

Tired of Doom - Transient Apocalypse Fatigue And Successful Climate Change Communication

Master Thesis in Sustainable Development

Carlotta Hedwig Harms

Institutionen för geovetenskaper
Uppsala universitet
2020

In cooperation with Utrecht University
and the Swedish Environmental Research Institute

Supervisor: Frans Lenglet

Subject reviewer: Hans Marien

Content

1. Introduction	1
2. Theoretical and empirical background	4
2.1. Theoretical background	4
2.1.1 The concept Apocalypse Fatigue	4
2.1.2 AF and the Stoknes CCC model	5
2.2 Empirical background	6
2.2.1 Distance	6
2.2.2 Doom	8
2.2.3 Two responses	10
2.3 Hypotheses	11
3. Method	12
3.1 Sample	12
3.1.1 Ideal sample	12
3.1.2 Exclusion of participants	12
3.1.3 Final sample	13
3.2 Design	14
3.3 Operationalisation	15
3.3.1 Operationalisation of doom	15
3.3.2 Operationalisation of distance	16
3.4 Material and procedure	16
3.4.1 Pre-intervention	16
3.4.2 Intervention	17
3.4.3 Post intervention	18
3.5 Statistics	19
4. Results	20
4.1 Randomisation check	20
4.2 Manipulation check	20
4.3 Main analyses	22
4.3.1 Effect of doom and distance phrasing on attitude change	22
4.3.2 Effect of doom and distance phrasing on recall ability	24
5. Discussion	26
5.1 Interpretation of results	26
5.1.1 Attitude	27
5.1.2 Recall ability	27
5.2.3 Both responses	28
5.2 Limitations	29

5.2.1 Limitations of the model	29
5.2.2 Limitations of the methodology	30
5.2.3 Limitations of the sample	31
5.3 Implications	31
5.3.1 For AF	31
5.3.2 For the Stoknes model	32
5.3.3 For CCC	32
5.4 Future research	33
6. Conclusion	34
7. Acknowledgement	35
8. References	36
Appendix	48
Appendix A. Manipulation check pilot study	48
Appendix B. Distance scales and threat scale for pilot study	49
Appendix C. Graphs pilot study	50
Appendix D: Responses of qualitative analysis of the pilot study	55
Appendix E: Experimental texts and videos	60
E.1 Threatening distal	60
E.2 Empowering proximal	65
E.3 Threatening proximal	70
E.4 Empowering distal	75
Appendix F. Pictures and subtitles including copyright	80
Appendix G. Climate Change Attitude Survey (CSSA) by Christensen & Knezek (2015)	84
Appendix H. Results of the manipulation check t-tests	85
Appendix I. Results of the non-significant variables of the manipulation check	86
Appendix J. Extensive chapter on response mechanisms to fear appeals	88
Appendix K. Recall test questions for all four experimental conditions.	91

Tired of Doom - Transient Apocalypse Fatigue And Successful Climate Change Communication

CARLOTTA HEDWIG HARMS

Harms, C. 2020: Tired of Doom - Transient Apocalypse Fatigue And Successful Climate Change Communication. *Master thesis in Sustainable Development at Uppsala University*, No. 2020/56, pp 94, 30 ECTS/hp

Abstract:

One route to climate change mitigation is empowering individuals and households to adopt climate-friendly cognitions and behaviours. This can be done through communication. Conventional climate change communication models have proposed to confront communication targets with messages that emphasise the threat and urgency of climate action in order to provoke change. In contrast, the fear appeal literature shows that these messages lead to rejection and denial of the topic, due to a phenomenon called Apocalypse Fatigue: a numbness resulting from confrontation with too much negative information without the perceived self-efficacy for removing or reducing the threat. The occurrence of Apocalypse Fatigue, according to the Stoknes communication model, depends on exposure criteria as well as on properties of the message. The model proposes five barriers to successful climate change communication, of which the outer two - doom and distance - have been tested in this study. Literature review suggests that the amount of doom contained in the message as well as the mental construal, which depends on the perceived distance to the threat described, determine the outcome of the message on the receiver. Based on these findings, this study proposes a model of Apocalypse Fatigue. It assumes that Apocalypse Fatigue is determined by doom and distance phrasing, leading to both a depletion of the working memory capacity of the receiver (first response evaluated in this thesis) or dissonance, which leads to rejection and denial (second response evaluated in this thesis). Furthermore, it is proposed that this effect is mediated by the phrasing of the distance between the message receiver and the consequences of climate change. To test the effect of doom and distance phrasing on the receiver, an experimental set-up was developed, in which participants were exposed to one of four interventions, manipulating doom and distance. Analysis revealed statistically significant effects of the doom and distance phrasing on the recall ability of message receivers, but no effects on climate change attitude. Further analysis shows that the recall ability of receivers is greater when confronted with threatening versus empowering and distal versus proximal messages. Comparison of means and standard deviations furthermore show that the effect of doom and distance phrasing on attitude change and recall ability are contrary to each other. These results indicate that the proposed Apocalypse Fatigue only affects attitude, and not information recall. Consequently, this thesis did not find support for Apocalypse Fatigue, but concludes that AF does not affect recall ability. It concludes on limitations and recommendations for climate practice and future research.

Keywords: Sustainable Development, Social Psychology, Attitude Change, Apocalypse Fatigue, Climate Change Communication, Stoknes

Carlotta Hedwig Harms, Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden

Tired of Doom - Transient Apocalypse Fatigue And Successful Climate Change Communication

CARLOTTA HEDWIG HARMS

Harms, C. 2020: Tired of Doom - Transient Apocalypse Fatigue And Successful Climate Change Communication. *Master thesis in Sustainable Development at Uppsala University*, No. 2020/56, pp 94, 30 ECTS/hp

Abstract:

One route to fight climate change that is both a strategy in itself and a mediator to other interventions is climate change communication. Currently, most climate change communication follows the assumption that conveying threat and urgency leads to attitude and behaviour change. A number of studies has shown that this type of communication fails to evoke individual change, and instead leads to a phenomenon called Apocalypse Fatigue: a numbness resulting from being confronted too many times with too much frightening information. As a result, the message is not implemented in one's action, but instead rejected, denied and avoided. This study has investigated the effectiveness of message phrasing, specifically of messages that are phrasing climate change as inevitable *doom* and the consequences as happening at a *distance*. Distance furthermore has four spheres: geographical, temporal, social and hypothetical. Based on the literature of this study, it is suggested that the effect of threatening messages on the message receiver is mediated by the communication of distance: threatening messages are only perceived as threatening, when they are not phrased distant. The effect on the receiver of the message was measured by assessing two types of responses. First, it was investigated whether they changed their climate change attitude after exposure to the message. Second, it was assessed how many message details they remembered. The results indicate different mechanisms of message phrasing on attitude change and recall ability. In this study, doom and distance phrasing did not have an effect on attitude change, but the means and standard deviations indicate that there could be an effect in the proposed direction, namely that it is beneficial for attitude change to phrase climate change as not threatening and not distant. Whether this effect is statistically significant has to be investigated in future studies. In contrast, there were statistically significant effects on recall ability, but in the opposite direction: it is beneficial for recall ability to phrase climate change as threatening and distant. Therefore, this thesis concludes that AF does not affect recall ability, and that further research is needed to investigate the effect of message phrasing on attitude change. It concludes on limitations and recommendations for climate practice and future research.

Keywords: Sustainable Development, Social Psychology, Attitude Change, Apocalypse Fatigue, Climate Change Communication, Stoknes

Carlotta Hedwig Harms, Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden

1. Introduction

Climate Change will likely be the greatest challenge humankind is facing in the 21st century (European Environmental Agency, 2020a, 2020b). Greenhouse gas emissions have exceeded all predictions of the 1970s and 1980s and are continuously increasing (Kerr, 2009; IPCC, 2018). Already now they have led to an increase of global average temperatures of 1.1°C above the pre-industrial levels (IPCC, 2018). With that, the 1.5°C and 2°C goals of the 2015 Paris agreement might already be out of reach (IPCC, 2018). With every year, this change is becoming increasingly visible. The planet is looking at the brink of a new climate age (Watts, 2018; The UN environment programme, 2019), resulting in extreme weather events, extinction and human mass migration (Flannigan, Amiro, Logan, Stocks, & Wotton, 2006; Crowell, Edelman, Coulton & McAfee, 2007; Yamamoto & Esteban, 2010; Keegan, Alber, McConnell & Baker, 2014; UN, 2017; Hoegh-Guldberg et al., 2018; Loria, 2018; Flannigan, Goodman & Robinson, 2019).

These are only a few examples of the threat and urgency of the topic. In our immediate future, climate change will impact every living being on this planet (European Commission, 2020). Many strategies have proposed technological inventions and supporting policies (e.g. Brecher, 2015; Hayashi, Morichi, Oum & Rothengatter, Xu & Ramanathan, 2017). But by doing so, they miss out on a much easier, large-scale intervention that is not aiming to repair damage already done but prevent it from happening, namely consumer pro-environmental attitude or behaviour change (Osbaldeston & Schott, 2012; Kolandai-Matchett & Armoudian, 2020). Pro-environmental attitudes (PEA) and - behaviours (PEB) are defined as conscious attitudes or actions aimed at minimizing the negative impacts of one's behaviour on the environment or to actively enhance it (Jensen, 2002; Kollmus & Agyeman, 2002; Sawitri, Hadiyanto & Hadi, 2015). An example for a PEB change would be if someone engages in climate activism (Homburg & Stolberg, 2006), or an increased energy saving behaviour of a person between two points in time (Osbaldeston & Schott, 2012). Finally, behaviour and attitude are intertwined in their effect; according to behaviour theories such as the Theory of planned behaviour (TPB; Ajzen 1985, 1991), PEA are predicting PEB (see also Bissing-Olson, Iwer, Fielding & Zacher, 2013).

Both PEA and PEB in individuals and households are a promising route of climate change mitigation, because they are tackling the problem at the root (e.g. Hargreaves, 2011; Osbaldeston & Schott, 2012). Studies estimate that about 24% of the final energy consumption in the European Union is directly caused by households (OECD, 2009). Household consumption is responsible for about 60% of global greenhouse gas emissions (Ivanova et al., 2015) and 50% to 80% of global water, land and material use (Ivanova et al., 2015). These numbers suggest that individual PEB can have some impact. But what they underestimate is the additional power of households, which is more difficult to put in numbers. Individuals have - at least in democracies - considerable impact on political decision making (Bin & Dowlatabadi, 2005; Fishediek et al., 2014). Furthermore, studies have shown that the adoption of one PEB (therefore, positive PEB change) spills over to a number of other behaviours (e.g. Poortinga, Whitmarsh & Suffolk, 2013; Lanzini & Thøgersen, 2014; Thomas, Poortinga & Sautkina, 2016), including work life and social life, which in turn affects coworkers and friends.

With the establishment of the importance of PEA/PEB comes the question of how to empower households and individuals to change them. For decades theories aiming to identify determinants of PEA and PEB have been proposed, modified and discarded. None of them has been capable of identifying the key determinants and universally explaining behaviour change (Kollmuss & Agyeman, 2002; Davis, Campbell, Hildon, Hobb & Michie, 2015; Kwasnicka, Dombroski, White & Sniehotka, 2016). Therefore, this thesis is suggesting another path: climate change communication (CCC; Ockwell, Whitmarsh &

O'Neill, 2009; Dupar, McNamara & Pacha, 2019). Whatever the determining factors, the success of a PEA/PEB intervention always depends on how the message is *communicated*. The framing of local policies, for example, can either spike climate action or lead to polarization and inaction (Romsdahl, Wood, Harsell & Hultquist, 2019; Meerow & Neuner, 2020). Communication is a universal tool with high potential in evoking climate action (Koger, Leslie & Hayes, 2012). On the other hand, it has the potential to inhibit the successful implementation of an intervention or even reverse the desired outcome (Stermann, 2011).

