are in need of some more information on the topic, are in general positive about their actions on climate change but at the same time also feel helpless about it. Half of the students talk from time to time with their family and friends about climate change and rather not when using online communication tools, such as Facebook or Twitter.

Using the audience segmentation by Maibach et al. (2011) for hypothesis 1, a great majority of German students, 94.09%, is either identified as concerned (58.82%), alarmed (19.67%) or cautious (15.60%) meaning that the plurality of German students believe that climate change is a problem. A fifth of students (the Alarmed) in fact is already ranked as part of the group of people who are most engaged regarding climate change and are most likely to already adopt changes in their personal lifestyles. This group of students is, therefore, no longer a prime target for climate change communication as they are already highly supportive of action to minimise the threat of climate change. More than half of the students (the Concerned) also hold the opinion that climate change is a serious threat, but at the same time are less engaged and also less likely to make changes in their lives in favour of combatting climate change. These are, therefore, a target audience for climate change communication as they only have to be minorly convinced of the urgency to take immediately action to mitigate the threat. A sixth of students (the Cautious) believes that climate change is a problem but are generally not too sure about the issue. It is not a risk that they perceive as personally affecting them and they therefore do not take action on an individual level. Thus, this group is also part of the prime target for climate change communication. The Cautious, above all, have to be persuaded of the high urgency and seriousness of the problem of climate change to at least increase the likelihood that action is taken and change occurs. A minority of students

(5.91%) on the downside is grouped as disengaged, doubtful or dismissive¹ either not having made their mind up about climate change and thus, not knowing if it is really happening or explicitly denying it. This is, therefore, in my opinion not a prime target group for climate change communication as this group only consist of a tiny minority and is moreover, not very likely to react to climate change communication that sees climate change as given. In a first step, this group would have to be convinced of the existence of climate change. But as the issue of climate change is a very urgent one it may be a better strategy to prioritise as target audience the great majority of students that do believe in climate change, thus reaching a critical mass in this group that adopts changes in their lifestyles. Then also the others might follow due to social pressure (Oliver, Marwell & Teixeira, 1985). In any case, climate change communication for this group would have to be tailored differently. This is not to say that those should not be addressed but one should bear in mind as Ring (2015, p. 411) warns that “communication aimed at reversing climate denial is at best a waste of time and at worst can alienate and silence potential allies”. However, this group should definitely not be the first item on the agenda of climate change communication when reaching out to German students, “debating solutions – rather than science – is a much higher priority” (Corner et al, 2015, p. 39).

All in all, the audience segmentation analysis suggests a good starting point for climate change communication addressing students in Germany. A great majority of them believe in the existence of climate change and are concerned about it, which is a core aspect of the typology and important prerequisite when ultimately aiming at triggering changes in behaviour via communication approaches.

Regarding the *response efficacy* hypothesis (hypothesis 2), interestingly, a majority (81.2%) of German students feel that they are in need of some more information concerning climate change. This stands in stark contrast to the argument of scholars who suggest that we are flooded with information about climate change and the fact, that in the multi-media world of today it should be fairly easy to find information on this topic. A possible explanation for this situation could be for instance that the

¹ Interestingly, the group of the Dismissive indeed exists among German students. This was not the case in a previous study using the audience segmentation by Maibach et al. (2011) conducted by Metag, Füchslin & Schäfer for the wider German population in 2015.

internet is so overloaded with information. Students who are interested in specific information may not be able to differentiate between information that is of use to them and that which is not. It may be that they may not know where to search or may possibly be just intimidated by the sheer amount that exists, so that they do not even start to look for information themselves. This assumption was strengthened by participants writing e-mails to me and explicitly asking for information. For example, I received an e-mail by a participant saying "I would definitely be interested in receiving more information about climate change as I always have read a lot about it and hear about it through my studies, but do not get condensed information and overviews about current studies and prognoses" (own translation). This lack of information is critical as the feeling of not being well-informed can lead to the avoidance of discussions about the topic. Therefore, this aspect has to be taken into consideration when designing suitable climate change communication strategies. I will go into more detail later when debating the role of sustainability science in climate change communication addressing German students. However, here is room for further research. In order to be able to tailor an appropriate climate change communication approach it is firstly crucial to know what kind of information students particularly demand and secondly, to examine the reasons for requesting further information although information about climate change exists en masse.