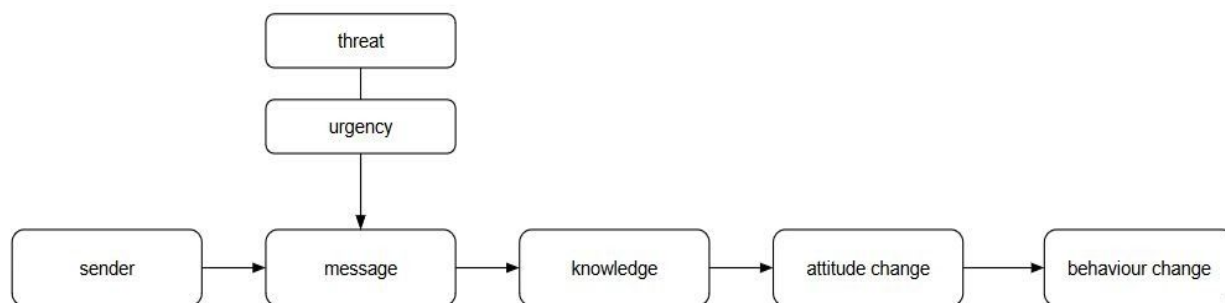


Fig. 1. Conventional model of the effects of climate change communication as described by Stoknes (2015), based on the Sender-Message-Channel-Receiver models of Communication by Shannon & Weaver (1949) and later Berlo (1977), adapted from Bendor (2018).

Most CCC has been executed based on the assumption that a message sent from a sender to a receiver leads to an increase of knowledge. Once knowledge is transferred, attitude and behaviour are assumed to change congruent with the message, see Fig. 1 (Nordhaus & Shellenberger, 2009; Stoknes, 2015; Wallace-Wells, 2019). This transfer is assumed to only be effective if the information is phrased urgently and threatening enough. Consequently, framings of climate change as a threat associated with great loss are dominating CCC (Sullivan & White, 2020). Research, on the other hand, suggests that such phrasing is highly unsuccessful in evoking PEA and PEB. Literature on fear appeals (see chapter 2.2.2), for example, shows that such a phrasing is not only likely to not reach the desired outcome, but instead leads to denial and rejection of both the message and the sender (Moser & Dilling, 2011; Dunlap & Brulle, 2015). According to Stoknes (2017), this is due to a phenomenon called Apocalypse Fatigue (AF): receivers faced with apocalyptic messages become numb eventually. Similar to the conventional model of CCC (see Fig. 1), Stoknes (2015) assumes that this effect is independent from any other properties of the communication such as sender, receiver or channel characteristics, but only depends on the occurrence of five CCC barriers (see Fig. 2).

In his climate change communication model shown in Fig. 2, Stoknes (2015) proposes that doom is one of five barriers that inhibit the message from evoking cognitive or behavioural change; and that there is a solution for overcoming each barrier. This bilateral nature of the model has the potential to explain both effective and ineffective communication, and could therefore be highly relevant for climate change mitigation. Effective communication is in this thesis understood as communication that leads to a positive change in receiver's attitude or behaviour towards climate change. Ineffective communication is understood as communication that fails to evoke change or leads to negative change in receiver's attitude or behaviour towards climate change, e.g. by evoking rejection and denial. Despite it taking into account a number of psychological phenomena such as norm activation, cognitive dissonance (Festinger, 1962) and social identity (Tajfel, 1974), neither the model nor the implied concept of apocalypse fatigue have until

now been empirically tested. In fact, only few studies have empirically investigated the effectiveness of CCC at all (Crawley, Coffé & Chapman, 2020). Although Stoknes (2015) implies a hierarchy by visualising his proposed climate change barriers as rings surrounding the receiver, he does not account for the interaction of these barriers with each other - even though the literature suggests that such an interaction is likely (Sreenivasan & Weinberger, 2018).

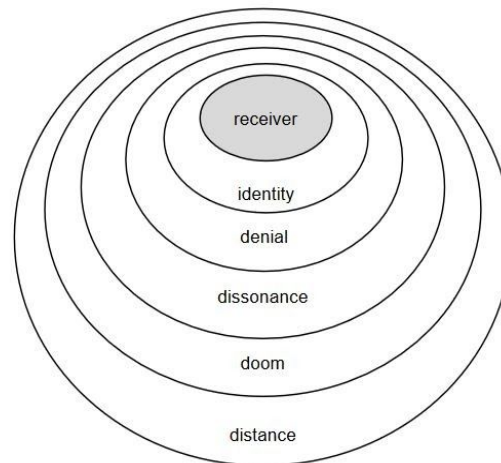


Fig. 2. The Stoknes model of the five psychological barriers (Stoknes, 2015).

The overarching aim of this thesis is to improve climate change mitigation by improving CCC in a way that does not fatigue but empower the receivers of climate change messages. To do so, this study is introducing a working model of AF and empirically testing it. Specifically, this study is concentrating on the effect of message phrasing on the receiver after only one exposure, measuring different receiver responses when manipulating the message phrasing. Such responses were collected as self-reports and through memory tests, both because a laboratory study would have exceeded the scale of this thesis and because one-on-one testing was impossible during the Corona crisis. Due to this thesis' limitations, the research did not measure effects of repeated exposure, but instead investigated receiver responses after only one exposure (transient AF). Therefore, this thesis is only investigating the direct effect of message phrasing on the receiver, independent from exposure criteria. It is furthermore limiting the working model to the AF determinants suggested by Stoknes in his CCC barrier model (2015) and does not account for any other possible AF mechanisms. The working model follows Stoknes' (2017) assumption that AF is stronger than any properties of the environment, the sender or the receiver. For the empirical testing, a methodology was developed based on Stoknes' model and insights from the literature. As such, both the working model and testing of this thesis are exploratory, giving first indications for AF under specific conditions. The research questions of this thesis were the following:

1. Is there such a phenomenon as transient apocalypse fatigue, working independently from sender, receiver or channel properties?
2. What role do doom and distance phrasing play?
3. What kind of response do they evoke in the message receiver?

To answer these questions, this thesis will first explore the theoretical concept of Stoknes' (2017) AF (chapter 2.1: theoretical background). Chapter 2.2 will give an overview of the empirical findings

concerning doom and distance, the two outer barriers of the Stoknes model (2015) whose influence on AF is the subject of this study. The chapter concludes with proposing a preliminary model of AF/effective CCC. Experimental design, material, process and sample are described in chapter 3, further details can be found in the appendices. The results will be reported in chapter 4 and discussed in chapter 5.

2. Theoretical and empirical background

2.1. Theoretical background

2.1.1 The concept Apocalypse Fatigue

Even though used by Nordhaus & Shellenberger (2009) and Stoknes (2017) as if it was a common term, AF is not yet a researched construct. The general construct of fatigue is manifest when a person faced with “prolonged periods of demanding cognitive activity” (Marcora, Staiano, & Manning, 2009, p. 857) tires out and becomes numb (Evans, Boggero & Segerstrom, 2015; Robuck, 2018). For example, health workers who are over a long period and in high intensity faced with human suffering, eventually reach a state of compassion fatigue, that inhibits their ability to show compassion and makes them numb to the suffering happening around them (Figley, 2002; Bride, Radley & Fingley, 2007; Yoder, 2010). Fatigue against apocalyptic messages in the climate change context is similar. The Post Carbon Institute (Zehner, 2020), for example, describes it as a physical and psychological exhaustion as a result of too much adrenaline and worry, leading to denial, rejection and avoidance (Rogers, 1983; Knowles & Riner, 2007; Glock & Kneer, 2009), see Fig. 3, after a person had been “*reading the latest harrowing report*” about climate change.

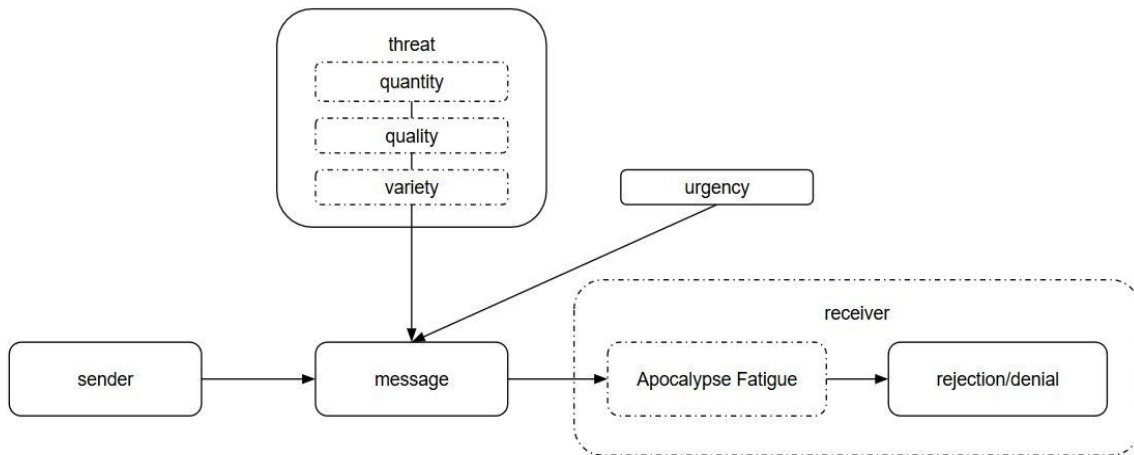


Fig. 3. Modified version of the conventional model of CCC reflecting the three message determinants and the receiver’s reaction to the message. Extensions to the model of Fig. 1 are highlighted in dashed lines.

The AF described is determined by properties of the message. More specifically, Stoknes (2015) proposes five components of the message, called “barriers”, that lead to AF as well as five “solutions” that lead to both the prevention of fatigue and the evocation of empowerment in the receiver (see next chapter).

Furthermore, Stoknes (2017) implies properties of exposure to determine AF occurrence. These are: quantity, quality and variety, see Fig. 2. Specifically, a person must be repeatedly exposed to

- a) ... a certain amount of messages...
- b)about different topics like sea-level rise, coral reef dying or forest fires that are ...
- c) ... threatening enough (Stoknes, 2015)...

... to show AF symptoms. With this thesis investigating transient AF, these criteria are operationalised in the empirical set-up of this study, but not subject to testing as they were implemented, not manipulated.

2.1.2 AF and the Stoknes CCC model

The models of barriers and solutions to effective CCC were first introduced by Stoknes in his 2015 book. They are furthermore linked to the occurrence of AF in his 2017 TED talk. In this thesis, the major focus will be on the Stoknes model of CCC barriers (2015) and whether they evoke AF. Stoknes' model of CCC solutions will be briefly introduced at the end of this chapter, as it provides suggestions for the avoidance of AF that will be operationalised in the experimental control group. For the visualisation of the barriers, see Fig. 2.

Distance. The first barrier is that of distance (Stoknes, 2015). If receivers of a message feel like the consequences of climate change described in the message are happening to other people, on the other side of the planet, they are unlikely to feel threatened by it. Consequently, distance phrasing is ineffective CCC.

Doom. The second barrier is that of doom. If the threat is too strongly emphasised, the message receivers may respond with fear and guilt (Stoknes, 2015). Stoknes describes there as passive emotions, that disconnect the receiver from the topic and eventually tire them out, leading to AF (Stoknes, 2018).

Dissonance. Hearing about the devastating consequences of the actions they are used to perform every day, such as driving to work by car or eating meat, message receivers will have to develop strategies to remove the cognitive dissonance resolving from it (Stoknes, 2015).

Denial. The possible receiver strategies to avoid the doom conveyed in the message rank from justifying current behaviour by comparing it to others who are doing worse or doubting, rejecting and denying the facts (Stoknes, 2015, 2017, 2018).

Identity. Every person is assumed to have a number of different social identities that can be activated depending on social situation and context (Tajfel, Billig, Bundy & Flament, 1971; Tajfel, 1972; Tajfel & Turner, 1979). If the message is attacking one identity like for example by criticising air travel, even though a travelling lifestyle is part of the receiver's identity, the message will lead to dissonance and will therefore be either ignored or denied.

These barriers could be linked to the occurrence of AF as follows: doom and distance evoke either denial or dissonance in the message receiver, if they feel incapable of removing the doom posed by the message. Therefore, the message phrasing (doom and distance) evokes a psychological response (denial, dissonance) to protect the receiver against the doom, which in turn leads to AF when the exposure criteria are fulfilled.

Associated to each barrier, Stoknes proposes five solutions to overcome them, thus avoiding fatiguing the message receiver and instead empowering them to act, as depicted in Fig. 4. He suggests to lift the distance barrier by activating social networks, ideally spiked with stories of successful climate activists (Stoknes, 2015). Doom and dissonance, denial and the rejection of a threat to the receiver identity can be reversed by emphasizing the simplicity and advantages of the proposed behaviour as well as opportunities, benefits and possible gains of taking action. While doing so, he emphasises that it is important to use terms and symbols (signals) that the receivers understand and therefore do not distance from (Stoknes, 2015). Finally, Stoknes argues that the good news-bad news ratio of the message should be 3:1.

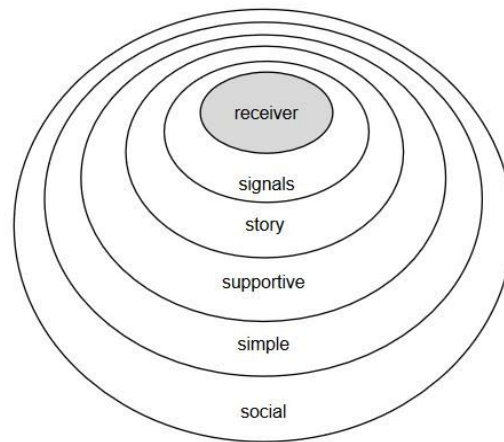


Fig. 4. Stoknes model of the five solutions to successful climate change communication (Stoknes, 2015).

2.2 Empirical background

This thesis is investigating the effect of message phrasing on receiver responses. Therefore, the following literature review will concentrate on the two of the five Stoknes CCC barriers that describe properties of message phrasing: distance and doom. With the Stoknes CCC model being - as discussed in the introduction - likely too simplified, this expansion will allow a more complete understanding of AF that in consequence will lead to more precise CCC interventions.

2.2.1 Distance

Distance is not only the first barrier of the Stoknes model. It is also a first indicator that the visualisation of the five Stoknes' barriers of AF as rings seems to be misleading. By showing them as hurdles that have to be taken one after the other, their interconnectedness and relation to each other is insufficiently displayed or specified. Distance is not a first barrier that can simply be taken by making climate change a social matter, such as Stoknes (2015) suggests. Instead, the distance of the message interacts with the second barrier, doom, by determining whether the messages is perceived as threatening: Without a perception of proximity between the receiver and the message, climate change is not perceived as actually threatening or urgent (Henderson, Waksak, Fujita & Rohrbach, 2011). This effect has been shown in a number of studies (e.g. Romero-Canyas et al., 2019) If such is the case, the message neither

evokes AF nor a positive change, but instead altogether fails to lead to any receiver response (Brügger, Morton & Dessai, 2016).

The underlying mechanism is explained by the *construal level theory* (CLT; Trope & Liberman, 2010). The theory proposes different levels of *construe*, or representation, of an information in the brain (Henderson, Wakslak, Fujita & Rohrbach, 2011). The level of construal depends on the distance of a message to the psychological reference point, which is the self (Henderson, Wakslak, Fujita & Rohrbach, 2011). The farther an object is from the self, the more construal is required to process the information, and the more distant the self feels to the message (Trope & Liberman, 2010). With distant messages requiring a higher level of mental construal than proximal messages (Trope & Liberman, 2010), the received information is processed differently. Whereas distance leads to abstract thinking about the topic of the message, proximity leads to concrete thinking (Trope & Liberman, 2010). Consequently, through the required level of construal, the distance to the message determines whether the receiver perceives the message as concrete and therefore feels an urge to act accordingly. According to the CLT, distance is not a stable individual belief but situational evaluation (Brügger, 2020).

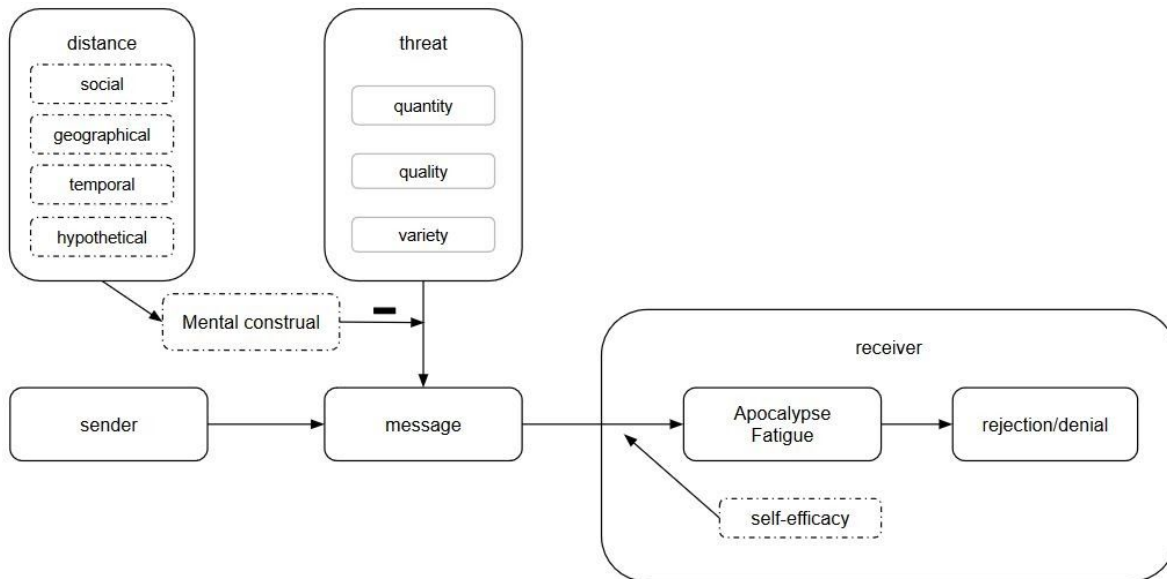


Fig. 5. Extended model of AF, adapted from the Stoknes CCC model (2015), highlighting the moderating nature of psychological distance, self-efficacy and the four spheres of distance. Extensions to the model of Fig. 3 are highlighted in dashed lines. The minus sign marks the direction of the moderating effect of distance on the effect of threat.

To prove this mediating effect, Howansky (2015) tested the effect of three different modes of proximity (proximate, distal, moderate) on pro-environmental intentions with an otherwise identical message. The results confirm the higher effect of proximal messages on pro-environmental intentions. They furthermore show that perceived proximity increases concern, efficacy and agency. Contrary to these findings, Brügger, Morton and Dessai (2016) did not find an increase in effectiveness of the message if the distance of the message was decreased. Therefore, it can be assumed that a number of mediators affect the extent to which distance mediates the perception of threat (Henderson, Wakslak, Fujita & Rohrbach, 2011; see Fig. 5). As the concept of urgency is largely covered by psychological distance, further extensions of the AF model will no longer specify urgency as a separate factor. Therefore, in Fig.

5 the concept of urgency is no longer represented separately but incorporated into the psychological distance box.

Brügger, Morton and Dessai (2016) suggest that the increased proximity might not inevitably lead to a greater effectiveness of the message, but only increase the potential of such an effect. Howansky (2015) furthermore proposes different factors that may be mediating the effect of psychological distance on pro-environmental intentions, one of which seems to be a key determinant for both distance and doom: self-efficacy (see Fig. 5).

Self-efficacy, first introduced in the *self-efficacy theory* of Bandura (1977) is the belief one has in their abilities (Akhtar, 2008; Bandura, 1977; Martin & McLellan, 2013). This is important for PEA and PEB, because a perception of ability in turn affects the foundation or change of attitudes and behaviour and can therefore inhibit attitude and behaviour change (Ertz, Karakas, & Sarigöllü, 2016). Other than self-esteem, self-efficacy is not a fixed trait but a constant evaluation of abilities in a number of different contexts (sports, art, academic writing; Ackerman, 2020). Self-efficacy is moderating the effect of the message on the receiver, because it determines whether the receiver takes action or feels overwhelmed and freezes. Therefore, only when confronted with an immediate threat to the self and without the perception of being able to defend against or remove the threat, receivers are suffering from AF. Consequently, Fig. 5 considers self-efficacy as a determinant of AF.

Whereas Stoknes (2015) emphasises only social distance to avoid psychological distance, the literature highlights spheres of distance that are cognitively related to each other and also influence mental construal (e.g. Liberman, Trope & Wakslak, 2007; Trope and Liberman, 2010): social, geographical, temporal and hypothetical distance. Threatening messages are only perceived as severe when phrased as socially (Spence & Pidgeon, 2010), geographically (Henderson, Wakslak, Fujita & Rohrbach, 2010; Jones, Hine and Marks, 2016) and temporally close. This may be a barrier to all successful communication, but especially to CCC, because the consequences of climate change in general and individual action specifically do not immediately occur or at the geographic location of the communication target. (Brügger, Morton & Dessai, 2016). Finally, hypothetical distance occurs when the consequences of climate change are described with a high level of uncertainty, allowing the communication target to distance themselves from the urgency to act (Liberman, Trope & Stephan, 2007).