Concerning the *self-efficacy* hypothesis (hypothesis 3), German students show mixed feelings when thinking of their action on climate change. A majority feel concerned (77.3%), hopeful (50.6%), interested (89.6%) and at the same time helpless (66.5%) when considering action. The feeling of hope is least pronounced and the emotional level of helplessness and concern is relatively high, which is not a very good emotional basis for actually engaging and supporting change. Yet, a great majority also feels interested, which is on the downside a very good starting point for triggering action. Hence, this requires further research. It is necessary to take a deeper look at the students' feelings concerning their action on climate change in order to clarify whether German students actually think their actions might have an impact. This is important for climate change communication to know in so far as whether a positive feeling of having an impact raises the likelihood of getting engaged. If this is not the case climate change communication should address this

aspect and provoke more positive feelings concerning action. If it is the case climate change communication does not have to take this into account anymore.

With regard to the hypothesis of a *climate spiral of silence* (hypothesis 4) the situation is challenging among German students. For discussions within family and among friends there seems not to exist a spiral of silence as about half of the students speak occasionally to often about this topic. On the downside, the climate spiral of silence may exist in online communication behaviour as climate change in this space it is never an issue for a great majority of students. This suggests that face-to-face communication might be the current space where climate change is discussed. In general, this is a good basis as an overall pluralistic ignorance of this topic is not a problem among the majority of German students. Nonetheless, these discussions should be triggered more by climate change communication strategies, especially in the online environment. Thus, more research is needed also for this aspect.

This is a good basis on which climate change communication can build, further triggering interpersonal dialogue that potentially might lead to behaviour change. I will discuss this further when referring to the role of sustainability science in climate change communication addressing German students. Overall, taking into consideration the results of the perceptions about climate change among German students it seems that this particular group of audience might generally be very accessible and receptive once an appropriately climate change communication strategy is tailored and employed.

6.2 Frames

When testing hypothesis 5, for the three different frames there was no significant effect found. The lack of an effect of emotions within the frames might be due to the fact that the frames possibly did not emphasize their aspect (*alarmism*, *common human identity* or *uncivilization*) enough. Perhaps the main focus was still on the topic of climate change and not on the frame. For the *alarmism* frame furthermore it might be due to the fact that it is currently the most common frame used in climate change communication and people are already numbed by the frame's repertoire of death and doom. Therefore, as students are already used to it, they might not react

anymore to the shocking horror scenarios evoked by the alarmist language. Connectedly, the lack of an effect for the *uncivilization* frame, on the downside, may be owed to the fact that it is a frame projecting a very dark vision of the future for human beings and therefore, being very similar to the *alarmism* frame in terms of language. So this frame might similarly as the *alarmism* frame have provoked a feeling of numbness among the students. Maybe the uncivilization frame is more suited for academics working in some way on the issue of climate change and people that have a good scientific knowledge and understanding about the implications of climate change: Recognizing the fact that our future is possibly going to be very dark. Then this frame might offer a good communication approach as it offers relief by enabling to embrace reality and allowing for the development of realistic solutions in a different and no longer bright and shiny future. Climate change communication scholars suggest that “when dealing with scientific communication and framing, research shows that an audience may be more receptive when they perceive the information being communicated as having salience, relevance, authority and legitimacy” (Cash, Clark, Alcock et al., 2002 as cited in Shome et al., 2009, p.8). Therefore, as most students, much like a majority of people in general, probably do not understand the scientific facts about climate change and their prospective consequences very well (Nisbet, 2009), this frame might not be suited as an appropriate communication strategy. Edström (2012) further notes that because of this, the frame of *uncivilization* may increase the distance between the audience and the topic of climate change even more. All in all, this leads to the surmise that the *common human identity* frame that also had the best tendency in terms of emotion is the most suitable one when communicating climate change to students. Here further research is needed.

6.3 Limitations of this Study

Although the creation of a good emotional basis for climate change communication in order to be effective is important there are some more aspects that can have decisive implications. Researchers such as Linden, Maibach & Leiserowitz (2015) stress the momentousness of paying attention to psychological barriers to acting on climate change. Stoknes (2015), for instance, in the context of climate change communication identified five of the most important ones, namely “distance” (climate

change feels distant, it is most often not personally relevant to us and therefore, there is no sense of urgency created), “doom”(this leads to a feeling of helplessness), “dissonance” (we delude ourselves in order to deal with the feeling of guilt that is created by our current not very sustainable lifestyles), “denial” (arises as a consequence of dealing with fear and doubt) and “iDentity” (our values and culture if not in line with news and information might pose a challenge for being receptive to it) . See figure 6.