2.2.2 Doom

The doom barrier to successful CCC that Stoknes (2015) proposes relates back to the evolutionary functions of fear. Fear and alarmism are states to protect against danger, thus motivating an individual to remove the threat (Rogers, 1983). In the psychological literature, messages that use fear to induce attitude or behaviour change, are called fear appeals (Tannenbaum et al., 2015). Research into the dynamics of fear appeals shows why the conventional CCC model fails to lead to empowerment but instead evokes rejection and denial (see e.g. Peters, Ruiter & Kok, 2013). They fulfill the first two of the key requirements for effective fear appeals as formulated, namely by being *harmful* to the individual (Rogers, 1975; Floyd, Prentice-Dunn & Rogers, 2006; Sreenivasan & Weinberger, 2018) and *likely to occur* (Rogers, 1975; Maddux & Rogers, 1983). But they miss out on the third and fourth key requirements, which are based on the realisation that fear alone does not change PEAs/PEBs. Instead, Maddux and Rogers (1983) have shown that threatening messages can only induce attitude change when coupled with recommendations to avoid the harm (Witte & Allen, 2000). Therefore, the third criterion to successful

fear appeals is that they must be communicated in a way that the receiver perceives them to have a high level of *effectiveness for a coping response* (Rogers, 1975). Finally, they have to be communicated in such a way that the receiver has a high level of *self efficacy expectancy* (Maddux & Rogers, 1983; Peters, Ruiter & Kok, 2013), for example by emphasizing that individual action does make a difference (Salomon, Preston & Tannenbaum, 2017). These last two criteria determine that the receiver is not numbed by the message (Maddux & Rogers, 1983). Some pro-environmental behaviour change studies even go as far as to describe self-efficacy phrasing as more effective than fear phrasing (Hunter & Röss, 2016). Therefore, the extended working model of AF of this chapter shown in Fig. 6 proposes that AF only occurs when harmfulness and likelihood are given, but not the perceived effectiveness or self-efficacy.

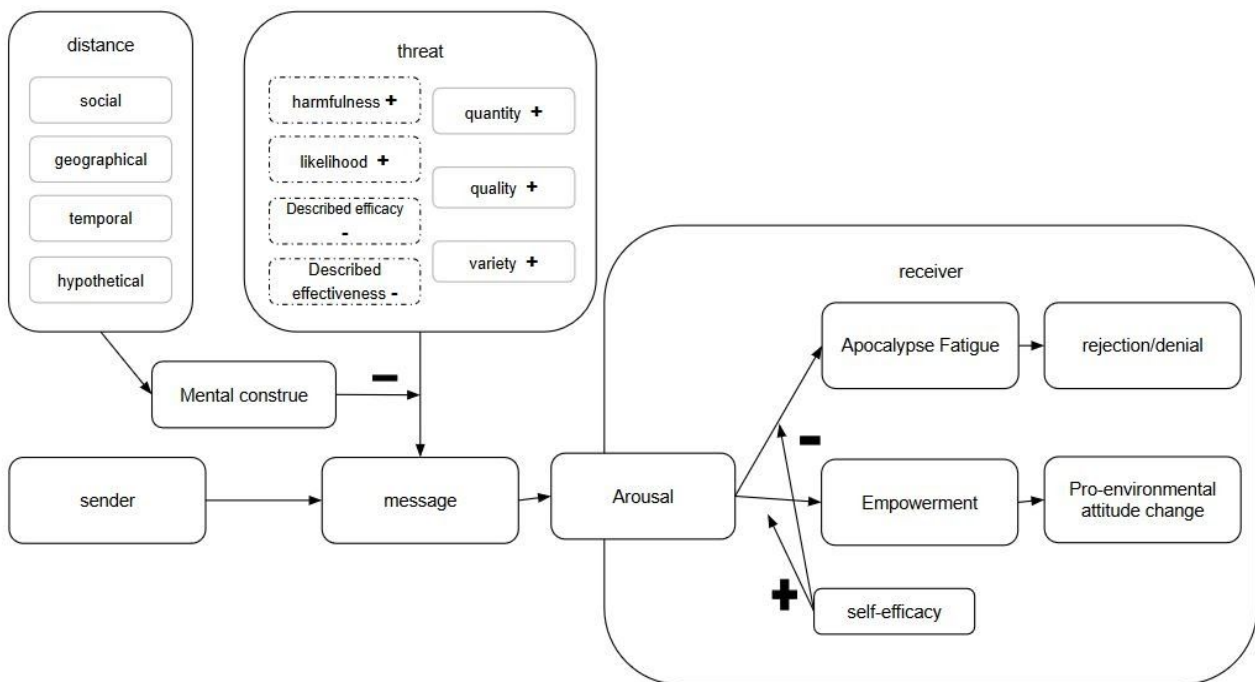


Fig. 6. Extended model of AF, including the four components of effective fear appeals. Extensions to the model of Fig. 5 are highlighted in dashed lines. The plus and minus signs represent the direction of the moderating effect.

state of this thesis's research, it is not possible to cover the full scope of these responses. For future research please find a more extensive overview in appendix J.

Finally, the literature on fear appeals goes even further in explaining the occurrence of AF. If someone is repeatedly exposed to a threatening stimulus such as a proximal (meaning, non-distant), threatening message, which from the beginning they perceive as impossible to do anything about or learn to have little influence on, they may enter a stage of learned helplessness (Seligman, 1972). Although, so far, there has been no empirical link established between both concepts, learned helplessness could be closely related to AF. For example, if receivers are in a continuous state of dissonance between message and perceived ability to act, they not only fail to show PEA/PEB, but eventually react with rejecting or denying climate change news. Research indicates that AF might be a continuous state that moderates the relationship between climate change concern and climate action), leading to high environmental concerns but little action (Salomon, Preston & Tannenbaum, 2017).

2.2.3 Two responses

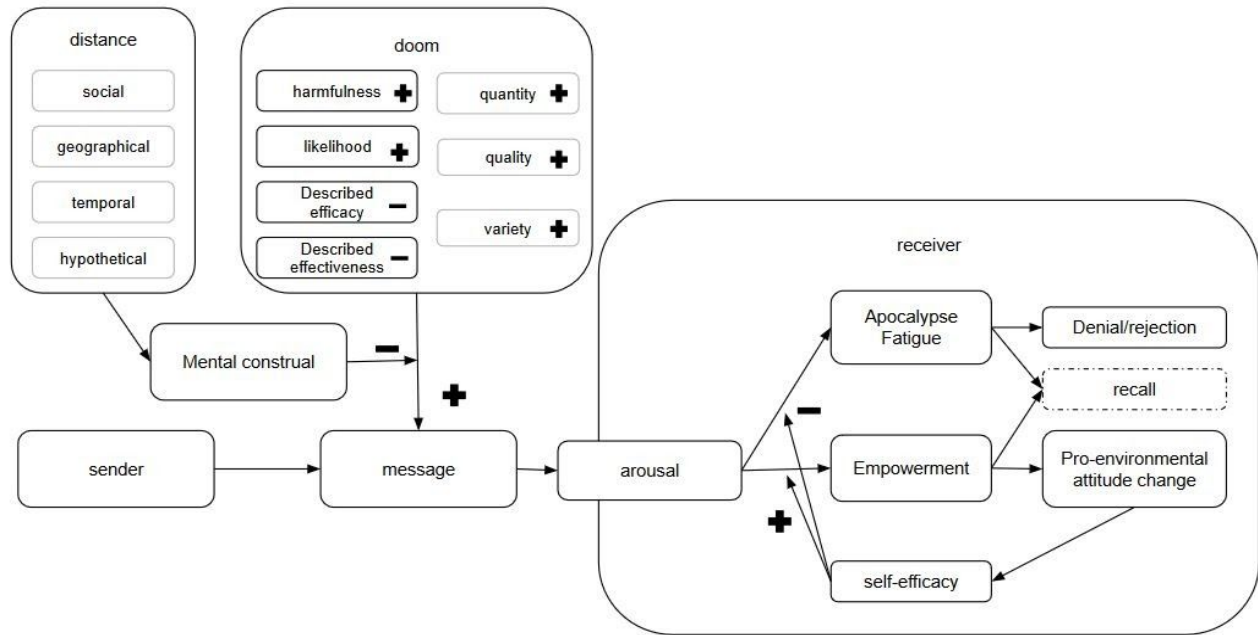


Fig. 7. Model of AF based on Model 6, added by the mediator of cognitive dissonance and the two different responses to AF. Extensions to the model of Fig. 6 are highlighted in dashed lines.

So far, this thesis has described the psychological effects of AF: attitude, intentions, behaviour (see boxes for rejection/denial and PEA change in Fig. 6). What the working model does not yet account for, is the knowledge component proposed by the conventional CCC model (see Fig.1). By adding an empirical examination of knowledge differences, this study investigates the relationship of knowledge transmission and AF. Literature on the effect of doom and distance on recall ability confirm that threatening information leads to a higher recall of information details. Even though stress and arousal are generally shown to reduce recall ability (Vytal, Cornwell, Arkin & Grillon, 2012), the same seems to not apply for information potentially relevant for survival. This suggestion aligns with the literature suggesting that high levels of arousal are associated with strong memories (Roosendaal, McEwen & Chattarji, 2009).

Research on so-called fear learning even suggests that some of the strongest, most detailed and lasting memories are associated with high levels of threat. Therefore, this study proposes that doom and distance lead to an increase in knowledge, but a decrease in attitudes (see chapter 2.3, hypotheses as well as Fig.7).

These results are supported by the - so far only - study into the effect of doom and distance phrasing on both attitude change and information recall. Spence and Pidgeon (2010) investigated the effect of gain phrasing in comparison to loss phrasing as well as local phrasing to distant phrasing on both attitudes and information recall by manipulating the 2007 report from the Intergovernmental Panel on Climate Change (IPCC). Congruent with the previously discussed literature, they showed that gain phrasing is superior to loss phrasing in increasing climate change attitudes. Information recall, on the other hand, was higher in the loss phrasing conditions than in the gain phrasing conditions, therefore supporting the literature on fear learning. In contrast, participants presented with gain phrased IPCC reports had a lower fear response and a poorer information recall. The effect of phrasing on AF is incorporated in a further extension of the model, depicted in Fig. 7.

2.3 Hypotheses

Based on the theoretical and empirical background resulting in the working model of AF presented in Fig. 7, this study's hypotheses are the following:

H1.1 - main effect doom on attitude change: Empowering messages lead, in comparison to threatening messages, to a higher climate change attitude change.

H1.2 - main effect doom on recall ability: Empowering messages lead, in comparison to threatening messages, to a lower recall of message details.

H2.1 – main effect distance on attitude change: The communication of proximal consequences leads in comparison to the communication of distal consequences to a higher climate change attitude change.

H2.2 - main effect distance on recall ability The communication of proximal consequences leads in comparison to the communication of distal consequences to a lower recall of message details.

H3.1 - interaction [doom*distance] on attitude: Doom and distance interact with each other in their impact on climate change attitude change. Attitude change between the threatening and empowering conditions is not different in the distal condition but it is different in the proximal conditions.

H3.2 - interaction on recall ability: Doom and distance interact with each other in their impact on the recall of message details. Recall of message details between the threatening and empowering conditions is not different in the distal feedback conditions but it is different in the proximal feedback conditions.

3. Method

The focus of this thesis is to investigate whether doom and distance phrasing evoke an effect of AF that leads to attitude change and differences in recall ability, independent from sender, receiver or channel properties. To do so, an exploratory quantitative study including a matching methodology was developed in which participants were presented with one of four experimental videos in which doom and distance were manipulated and climate change attitude and recall ability for details were ascertained. The methodology was tested in a pilot study in May 2020 and subsequently improved based on the feedback gathered from the pilot participants. The data collection for the final thesis took place in June 2020. Participants were recruited through social media by publishing a flyer and through SONA, the survey platform of Utrecht University. Psychology students of Utrecht University were compensated for their participation with one participation hour, and together with all other participants had the chance to participate in a 20€ voucher lottery. Participation roughly consisted of briefing, pre-survey, the intervention (specifically, the presentation of one out of four experimental videos) and a post-survey. The following sections describe the participants, design, material, procedure, operationalisation of variables and statistical analysis of the present study.