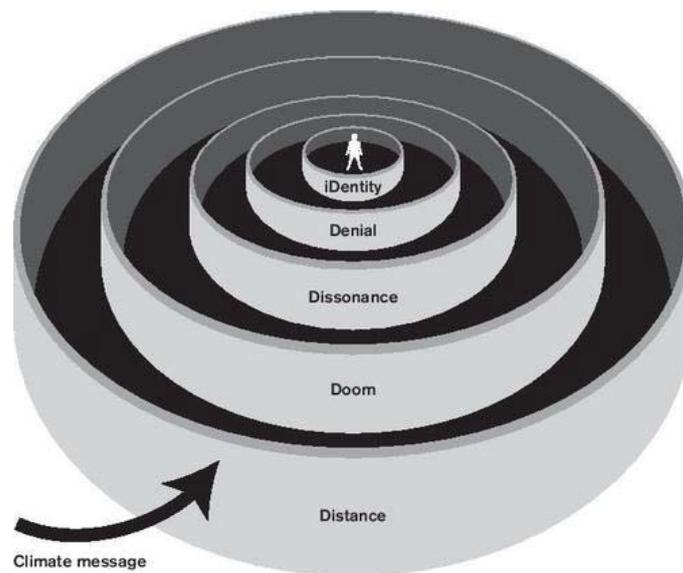


Figure 18. Five barriers that climate change communication has to pass in order to be effective from Stokes (2015, p.83).

According to Stoknes (2014, 2015), all these barriers have to be taken into account when communicating climate change. To give an example, the frame of *common human identity* for example can already take care of some. For example it reduces a sense of “doom” by painting the future not as dark as the *alarmism frame*. However, it could be refined and ameliorated further by also considering “distance” and making the message local or considering “iDentity” and appealing to specific values German students hold. For instance, a study conducted by Autio and Heinonen (2004) found that young people generally have a certain degree of awareness concerning environmental problems, but conversly do not hold post-materialistic values. This might also be the case for German students. To verify this, it would be helpful to conduct a further study on German students about their values and then tailor climate change communication accordingly.

Furthermore, there are power issues at play, which cannot be ignored in order to make communication strategies meaningful. This refers to another debate about highly contested questions of how to define sustainable behaviour, what behaviour is particularly relevant and what are we actually trying to sustain (Adams, 2016). I did not include those aspects in my thesis as my aim was to provide the basis for further communication strategies, for follow up research and practical approaches this, nonetheless, has to be taken into account.

Moreover, this study focuses on individual behaviour change and therefore, on small steps of change. This can pose a problem in so far as those approaches might potentially result in an underestimation of the scope of change that is overall needed and in depoliticizing the problem of climate change. Small lifestyle changes will simply not be sufficient to solve the whole problem (Adams, 2016). Nonetheless, those approaches focusing on individuals can be seen as complementary and indeed useful as societal response will not be effective if we do not also understand individual behaviour (Adams, 2016).

In this thesis, however, I do not measure behaviour change. As a first step, I only analyse the background conditions needed for this to take place. Yet, also if there are favourable conditions among German students such as high levels of awareness and concern about climate change and talking about the issue that is going on for at least half of the students with family and friends, the whole situation has to be observed and examined further. There is the possibility that interpersonal discussion will not result in behaviour change as "on the whole, there is no direct correlation between communication and behavior change" (Nerlich et al., 2010, p.101). It is rather an important contributing factor (Geiger et al., 2017; Pearce, et al. 2015; Geiger & Swim, 2016; Marshall, 2014; Norgaard, 2011).

6.4 Looking at the Larger Picture: Sustainability Science Approaches Needed

This thesis is just a first tiny step of many important ones to the larger whole and needs to be taken up further if it should have any generally useful implications. It provides important information for targeting German students in climate change

communication and can therefore, be understood as a first assessment of the situation. Besides this, of course further research on German students is necessary, especially with regards to framing and then it is decisive to also effectively employ the results in real world climate change communication approaches. Here, best-practice examples such as the *carbon talks*² in Canada and above all sustainability science approaches might provide additional fruitful inspiration on how to implement climate change communication strategies when addressing German students and on how to conduct further research.

Sustainability science particularly with its holistic and participatory approaches, seeking to work on the interdisciplinary as well as the intradisciplinary level (Kates et al., 2001; Lang et al., 2012) might fit well to face the above listed future tasks for research in this field. It can satisfy the demands of working more inter- and intradisciplinary by researchers as Moser (2010) and Kahan (2012), who investigate climate change communication more in-depth. Moser (2010) in particular points out to a missing collaboration between climate change communicators and climate change communication scientists and Kahan (2012) notices the importance of interdisciplinarity research in calling for psychologists, anthropologists, sociologists, political and economic scientist to collaborate. Furthermore, this type of research may be used to consider the “importance of two-way dialogue and lively debate as inherent to productive deliberation about possible futures in a changing climate” (Pearce et al. 2015, p. 620). Moreover, as one-way communication has proven to be insufficient participatory approaches might be of great use. Nerlich et al. (2010) importantly note, “a lively debate can best be understood not as a failure of consensus or a deficiency of knowledge but as a means of ‘keeping public engagement with science authentically alive and not under the control of agents whose own culturally embedded assumptions, imaginations, and practices may well be part of the problem’ ” (p.107). Hence, this could provide the opportunity for an open dialogue to spread maybe even including the “[...] creating and supporting [of] new institutions and societal infrastructure that provide a buffer between the science

² “Carbon Talks provides the platform to discuss, define and manage the transition to a low-carbon economy. It creates spaces for dialogue – not debate – spaces which help people to think creatively, consider alternatives, and develop practical solutions that are viable, cost-effective and sustainable.” (<http://www.carbontalks.ca/about/>)

of climate change and the complex challenge of engaging the public” as Corner & Groves suggest (2014, p.744). One more advantage of participatory approaches in sustainability science is the creation of local knowledge for action (Cash et al. 2003) and so specific solution-oriented approaches (Jerneck et al., 2010; Kates et al., 2001). This is especially important to climate change communication strategies as they always have to be tailored according to local conditions including attitudes, values and worldviews in order to reach their target audience and be successful (Pearce et al., 2015; Stoknes, 2014, 2015; Shome et al., 2009; Thompson & Schweizer, 2008).

Moreover, climate change communication research could make use of Miller’s (2013) understanding of sustainability, dividing the concept of sustainability into “universalist sustainability” (here it is the lowest common denominator that provides the definition of sustainability and on that everyone can agree) and “procedural sustainability” (this is a more specific definition of sustainability identified by participatory engagement). When analysing public perception studies to tailor climate change communication the concept of “universalist sustainability” would be of use to reach as many people as possible. Then, in a second step creating open dialog that involves participatory engagement the concept of “procedural sustainability” could inform this process.

To sum up, in the words of Nerlich et al. (2010) “there is no one-size that fits all solution. What is needed is a mix of measures of which communication is only one, and it will only work when it is embedded in other approaches which are more directly linked to practical behavior in social life” (p.101).

6.4 Future research

The findings of this thesis suggest that there is a need for some more research on German students and climate change communication in Germany in general in order to create effective communication strategies. As already stated, an area that would be interesting for prospective research, concerns for instance the reason why students are in need of some more information about climate change in a world that is overloaded by information easily accessible. In particular, one might look at what kind of information it is that they request. Additionally, a study on values and worldviews of German students would be of great use to climate change

communication. Furthermore, examining the assumption of a climate spiral of silence on social media could be an interesting topic for further research. And moreover, framing needs further investigation. In particular, the *common human identity* frame could be of interest here. In addition, also justice and moral framings could be tested with regards to emotions with the aim of ultimately replacing the predominant *alarmism* frame. These are some of the most interesting questions and pressing issues that might serve as possible departure points for further research as well as for practical approaches.