3.1 Sample

3.1.1 Ideal sample

Power analysis conducted prior to this study revealed a needed sample size of $N = 360$. The ideal sample should furthermore consist of participants with high European identification to ensure that the distance manipulation works as best as possible. Ideally, most participants should be German, Dutch or Swedish, as these countries were specifically emphasised as proximal in the manipulation. Furthermore, the ideal sample would have representatively consisted of all age groups, educational backgrounds, a students-to-working-participants ratio representative of the population and a variety of different political orientations, levels of climate change interest, pre-existing climate change attitude and self-efficacy. The ideal participation time in which participants would be able to attentively follow the surveys and the manipulation was calculated at 20-30 minutes.

3.1.2 Exclusion of participants

In the given study, in the three weeks of data collection, only $N = 196$ participants were recruited. Participants who had completed less than 82% of the survey were excluded from analysis. This was the case of $N = 50$ participants. The threshold was chosen after inspection of the survey, in which 82% was the level at which no data was missing. Furthermore, participants with duration times under 13 minutes had to be removed, as that was the calculated minimum time a participant needed to attentively follow the intervention and answer the questions. This led to the removal of a further $N = 18$ participants. Consequently, the final sample consisted of $N = 128$ datasets participants, less than half of the calculated minimum sample size. For the number of participants per experimental group please see table 1. Participants with especially long duration times of 40 minutes and more were not removed due to feedback that many participants had forgotten to click on the final button or close the browser window. Therefore, participation time ranged between 13.65 and 283.33 minutes, and cannot be used for analysis, as it is likely unrepresentative of the actual participation time.

Table 1. Total number and percentage of participants in the experimental conditions dependent on the two independent variables doom and distance.

2x2 design		Distance		
		proximal	distal	total
Doom	empowering	34 (26.6%)	30 (23.4%)	64 (50%)
	threatening	30 (23.4%)	34 (26.6%)	64(50%)
	Total	64 (50%)	64 (50%)	128 (100%)

3.1.3 Final sample

Sociodemographics. Participants were between 19 and 81 years old with a mean of $M = 29.35$, $SD = 13.90$. The age group of under 30 year olds is overrepresented. A total of 57.8% of participants were female ($N = 74$) and 42.4% were male ($N = 54$). More than two thirds (72.7%, $N = 93$) were studying, 27.3% were working ($N = 35$), therefore students are by far overrepresented in the sample in comparison to the general population. In both categories a wide range of disciplines was represented, but a majority of the students came from the field of psychology, due to the recruitment through the SONA database of Utrecht University. Therefore, this sample has to be considered a convenience sample and interpreted as such. Similarly diverse was the representation of nationalities, even though the Netherlands ($N = 75$), Sweden ($N = 12$) and Germany ($N = 26$) accounted for 88.28% of participants, which aligns with the ‘ideal’ sample.

Control variables. The sample represented the total range of political orientation from the far left, scoring 00 to the far right scoring 99 out of a hundred possible points. Still, political left orientation was overrepresented, as visible in the mean score $M = 33.53$ and $SD = 20.164$, showing that 67% of participants reported political orientation left of the political middle. Although European identification was on average relatively high ($M = 4.708$, $SD = 1.279$ on a 7-point Likert scale), a total of $N = 21$ respondents reported scores lower than 3.5, and only $N = 21$ reported European identification higher than 6. Therefore, the sample did not identify as European as many participants as desired, but on average European identification was high enough to consider Europe as geographically close. Climate change interest was on average very high ($M = 5.842$, $SD = .961$), with only $N = 4$ participants reporting scores lower than 4 on the 7-point Likert scale. Therefore, people with high climate change interest were overrepresented in the sample. Similarly unrepresentative was the sample with respect to climate change self-efficacy. Only $N = 3$ participants reported scores under 4.33 and $N = 61$ even reported scores of 6 and higher ($M = 5.932$, $SD = .744$). The same applied for the control measure of pre-existing climate change attitude. The lowest reported value was 3.43, with only $N = 3$ participants reporting values under 4, whereas $N = 78$ participants reported scores of 6 and higher ($M = 6.026$, $SD = .740$). Average climate change attitudes were very high both in the pre-measurement and the post-measurement, see table 2.

Therefore, the sample underlying the present study does not come close to the ‘ideal’; instead, it is biased. While being a highly selective sample, it can still serve the purpose for this initial study into the effect on doom and distance phrasing on attitude change and recall ability.

Table 2. Mean and standard deviation for attitude scores of pre-measurement and post-measurement attitude in the four experimental groups.

Pre-measurement attitude (T1)				Post-measurement attitude (T2)			
		Distance				Distance	
		proximal	distal			proximal	distal
Doom	empowering	M = 5.8992 SD = .79386	M = 6.1571 SD = .80055	Doom	empowering	M = 5.9790 SD = .85217	M = 6.2667 SD = .72235
	threatening	M = 5.8857 SD = .71023	M = 6.1639 SD = .63707		threatening	M = 6.1048 SD = .68351	M = 6.2521 SD = .57041

3.2 Design

Congruent with the aim of investigating phrasing effects, the independent variables are doom and distance. To maximise the likelihood of finding an effect, each of these independent variables consists of two different conditions. For the doom variable, the two experimental conditions are threatening and empowering. For the distance variable, they are distal and proximal. These result in four experimental groups in a 2x2 between subjects design. Details on how doom and distance were operationalised will be discussed in the following chapter. As this thesis's aim was to measure a change in climate change attitudes, attitudes are measured before and after the exposure, therefore introducing a within subjects variable. Consequently, this study was using a 2x2x2 mixed design, see table 3.

Table 3. Experimental conditions in 2x2x2 design with the between factors doom and distance and the within factor time.

Pre-measurement (T1)				Post-measurement (T2)			
		Distance				Distance	
		proximal	distal			proximal	distal
Doom	empowering	empowering proximal T1	empowering distal T1	Doom	empowering	empowering proximal T2	empowering distal T2
	threatening	threatening proximal T1	threatening distal T1		threatening	threatening proximal T2	threatening distal T2

With the aim of investigating the effect on recall ability and attitude, attitude and recall are the dependent variables. Attitude change is measured by comparing the answers of the pre-intervention and post-intervention attitude scores. Recall ability is measured by a score of how many of a total of eight multiple-choice questions about the intervention video participants were able to answer.

Due to the limited scale of this thesis, it is not possible to manipulate more than the two independent variables mentioned above. Therefore, other potential factors that may influence AF are assessed and randomisation in all four experimental groups was controlled. These are - besides the usual sociodemographic characteristics of age, gender, education, nationality and student or working status - political orientation, interest in the subject of climate change, European identification and self-efficacy. Political orientation was assessed, as political orientation according to Stoknes (2015) can lead to dissonance and therefore may influence the effect of the message on the receiver response. Interest in climate change could bias the attentiveness to the intervention and was therefore assessed. Self-efficacy was added to the survey because the literature on flight/fight mechanism suggests that it determines whether the message leads to AF or empowerment. Finally, as the distance was manipulated by either describing climate change as occurring on the other side of the planet (distal condition) or in Europe (proximal condition), see operationalisation Section 3.3 below, and identification with the region determines whether a message is perceived as proximal (Armenta, 2010), the European identification of participants was assessed. The post-survey additionally measured potential confounders to the message such as familiarity with the presented information, believability of the video as well as doom and the perceived distance.

3.3 Operationalisation

To operationalise doom and distance, both the theoretical concept of Stoknes (2015, 2017, 2018) and insights from the literature review were used. As proposed in the model, a message evoking AF needs to be perceived as proximal, harmful and likely to occur, but with a low receiver perception of self-efficacy and efficiency of suggested coping actions. The exposure criteria of AF were not manipulated but kept constant in all conditions to maximise the likelihood of detecting AF. They were operationalised as follows: The quality of the message, i.e. the necessary intensity of threatening content to induce stress and resulting AF, was implemented through the operationalisation of the independent variable doom, see chapter 3.3.1. The variety of the message (see Fig. 2-7) was implemented by describing not just one consequence of climate change, but rather three consequences in each of the texts: sea-level rise, the threat of climate change for the Wadden Sea, European forest fires in the proximal conditions; sea-level rise, the bleaching of coral reefs and Amazon forest fires in the distal conditions.

3.3.1 Operationalisation of doom

With one aim of this study being the proof of an AF response in the message receiver, doom was manipulated by following the Stoknes' barriers and all recommendations how *not* to successfully phrase fear appeals. These conditions were furthermore compared with conditions that did follow all guidelines to achieve the opposite: empowerment, leading to attitude and behaviour change. Consequently, the empowering conditions followed Stoknes (2015) recommendation of a 1:3 ratio of threatening to empowering messages, measured in lines and number of words containing positive information. Furthermore, empowerment was operationalised by making specific recommendations for actions in the proximal conditions. To still incorporate distance, the empowering distal conditions described possible action, but without making it too specific to avoid proximity. In comparison, the threatening conditions did not report any positive information, information about initiatives or action, but instead only the impacts and consequences of climate change.

3.3.2 Operationalisation of distance

For the distance variable, information was presented as either distal or as proximal in four spheres:

Geographic Distance. Geographic distance was operationalised by using different geographic settings for the matters discussed in the text/audio. The proximal conditions described climate change in Europe, more specifically the Netherlands, Sweden and Germany. The author of this thesis studies in both Sweden and The Netherlands but is German-born. This familiarity explains why most participants came from these three countries. Therefore, these three countries were most likely to provide the greatest number of participants. The distal conditions, on the other hand, described climate change consequences in the Southern hemisphere: Australia, Pacific island states, Amazon rainforest.

Temporal Distance. Temporal distance was controlled by either presenting the consequences to occur within the next few years or within the next 50 to 100 years. Content describing past events was not changed between the different distance conditions, as that would have too much manipulated the information content and the believability of the information.

Social Distance. Social distance is the perception of being close to either the narrator or the people described in the text (ibid). It was therefore operationalised on the one hand by the use of grammar - “we” and “us” in the proximal conditions, “them” and “they” in the distal condition. Additionally, every video presented one example of either a person (social proximity) or a company or city (distal conditions), either making a positive difference (empowering conditions) or suffering from climate change (threatening condition). The distal conditions did not present person case examples to avoid any sympathy for and therefore identification with the discussed person.

Hypothetical Distance. The hypothetical distance was mainly manipulated through the use of grammar. Whereas the proximate conditions were formulated as if the consequences were certain and there was no doubt about them happening with usage of wording like “it will happen”, “there is a threat”, the distal condition used formulations like “can happen”, “might happen” or “there is a possibility”.

3.4 Material and procedure

3.4.1 Pre-intervention

This study has been presented to participants in an online survey format through the survey platform Qualtrics. As shown in Fig. 8 and discussed in the previous chapter, it is programmed as a number of consecutive steps. First, participants were recruited through online advertising with flyers and through the internal survey database of Utrecht University, SONA. Once they clicked on the link on either of these ads, they were led to the start page including the briefing and informed consent. If they gave consent, they were next asked to give themselves a personal code, with which the researchers could identify and potentially remove participants from the sample, if participants should request it. They were then asked to enter their age, gender, nationality and student or working status. Political orientation was assessed by a slider between 0 and 100, with 0 representing the far left spectrum and 100 representing the far right. For European identification, participants were asked to state on a 7-point likert scale how much they agree with the following statements: “Being a European citizen is part of my identity”, “Overall, my self-image is not affected by my European status” (reverse-coded item), “I identify as a European citizen.

The scale was developed by the author of this study adapted from Hübner and Woznica (2015). Climate change interest was similarly assessed by agreement statements on a 7-point Likert scale with three items: “I regularly inform myself about climate change”, “I consider the impact of my behaviour on climate change when making a decision”, “climate change is not important to me”, again adapted from Hübner and Woznica (2015). Finally, self-efficacy is assessed with the six self-efficacy questions from the Climate Change Attitude Survey (CSSA) by Christensen and Knezek (2015), see appendix G. After these control questions, participants were presented with the seven climate change attitude questions of the CSSA.

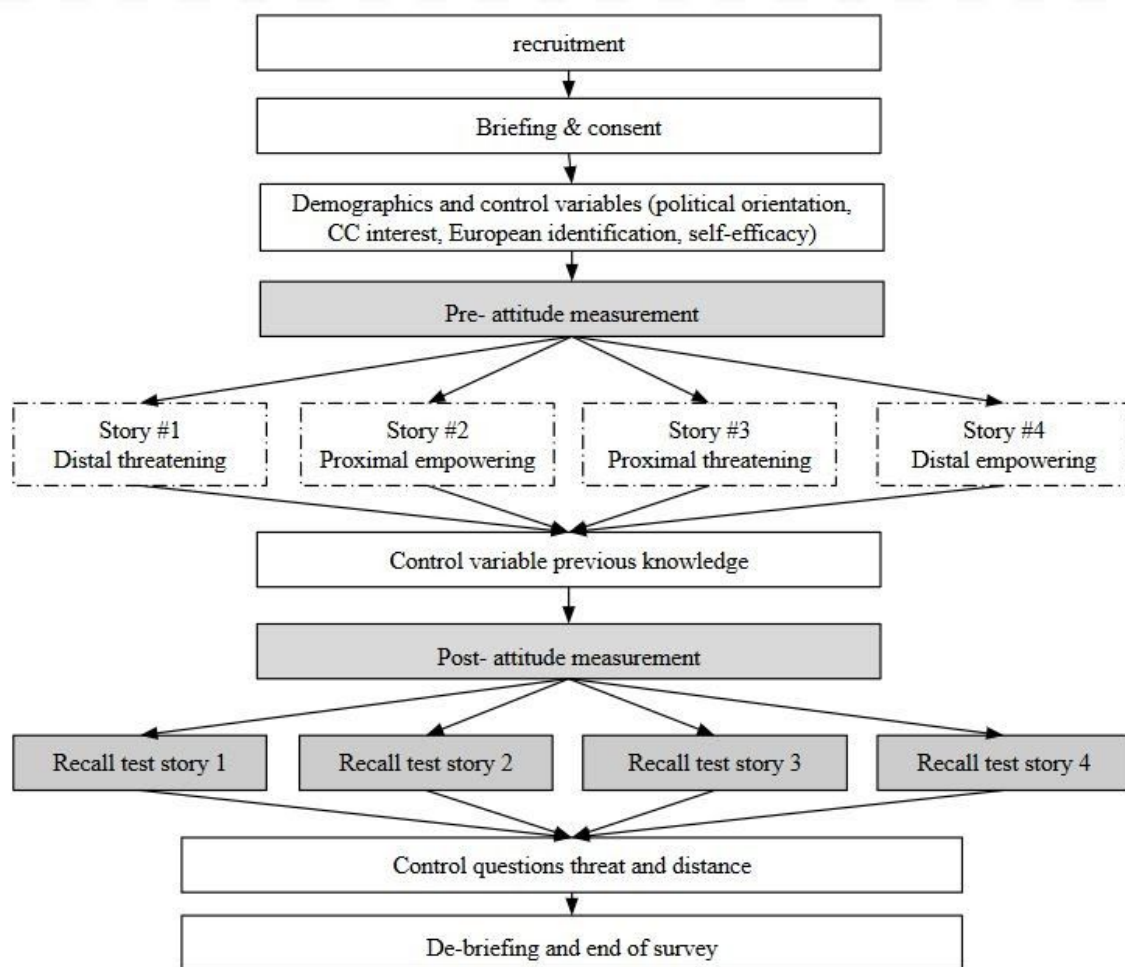


Fig. 8. Process model of the AF study including the measurement of for the dependent variables in grey and the intervention in dashed lines.

3.4.2 Intervention

After finishing these pre-intervention questions, participants were presented with one of the four experimental interventions, in which they were first presented with instructions to watch the video carefully to be able to answer questions about it later, followed by one of the four videos. Each video presented one of the four experimental conditions, see Fig. 8 and appendix E. They were embedded in the qualtrics survey through a YouTube link. Videos were used, as they - opposing simple texts -

increased interest and commitment according to the focus groups used for the methodology development prior to the pilot study. Each of the texts underlying the videos is between 1.187 and 1.278 words long, resulting in 9:27 and 10:02 minutes video time. The video length was determined by the feedback from the pilot study that suggested that the pilot texts were too long and left people drained. As this may result in physical fatigue that could bias the measuring of AF, the texts were thereafter shortened and validated by subsequent small focus groups. Through this procedure, the quantity and quality exposure criteria for AF were implemented. The audio for the videos was recorded by Benjamin de Graaf, a Dutch actor.

All videos start with a general message of climate change being caused by human behaviour and a general introduction into the IPCC and either proximal or distal general consequences of climate change. In all conditions, this is followed by a description of the impacts of sea-level rise either in Bangladesh (distal) or The Netherlands (proximal). In the empowering conditions, three quarters of the information presented are positive, whereas in the threatening conditions there was no positive information at all. Staying with the marine topic, the next paragraphs describe the consequences of climate change either for coral reefs in Australia (distal) or for the Wadden Sea (proximal). Again, the empowering conditions present three positive pieces of information for any negative one (see also operationalisation chapter). Moving to a terrestrial topic, all texts then describe the impacts of climate change on forest fires either in the Amazon rainforest (distal conditions) or in Germany and Sweden (proximal conditions). Again, half of the information presented in the empowering conditions is positive. Finally, the texts conclude on either specific recommendations for action (empowering conditions) or the prospect that climate change will be worse than current predictions state (threatening conditions). So as not to interrupt reading flow and present information believably, some texts slightly deviate from this general structure. Still, good-bad information ratios and topics are kept constant. See appendix E for both the videos and the underlying texts.

While the audio is presenting these information, one out of nine supporting pictures for each condition is presented. (Adding these was based on feedback retrieved from the focus groups). They were chosen to accompany the text and also to present either empowering or threatening content. For an overview of the pictures used and the reasoning behind them, see Appendix F.

3.4.3 Post intervention

After watching the video, participants were asked to state how much of the information was already known to them on a 7-point Likert scale for three statements: “I already knew all the information that was presented in the video”, “There was a lot I learned from watching the video” and “I feel like my knowledge on climate change and its consequences improved after watching the video”. This was followed by the post-measurement of climate change attitude using the same CSSA scale for climate change attitude as in the pre-measurement. Then, participants were briefed to answer a total of eight questions to test their recall ability to message details. These questions are formulated for each experimental condition and kept as close as possible to the text while staying relatively similar in difficulty and content. An overview can be found in appendix K. Finally, as a manipulation check, participants are asked to report the believability of the video as well as their perception of the threat and the social, geographical, temporal and hypothetical distance by stating their agreement with each one of the following statement “The video made me feel like climate change was happening at the other side of the planet/ was happening in the far future/ was happening to other people, not to me/ was not certain to happen at all/ was very threatening” on a 7-point Likert scale. The final question assessed whether

participants perceived the presented videos as believable, assessed by a simple multiple choice question with the answer options yes and no.

Following these questions, participants are debriefed about the validity of the presented information. This is especially important in the threatening conditions, that did not present any positive information, to avoid that participants get fatigued by the texts and potentially change their climate change attitude for the worse. Participants furthermore are given the option to enter their email addresses to receive compensation and further information about the study once published.

3.5 Statistics

Statistical analysis was conducted with IBM SPSS Statistics 28. First, a randomisation check is carried out through a number of one-way ANOVAs for climate change interest, political orientation, climate change attitude, self-efficacy or previous knowledge between the four experimental groups. Furthermore, to see whether the operationalisation of doom and distance was successful, a manipulation check was conducted. First, t-tests comparing the participants of the threatening to the empowering groups and the participants of the distal to the proximal groups were conducted. As the results were then considered too broad, a subsequent further analysis was conducted. Similar to the randomisation check a one-way ANOVA was used to see whether there are differences in the reported doom and distance perceptions between the four experimental groups. To ensure that the scales adapted or invented for this study were reliable, Cronbach's Alpha was calculated for all scales. This way, the reliability of the scales was assessed through measurements of the internal consistency.

Finally, the effects of doom and distance were assessed as follows: For the change in climate change attitudes, a three-way ANOVA of doom, distance and time (comparing pre-attitude and post-attitude) was conducted. To gather more insights, further analysis was executed by creating a variable for the difference between pre- and post-attitude, that was then assessed through a one-way ANOVA. Recall of message details was similarly assessed through a one-way ANOVA. Prior to the different ANOVAs executed for this study, a number of requirements had to be statistically evaluated. For the one-way ANOVA, these are the following: First, visual examination of boxplot analysis reveals whether there are significant outliers, i.e. outliers of more than three standard deviations. If this assumption was violated the outliers were removed from further analysis. Secondly, normal distribution was assessed by Shapiro-Wilk's test. With ANOVAs being relatively robust against violation of this assumption, the criterion was assessed but will not be reported in the result chapter. Thirdly, equality of variances was assessed through the Levene test. If this criterion is violated, the ANOVA cannot be executed as planned but instead a Welch ANOVA must be conducted. For three-way ANOVAs, a fourth assumption of sphericity has to be checked. For this study, with both independent variables having only two levels, the assumption was automatically met (Laerd, 2020).

To determine how the groups differ from each other, a post hoc test has to be conducted (Laerd Statistics, 2018). As post hoc tests can only be run if there are significant differences shown in the ANOVA (Laerd Statistics, 2018), they were only conducted for the two-way ANOVA for recall ability and not for the three-way ANOVA for attitude change, since the latter did not show significant differences.

4. Results

4.1 Randomisation check

The randomisation check was executed for European identification, climate change interest, political orientation, climate change attitude or self-efficacy. Visual examination of the box plots reveals one significant outlier that was removed from further analysis for European identification, but no outliers for the other variables. For most variables - European identification ($p = .578$), climate change interest ($p = .073$), political orientation ($p = .178$), the pre-measurement of climate change attitude ($p = .506$), self-efficacy ($p = .373$) - the Levene test was not significant, and the assumption of equality of variances was not violated. The ANOVA for European identification is not statistically significant, $F(3, 122) = 2.091, p = .105$. Neither is there a significant difference between the groups concerning climate change Interest $F(3, 123) = 2.456, p = .066$, or for the political orientation, $F(2, 122) = .815, p = .488$. The same applies for the preparticipation measure of climate change attitude, $F(3, 124) = 1.410, p = .243$ and for climate change self-efficacy, $F(3, 124) = .362, p = .781$.

Consequently, it is concluded that randomisation for European identification, climate change interest, political orientation, climate change attitude, self-efficacy and previous knowledge is successful. For descriptive data on the factors, please see “sample” chapter of the methods.

4.2 Manipulation check

The manipulation was assessed by comparing participants of the empowering to the threatening groups and participants of the proximal to the distal groups through t-tests. For the results see appendix H. As these results did not allow a detailed review of differences between all four conditions, ANOVAs were conducted for both the doom variable and all distance variables. Prior to the analysis of the answers, Cronbach's Alpha was calculated for European identification ($\alpha = .737$), climate change interest ($\alpha = .735$), pre-measurement climate change attitude ($\alpha = .811$) and pre-measurement self-efficacy ($\alpha = .791$). For all scales, internal consistency was high.