7 Conclusion

This thesis, as having conducted the groundwork for prospective climate change communication strategies targeting German students, provides important knowledge in order to craft new and effective ones. The main findings suggest that there exists a good basis including the presence of necessary conditions for communication strategies to be effective, on which prospective climate change communication can build. German students, at least those who took part in the survey, create the impression to be an easy accessible and receptive target audience. A majority of German students having taken part in the survey are highly aware of the topic of climate change and concerned about the issue. Most of them are in need of some more information and about half of the students talk at least sometimes to often about the topic with their family and among friends, suggesting that there is no *climate spiral of silence* among German students when talking face to face. On the downside, this might be the case for communication in the online space. However, a suitable framing of the topic of climate change for this specific target group could not be found in this thesis.

Therefore, the ice needs to be broken more and prospective climate change communication strategies should aim at triggering more communication about the topic of climate change among German students, especially in the online space, with the overall goal of motivating behaviour change. Here an alternative framing, as for example the common human identity frame, might provide a more fruitful outcome. But as there is no direct correlation between communication and behaviour change, rather it is an important contributing factor (Nerlich et al., 2010), what is needed when crafting new communication strategies, is a mix of measures. When acknowledging this, then in fact “the hope invested in alternative narratives [or framing] is the basis for transition towards genuinely sustainable societies” (Adams, 2016, p.197).

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Appendices

Appendix A: Questions of audience segmentation

- **Recently, you may have noticed that climate change has been getting some attention in the news. Global warming refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate may change as a result.**

What do you think: Do you think that climate change is happening?

Yes/ No/ Don't know

- **How sure are you that climate change is happening?**

Not at all sure/ Somewhat sure/ Very sure/ Extremely sure

- **Assuming global warming is happening, do you think it is ...**

Caused mostly by human activities/ Caused mostly by natural changes in the environment / Other/ None of the above because global warming isn't happening/ Don't know

- **How worried are you about climate change?**

Not at all worried/ Not very worried/ Somewhat worried/ Very worried

- **How much do you think climate change will harm you personally?**

Not at all/ Only a little/ A moderate amount/ A great deal/ Don't know

- **When do you think climate change will start to harm people in Germany?**

They are being harmed now/ In 10 years/ In 25 years/ In 50 years / In 100 years/ Never

- **How much do you think climate change will harm future generations of people?**

Not at all/ Only a little/ A moderate amount / A great deal/ Don't know

- **How much had you thought about climate change before today?**

A lot/ Some/ A little/ Not at all

- **How important is the issue of climate change to you personally?**

Not at all important/ Not too important/ Somewhat important/ Very important/
Extremely important

- **How much do you agree or disagree with the following statement: "I could easily change my mind about climate change."**

Strongly agree/ Somewhat agree/ Somewhat disagree/ Strongly disagree

- **How many of your friends share your views on climate change?**

None /A few/ Some /Most /All

- **Which of the following statements comes closest to your view?**

Global warming isn't happening./ Humans can't reduce global warming, even if it is happening. / Humans could reduce global warming, but people aren't willing to change their behavior so we're not going to/ Humans could reduce global warming, but it's unclear at this point whether we will do what's needed.
/Humans can reduce global warming, and we are going to do so successfully.

- **Do you think citizens themselves should be doing more or less to address climate change?**

Much less/ Less/ Currently doing the right amount/ More/ Much more

- **Over the past 12 months, how many times have you punished companies that are opposing steps to reduce climate change by NOT buying their products?**

Never/ Once/ A few times (2-3)/ Several times (4-5)/ Many times (6+)/ Don't know

- **Do you think climate change should be a low, medium, high, or very high priority for the government of Germany?**

Low/ Medium/High/ Very high

- **People disagree whether Germany should reduce greenhouse gas emissions on its own, or make reductions only if other countries do too. Which of the following statements comes closest to your own point of view?**

Germany should reduce its greenhouse gas emissions ...

Regardless of what other countries do / Only if other industrialized countries (such as England, Germany and Japan) reduce their emissions/ Only if other industrialized countries and developing countries (such as China, India and Brazil) reduce their emissions / The US should not reduce its emissions/ Don't know

Appendix B: Frames

1. Common Human identity:

Climate change is causing harm to us humans.

Although the planet is not dying; we humans will endure suffering due to changed living conditions.

Nature does not need humans. Humans need nature.

2. Uncivilization:

Planet Earth is not dying because of climate change; but our civilisation as we know it might be.

Neither green technology nor ethical shopping is going to prevent a serious crash.

Once we stop pretending that a happy shiny future compatible with modern life is possible, we are released to think seriously about the future.

3. Alarmism:

Climate change will have devastating consequences.

Ecosystems become extinct, islands will disappear and extreme temperatures will make it at some places on Earth impossible for life to develop

The list of adverse effects is extensive and if appropriate measures are not taken soon it will be very quickly to late to stop those horror scenarios.

Appendix C: Questionnaire

Welcome to my online survey!

Data in this survey is only gathered and analysed anonymously to ensure the protection of your identity. I will not demand your name or adress at any time.

Furthermore, your data will be dealt with in strict confidence.

The average time to complete the survey is about 11 minutes. The questionnaire consists of several parts. Detailed instructions to fill in the survey are provided before each part. There is no such thing as good or bad answers. Please respond always in a way that reflects your personal attitude. In case of doubts, give the answer that is most applicable to you.

Thank you for your support!

1. *Anonymous person code*

Please fill in your anonymous person code:

First letter of the name of you mother (e.g. E for Ela): _____

First letter of the name of your father (e.g. M for Matthias): _____

Day of your birth (e.g. 08 for 08.04.1990): _____

First letter of place of birth (e.g. H for Heidelberg): _____

Demographic data

Before starting with the actual survey please fill in some demographic information about your person.

2. Is German your native language?

Yes/ No

3. Please specify your gender.

Female/ Male/ Other

4. How old are you?

5. Please indicate the highest successfully completed level of education.

No educational qualification/ „Hauptschulabschluss“/ Secondary education/ High school education/ University degree

6. Are you currently enrolled in a University college programe?

Yes/ No

7. If you are enrolled in a University program please indicate the field of studies.

8. Are you currently employed?

No/ Yes, full-time/ Yes, part-time

9. If you are currently employed please indicate your occupation.

10. Do you have children?

Yes/ No

11. Please indicate your current mood.

Please answer as spontaneously as possible. There is no such thing as good or bad answers.

Very bad/ Bad/ Moderately/ Good/ Very good

12. How worried are you about climate change?

Not at all worried/ Not very worried/ Somewhat worried/ Very worried

13. How important is the issue of climate change to you personally?

Not at all important/ Not too important/ Somewhat important/ Very important/
Extremely important

14. Recently, you may have noticed that *climate change* has been getting some attention in the news. Global warming refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate may change as a result.

What do you think: Do you think that climate change is happening?

Yes/ No/ Don't know

15. How sure are you that climate change is happening?

Not at all sure/ Somewhat sure/ Very sure/ Extremely sure

16. How strongly do you feel each of the following emotions when you think about the issue of climate change?

Either Emotions A or Emotions B.

Emotions A:

Interest

Not at all/ Not very/ Moderately/ Very

Worry

Not at all/ Not very/ Moderately/ Very

Hope/

Not at all/ Not very/ Moderately/ Very

Guilt

Not at all/ Not very/ Moderately/ Very

Emotions B:

Anger

Not at all/ Not very/ Moderately/ Very

Fear

Not at all/ Not very/ Moderately/ Very

Heplessness

Not at all/ Not very/ Moderately/ Very

Grief

Not at all/ Not very/ Moderately/ Very

17. How strongly do you feel each of the following emotions when you think about your actions and the issue of climate change?

Either Emotions A or Emotions B. See question 16.

18. How strongly do you feel each of the following emotions when you think about the future and the issue of climate change?

Either Emotions A or Emotions B. See question 16.

Frames

Either Common Human Identity frame, Uncivilization frame or Alarmism frame

Common Human identity:

Please read the following sentence carefully:

Climate change is causing harm to us humans.

Please read the following sentence carefully:

Although the planet is not dying; we humans will endure suffering due to changed living conditions.

Please read the following sentence carefully:

Nature does not need humans. Humans need nature.

Uncivilization:

Please read the following sentence carefully:

Planet Earth is not dying because of climate change; but our civilisation as we know it might be.

Please read the following sentence carefully:

Neither green technology nor ethical shopping is going to prevent a serious crash.

Please read the following sentence carefully:

Once we stop pretending that a happy shiny future compatible with modern life is possible, we are released to think seriously about the future

Alarmism:

Please read the following sentence carefully:

Climate change will have devastating consequences.