For geographical distance, box plot analysis showed no significant outliers, but the assumption of equal distribution of variances, assessed by Levene's test is violated, $p = .000$. Further analysis revealed statistically significantly higher reported geographical distance ($M = 4.392, SD = 1.812$ for threatening and $M = 3.849, SD = 1.710$ for empowering) in the distal than in the proximal conditions ($M = 2.120, SD = 1.166$ for threatening; $M = 2.069, SD = 1.099$ for empowering), Welch's $F(3, 67.252) = 17.726, p < .001$. For none of the other distance variables, there was a significant difference (see appendix I). Therefore, only the manipulation of geographical distance is considered successful. Similarly successful was the different manipulation of perceived threat. Box plot analysis revealed one significant outlier that was removed from further analysis. Levene's test showed that the homogeneity of variances was given, $p = .051$, and the ANOVA showed a statistically significant difference between all four experimental groups $F(3, 123) = 7.921, p = .000$. Further analysis revealed statistically significant differences between the empowering and threatening conditions, $p > .05$, but no statistically significant differences within the threatening or empowering conditions (see appendix I).

Consequently, both t-tests and ANOVA showed that geographical distance and doom were perceived statistically significantly different by the experimental groups, whereas temporal, social and hypothetical distance were not statistically significantly different. Therefore, only geographical distance and doom can be described as successfully implemented.

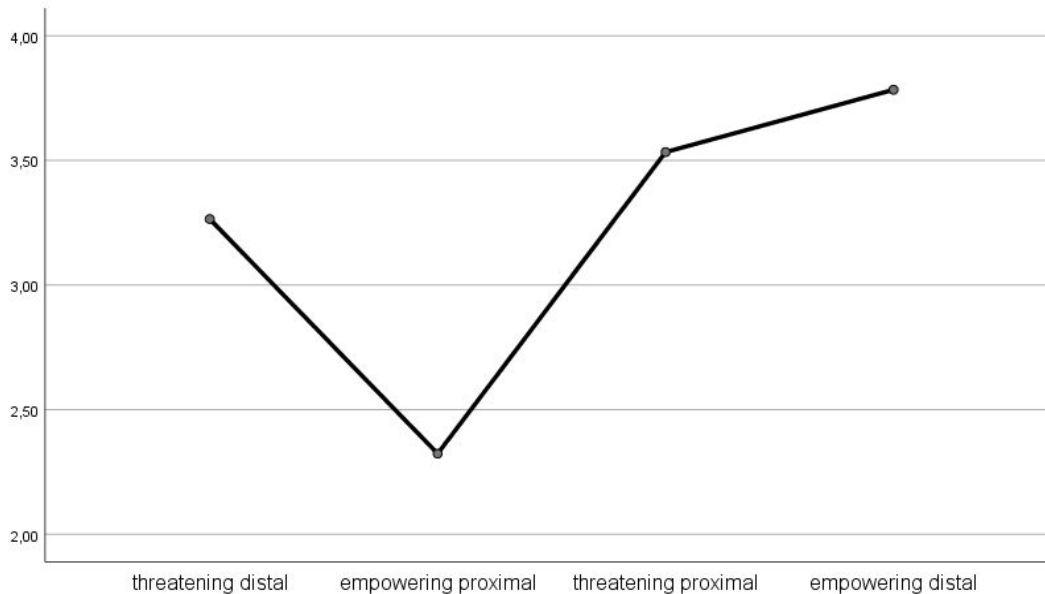


Fig. 9. Mean average perception of previously knowing the information presented in the manipulation in all four experimental conditions on a 7-point Likert scale.

Finally, it was assessed whether the information presented in the text was already familiar. First, the internal consistency for the scale was calculated. It showed that the internal consistency for the scale including all three items was low ($\alpha = .195$), but internal consistency excluding the third item was high ($\alpha = .687$). Therefore, the third item was excluded from further analysis of the previous knowledge scale. This is both a randomisation check of equal distribution of previous knowledge in the four experimental groups, and a control for the effect of the manipulation on participants' ability to recall message details. A one-way ANOVA was executed to examine participants' perception of familiarity with the presented information. No outliers were detected in the visual examination of the box plots. The assumption of homogeneity of variances was fulfilled, Levene's test $p = .538$. The ANOVA revealed a statistically significant difference between the perceived previous knowledge of the participants of the four experimental groups, $F(3, 127) = 7.398, p = .000$. The descriptive statistics as well as the visualisation in Fig. 9 reveal that while the threatening-distal condition ($M = 3.265, SD = 1.361$), the threatening-proximal condition ($M = 3.533, SD = 1.462$) and the empowering-distal condition ($M = 3.783, SD = 1.237$) are fairly equal, participants of the empowering-proximal condition were considerably less familiar with the message presented to them ($M = 2.324, SD = 1.290$). Therefore, the difficulty of the intervention was not equally distributed. Further analysis through the Games-Howell test revealed that participants in the empowering-proximal condition reported significantly different levels of previous knowledge than participants of all other conditions ($p = .0024$ for threatening-distal; $p = .005$ for threatening-proximal and $p = .000$ for empowering-distal). In contrast, none of the other conditions were statistically significant from each other, $p > .05$.

4.3 Main analyses

4.3.1 Effect of doom and distance phrasing on attitude change

It was hypothesised that positive messages lead, in comparison to threatening messages, to a higher pro-environmental attitude of a post-measurement compared to a pre-measurement (H1.1) and that the communication of proximal consequences leads in comparison to the communication of distal consequences to a higher pro-environmental attitude in the post-measurement compared to a pre-measurement (H2.1). Finally, their interaction was hypothesised to be as follows: doom and distance interact with each other in their impact on the attitude. Attitude change between the threatening and empowering conditions is less different in the distal condition than in the proximal condition (H3.1).

To test these hypotheses, a three-way mixed ANOVA was conducted. There were no outliers in the data, as assessed by inspection of a boxplot. Homogeneity of variances, assessed by Levene's test for equality of variances, was given for both the pre-attitude ($p = .506$) and post-attitude ($p = .351$). As there were only two levels of the within-factor, the Mauchly test of sphericity and the assumption was automatically met (Laerd, 2020).

Hypothesis 1.1. H1.1 proposes a main effect of doom on attitude change as follows: empowering messages lead, in comparison to threatening messages, to a higher climate change attitude change. Analysis showed that there was no statistically significant difference of doom on the attitude change of participants, $F(1, 124) = 0.553$, $p = .458$, $\eta^2 = .004$, see table 4. Mean scores for the attitude prior to and following the intervention did not change significantly more in the empowering than in the threatening conditions, see table 5.

Table 4. Results of the ANOVA for doom, distance and time on attitude.

	Type III Sum of Squares	df	Mean Squares	F	Sig.	Partial Eta Square
Time	.9983	1	.983	9.811	.002	.073
Time*Doom	.055	1	.055	.553	.458	.004
Time*Distance	.041	1	.041	.407	.525	.003
Time*Doom*Distance	.103	1	.103	1.025	.313	.008
Error (Time)	12.421	124	.100			

Hypothesis 2.1. H2.1 proposes a main effect of distance on attitude change and is formulated as follows: the communication of proximal consequences leads in comparison to the communication of distal consequences to a higher climate change attitude change. Similarly to the H1.1, the analysis did not show a significant effect of distance on the attitude change of participants on any conditions, $F(1, 124) = .407$, $p = .525$, $\eta^2 = .003$. Therefore, attitude changed not more for participants in the empowering-proximal and

the empowering-distal conditions compared to the threatening-proximal and the threatening-distal conditions.

Table 5. Mean and standard deviation for attitude scores of pre-measurement and post-measurement attitude in the four experimental groups.

Pre-measurement attitude (T1)			
		Distance	
		proximal	distal
Doom	empowering	M = .5588 SD = 3.5521	M = .7667 SD = 3.9012
	threatening	M = 1.5333 SD = 2.3741	M = .6176 SD = 2.4372

Hypothesis 3.1. H3.1 proposes the interaction of doom and distance on attitude change in the following way: doom and distance interact with each other in their impact on climate change attitude change. Attitude change between the threatening and empowering conditions is not different in the distal condition but it is different in the proximal conditions. Contrary to the H3.1, attitude change was highest in the threatening-proximal condition ($M = 1.5333$, $SD = 2.3741$) and lowest in the empowering-proximal condition ($M = .5588$, $SD = 3.5521$). Attitude change in the empowering-distal condition was at $M = .7667$, $SD = 3.9012$ and in the threatening-distal condition at $M = .6176$, $SD = 2.4372$. The effect was not statistically significant, $F(1, 124) = 1.025$, $p = .313$, partial $\eta^2 = .008$, meaning that there was no three-way interaction between doom, distance and time. Fig. 10 visualises the attitude change between the first and second attitude survey in all four experimental conditions, with the Y-axis being the difference on a 7-point Likert scale.

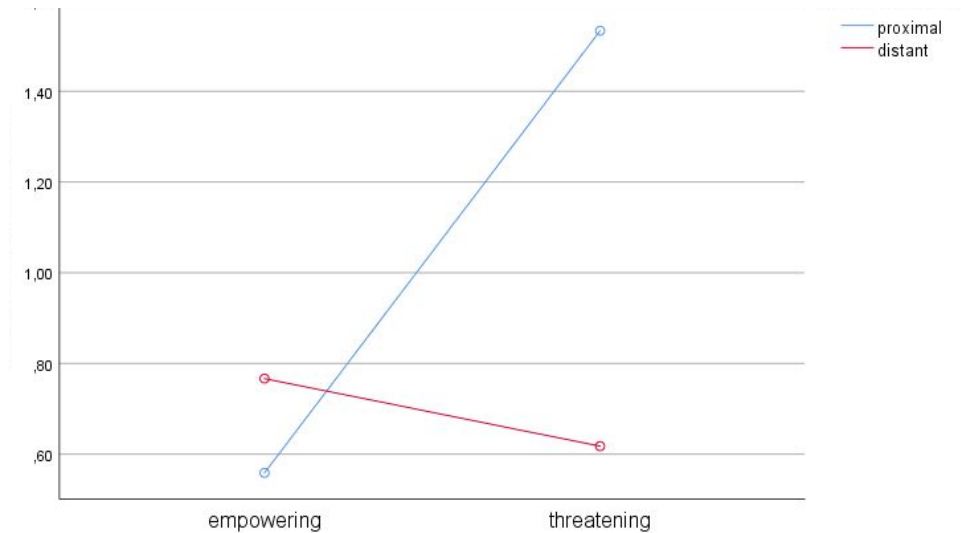


Fig. 10. Difference between the pre-intervention climate change attitude and the post-intervention climate change attitude depending on doom and distance on a 7-point Likert scale.

Explorative. The only significant effect shown by the analysis of doom, distance and time on attitude was the effect of time on attitude, $F(1, 124) = 9.811$, $p = .002$, $\eta^2 = .073$, meaning that the pre-and post attitude statistically significantly differed from each other between the first and second measurement of climate change attitude, but independent from doom or distance phrasing. On average, attitude increased in all four conditions, see table 5. Fig. 10 shows that there is an increase in climate change attitude after the intervention in all four experimental groups.