Please read the following sentence carefully:

Ecosystems become extinct, islands will disappear and extreme temperatures will make it at some places on Earth impossible for life to develop

Please read the following sentence carefully:

The list of adverse effects is extensive and if appropriate measures are not taken soon it will be very quickly to late to stop those horror scenarios.

19. How strongly do you feel each of the following emotions when you think about the issue of climate change?

Either Emotions B or Emotions A. See question 16.

20. How strongly do you feel each of the following emotions when you think about your actions and the issue of climate change?

Either Emotions B or Emotions A. See question 16.

21. How strongly do you feel each of the following emotions when you think about the future and the issue of climate change?

Either Emotions B or Emotions A. See question 16.

22. How sure are you that climate change is happening? Please indicate a percentag.

Please click on the slider bar below to indicate your answer. You can slide the indicator to the position that best describes your opinion.

23. Assuming climate change is happening, do you think it is ...

Caused mostly by human activities/ Caused mostly by natural changes in the environment / Other/ None of the above because global warming isn't happening/
Don't know

24. How much do you think climate change will harm you personally?

Not at all/ Only a little/ A moderate amount/ A great deal/ Don't know

25. When do you think climate change will start to harm people in Germany?

They are being harmed now/ In 10 years/ In 25 years/ In 50 years / In 100 years/
Never

26. How much do you think climate change will harm future generations of people?

Not at all/ Only a little/ A moderate amount / A great deal/ Don't know

27. How much do you agree or disagree with the following statement: "I could easily change my mind about climate change."

Strongly agree/ Somewhat agree/ Somewhat disagree/ Strongly disagree

28. How many of your friends share your views on climate change?

None /A few/ Some /Most /All

29. Which of the following statements comes closest to your view?

Global warming isn't happening./ Humans can't reduce global warming, even if it is happening. / Humans could reduce global warming, but people aren't willing to change their behavior so we're not going to/ Humans could reduce global warming, but it's unclear at this point whether we will do what's needed. /Humans can reduce global warming, and we are going to do so successfully.

30. Do you think citizens themselves should be doing more or less to address climate change?

Much less/ Less/ Currently doing the right amount/ More/ Much more

31. Over the past 12 months, how many times have you punished companies that are opposing steps to reduce climate change by NOT buying their products?

Never/ Once/ A few times (2-3)/ Several times (4-5)/ Many times (6+)/ Don't know

32. Do you think climate change should be a low, medium, high, or very high priority for the government of Germany?

Low/ Medium/High/ Very high

33. People disagree whether Germany should reduce greenhouse gas emissions on its own, or make reductions only if other countries do too. Which of the following statements comes closest to your own point of view?

Germany should reduce its greenhouse gas emissions ...

Regardless of what other countries do / Only if other industrialized countries (such as England, Germany and Japan) reduce their emissions/ Only if other industrialized countries and developing countries (such as China, India and Brazil) reduce their emissions / The US should not reduce its emissions/ Don't know

34. Which comes closer to your own view?

Most scientists think climate change is happening/ Most scientists think climate change is not happening/ There is a lot of disagreement among scientists about whether or not climate change is happening/ Don't know enough to say

35. To the best of your knowledge, what percentage of climate scientists think that human-caused climate change is happening?

Please click on the slider bar below to indicate your answer. You can slide the indicator to the position that best describes your opinion.

36. Are each of the following statements definitely true, probably true, probably false, definitely false, or you do not know? (items randomized)

Climate change will cause some places to get wetter, while others will get drier.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

The period from 2014 to 2016 was warmer than any other decade since 1850.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

Scientists can't predict the weather more than a few days in advance – they can't possibly predict the climate of the future.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

Climate change will increase crop yields in some places, and decrease it in others.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

Scientists' computer models are too unreliable to predict the climate of the future.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

In the 1970s, most scientists were predicting an ice age.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

Climate change will cause temperatures to increase by roughly the same amount in all countries.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

Any recent climate change is caused by the sun.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

The Earth is actually cooling, not warming.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

Climate change is happening, but will be more beneficial than harmful.

Definitely true/ Probably true/ Probably false/ Definitely false/ Don't know

37. On some issues people feel that they have all the information they need in order to form a firm opinion, while on other issues they would like more information before making up their mind. For climate change, where would you place yourself?

I need a lot more information/ I need some more information/ I need a little more information/ I do not need any more information

38. How often do you discuss climate change with your family?

Often/ Occasionally/ Rarely/ Never

39. How often do you discuss climate change with your friends?

Often/ Occasionally/ Rarely/ Never

40. How often do you hear other people talk about climate change?

Never/ At least once a week/ At least once a month/ Several times a year/ Once a year or less/ Don't know

41. How often, if ever, have you done the following?

Written an e-mail about climate change.

Never/ Rarely/ Occasionally/ Often

Shared information about the event on Facebook or Twitter.

Never/ Rarely/ Occasionally/ Often

Given a speech about the event.

Never/ Rarely/ Occasionally/ Often

Posted a comment online in response to a news story or blog about climate change.

Never/ Rarely/ Occasionally/ Often

Written letters or emailed a newspaper about climate change.

Never/ Rarely/ Occasionally/ Often

42. How much had you thought about climate change before today?

A lot/ Some/ A little/ Not at all

You have reached the end of the survey.

I would like to thank you very much for participating.

In case you have any questions or critique regarding the survey or the results or in case you like to receive further information on the topic of climate change please write an e-mail to ess15jhe@student.lu.se.

You can close the window now.

Appendix D: Results t-Tests & oneway ANOVA

Table 1. t-test Results Comparing Emotions on the Common Human Identity Frame

	<i>MD</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Interest	,05636	,07964	,708	359	,480
	,05636	,07986	,706	341,541	,481
Worry	,10754	,08153	1,319	359	,188
	,10754	,08168	1,317	349,895	,189
Hope	-,02444	,07497	-,326	359	,745
	-,02444	,07507	-,326	353,620	,745
Fear	,08086	,08989	,900	359	,369
	,08086	,08991	,899	358,353	,369

Table 2. t-Test Results Comparing Emotions on the Uncivilization Frame

	<i>MD</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Interest	,04122	,07034	,586	359	,558
	,04122	,07032	,586	358,441	,558
Worry	,06643	,06986	,951	359	,342
	,06643	,07000	,949	353,419	,343
Hope	,09555	,07559	1,264	359	,207
	,09555	,07581	1,260	349,352	,208
Fear	-,09386	,08629	-1,088	359	,277
	-,09386	,08598	-1,092	355,786	,276

Table 3. t-Test Results comparing Emotions on Alarmism Frame

	<i>MD</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Interest	,04590	,07270	,631	359	,528
	,04590	,07278	,631	355,333	,529
Worry	-,04000	,08021	-,499	359	,618
	-,04000	,08027	-,498	356,500	,619
Hope	,04359	,08168	,534	359	,594
	,04359	,08162	,534	358,777	,594
Fear	,03699	,08613	,429	359	,668
	,03699	,08623	,429	354,505	,668

Table 4. Descriptive Measures for oneway ANOVA

		<i>N</i>	<i>M</i>	<i>SD</i>	<i>SE</i>
Interest	Frame 1	178	-,0506	1,11625	,08367
	Frame 2	176	-,0455	,92470	,06970
	Frame 3	176	-,0568	1,00692	,07590
	Total	530	-,0509	1,01745	,04420
Fear	Frame 1	178	,0787	1,21409	,09100
	Frame 2	176	-,0909	1,07583	,08109
	Frame 3	176	,0398	1,18737	,08950
	Total	530	,0094	1,16092	,05043
Hope	Frame 1	178	,0337	,98519	,07384
	Frame 2	176	-,1023	1,01463	,07648
	Frame 3	176	-,0625	1,11692	,08419
	Total	530	-,0434	1,03985	,04517
Worry	Frame 1	178	-,0955	1,08762	,08152
	Frame 2	176	-,0852	,88712	,06687
	Frame 3	176	,0284	1,09768	,08274
	Total	530	-,0509	1,02854	,04468

Table 5. Results oneway ANOVA

		<i>df</i>	<i>MST</i>	<i>F</i>	<i>p</i>
Interest	Between Groups	2	,006	,005	,995
	Within Groups	527	1,039		
	Total	529			
Fear	Between Groups	2	1,393	1,034	,356
	Within Groups	527	1,348		
	Total	529			
Hope	Between Groups	2	,866	,801	,450
	Within Groups	527	1,082		
	Total	529			
Worry	Between Groups	2	,834	,788	,455
	Within Groups	527	1,059		
	Total	529			