4.3.2 Effect of doom and distance phrasing on recall ability

In addition to the change in attitudes, it was hypothesised that positive messages lead, in comparison to threatening messages, to a lower recall of message details (H1.2) and that the communication of proximal consequences leads in comparison to the communication of distal consequences to a lower recall of message details (H2.2). Finally, the interaction of doom and distance on recall scores was hypothesised to be as follows: Doom and distance interact with each other in their impact on the recall of message details. Recall of message details between the threatening and empowering conditions is less different in the distal feedback conditions than in the proximal feedback conditions (H3.2).

Table 6. Results of the ANOVA for doom and distance on recall ability.

	Type III Sum of Squares	df	Mean Squares	F	Sig.	Partial Eta Square
Corrected Model	90.945	3	30.315	17.934	.000	.303
Intercept	4128.949	1	4128.9494	2442.584	.000	.952
Doom	16.551	1	16.551	9.791	.002	.073
Distance	47.489	1	47.489	28.093	.000	.185
Doom*Distance	23.136	1	23.136	13.687	.000	.099
Error	209.610	124	1.690			
Total	1107.000	128				
Corrected Total	300.555	127				

Hypothesis 1.2. H1.2 proposes a main effect of doom on the recall of message details as follows: empowering messages lead, in comparison to threatening threatening messages, to a lower recall of message details. The main effect of the manipulation of doom and distance on the recall ability of the participants was assessed through a two-way ANOVA of the mean scores of the recall test for participants in the four experimental conditions. During the assumption assessment, box plot analysis revealed no outliers, homogeneity of variances as assessed by Levene's test was given ($p = .493$). The analysis revealed a statistically significant difference in mean recall scores between participants of the threatening and empowering conditions, $F(1, 124) = 9.791$, $p = .002$, partial $\eta^2 = .073$, see table 6. Whereas participants of both empowering conditions had a mean score of $M = 5.265$, $SD = 1.720$, participants of both threatening conditions scored significantly higher ($M = 6.062$, $SD = 1.219$), see table 7 as well as

Fig. 11. Hypothesized to have the highest score (see also H2.3), the empowering-proximal condition indeed had the lowest mean recall score ($M = 4.294$, $SD = 1.360$).

Table 7. Mean and standard deviation for recall scores out of eight possible points that could be achieved by answering the eight multiple choice questions correctly in the four experimental groups.

		Distance	
		proximal	distal
Doom	empowering	M = 4.2941 SD = 1.3602	M = 6.3667 SD = 1.4015
	threatening	M = 5.8667 SD = 1.2793	M = 6.2353 SD = 1.1562

Hypothesis 2.2. H2.2 proposes a main effect of distance on recall of message details: the communication of proximal consequences leads in comparison to the communication of distal consequences to a lower recall of message details. The effect was tested through the two-way ANOVA. Again, congruent to the proposed direction in H2.2, the recall scores were lower for participants of the proximal conditions ($M = 4.294$, $SD = 1.360$ for the empowering condition; $M = 5.866$, $SD = 1.279$ for the threatening conditions) compared to participants of the distal conditions ($M = 6.366$, $SD = 1.401$ for the empowering condition; $M = 6.235$, $SD = 1.156$ for the threatening condition, see Fig. 11. The effect was statistically significant, $F(1, 124) = 28.093$, $p = .000$, partial $\eta^2 = .185$, see table 6.

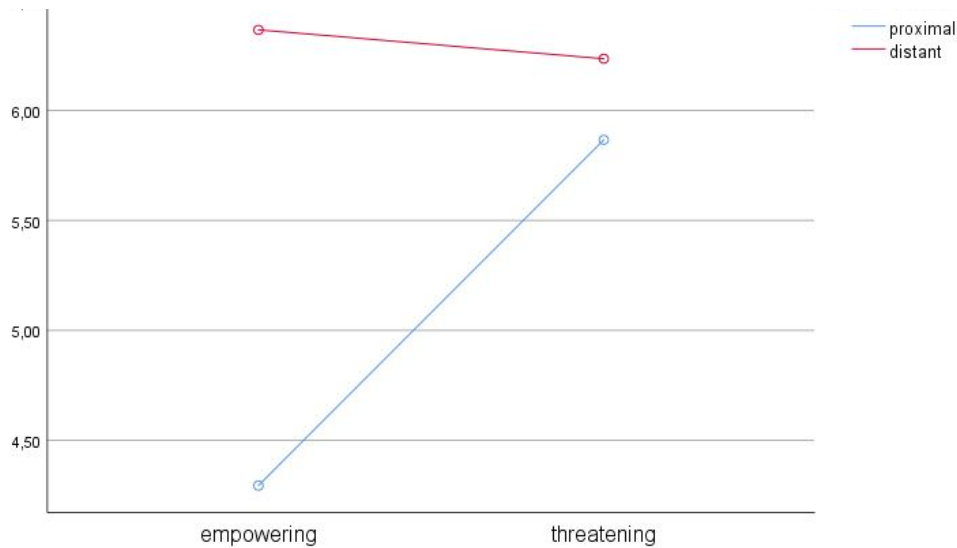


Fig. 11. Mean recall scores for participants of the four experimental conditions out of eight possible points that could be achieved by answering the eight multiple choice questions correctly.

Hypothesis 3.2. H3.2 proposes an interaction of doom and distance on recall ability as follows: doom and distance interact with each other in their impact on the recall of message details. Recall of message details

between the threatening and empowering conditions is not different in the distal feedback conditions but it is different in the proximal feedback conditions.. Aligning with the hypothesis, recall scores of the participants of the empowering-proximal and threatening-proximal conditions, $F(1, 124) = 23.315, p = .000, \eta^2 = .158$ were statistically significantly different from each other - and lower than in the distal conditions, see Fig. 11. Congruent with H2.2, participants of the empowering-distal and the threatening-distal conditions did not score statistically significantly different from each other on the recall score, $F(1, 124) = .163, p = .687, \eta^2 = .001$. The interaction effect of doom and distance on recall ability was statistically significant, as shown by the ANOVA, $F(3, 124) = .17.934, p = .000$, partial $\eta^2 = .099$.

5. Discussion

The aim of this study was to improve the effectiveness of climate change communication in evoking attitude and behaviour change through the investigation of AF, specifically AF resulting from the doom and distance barriers of the Stoknes model of climate change communication (2015). Therefore, threat/empowerment and distance/proximity were operationalised in four experimental videos that were presented to participants. It was investigated whether distance and doom phrasing lead to a difference in climate change message receivers' pro-environmental attitude and recall ability of message details.

5.1 Interpretation of results

Analysis of the data from this study showed no statistically significant effect of doom or distance on attitude change, nor a three-way interaction of doom, distance and time on attitude. The only statistically significant effect found was that of time on attitude, meaning that the climate change attitude of participants in all four conditions on average changed for the better. Analysis further revealed main effects of both doom and distance on participant's recall ability, consistent with the direction proposed in the hypotheses H1.2 and H2.2. There was a statistically significant interaction effect of doom and distance on the recall ability of participants in the expected direction. Therefore, the hypothesis testing led to the conclusion summarised in table 8.

Table 8. Results of hypothesis testing.

Hypothesis	Formulation	Result
H 1.1 main effect doom on attitude change	Empowering messages lead, in comparison to threatening messages, to a higher climate change attitude change.	rejected
H 1.2 main effect doom on recall ability	Empowering messages lead, in comparison to threatening messages, to a lower recall of message details.	rejected
H 1.3 main effect distance on attitude change	The communication of proximal consequences leads in comparison to the communication of distal consequences to a higher climate change attitude change.	rejected
H 2.1 Main effect distance on recall ability	The communication of proximal consequences leads in comparison to the communication of distal consequences to a lower recall of message details.	kept

H 2.2 Interaction effect on attitude change	Doom and distance interact with each other in their impact on climate change attitude change. Attitude change between the threatening and empowering conditions is not different in the distal condition but it is different in the proximal conditions.	kept
H 2.3 Interaction effect on recall ability	Doom and distance interact with each other in their impact on the recall of message details. Recall of message details between the threatening and empowering conditions is not different in the distal feedback conditions but it is different in the proximal feedback conditions.	kept

5.1.1 Attitude

Analysis of the data retrieved from this study shows no statistically significant effect of the manipulation of doom and distance on attitude change. Even though failing to support this thesis' hypothesis for climate change attitude change as a result of AF or empowering climate change communication, results already reveal some insights into the mechanisms of AF. Before closer examination, it is important to point out that the higher averages in both distal groups as illustrated in Fig. 10 are not due to the manipulation, but to the sample. Even though there is a clear visual difference, it has to be emphasised that the groups differ only marginally, and that the randomisation check revealed no sample bias concerning the climate change attitude variable. Therefore, the higher averages for the distal groups cannot be interpreted as a general advantage of the distal groups over the proximal groups.

Neither the main nor the interaction effects are significant. Nevertheless, the results indicate that there may be a difference in the receiver responses to the message depending on the phrasing. Fig. 10 shows different attitudes related to the four experimental conditions, even though the effect is not statistically significant. Contrary to expectations, the increase in climate change attitudes was greater for the proximal-threatening condition, and not for the proximal-empowering condition, which according to the hypotheses should have shown the greatest attitude change. If the effect had been significant, it could have indicated that the threatening messaging (as proposed in the conventional climate change communication model (Fig. 1) may be effective for climate change consequences that are perceived as proximal to the message receivers. In the distal conditions, on the other hand, neither the empowering nor the threatening phrasing seem to have made much of a difference for the participants' climate change attitude. With the given limitations of the exploratory nature of this thesis, the scale of this study, its sample size and the methodology used, it is not possible to conclude whether doom phrasing, moderated by the proximity or distance of the described consequences, lead to a change in the climate change attitudes of the message receivers.

5.1.2 Recall ability

Even though this study was unable to detect an effect of the message phrasing on climate change attitude, it did find an effect on participant's recall ability. The results indicate that the recall ability of message details is influenced by the message phrasing, as expected. Fig. 10 and 11 show that the recall scores in the empowering conditions are more different than in the threatening conditions - as expected - that the scores are higher in the distal than in the proximal conditions. Therefore, the assumption of the model that it is beneficial for information recall to phrase the message distal and threatening, is supported by the

research results. For a discussion of these results it is important to keep in mind the overall greater climate change attitude and climate change interest in the two distal groups, as shown in Fig. 11. Even though there is no significant difference, this slight difference may account for the higher mean scores in Table 7. Furthermore, the effect sizes give an indication of the importance of the respective factors for climate change communication. For the main effect of doom, the analysis showed an Eta square value of $\eta^2 = .073$, which is a medium effect (University of Cambridge, 2019). Distance had an even greater main effect with $\eta^2 = .185$, which according to the University of Cambridge (2019) is a large effect. Closer analysis revealed a large effect of doom in the proximal conditions ($\eta^2 = .246$), but no effect of doom in the distal conditions. Therefore, the only thing that matters is whether a matter is phrased empowering/threatening and proximal/distal. These results indicate that it is beneficial for recall scores if the message is phrased as threatening and distal, and that - if phrased proximal - it is even more important for the recall scores to emphasize the threatening consequences of climate change. Still, with the control variable previous knowledge not being equally distributed in the four experimental conditions, it is possible that the operationalisation of the empowering-proximal text biased the recall ability of participants of that condition. Therefore, these results have to be interpreted cautiously.

5.2.3 Both responses

Consequently, it can be concluded that doom and distance phrasing do not have an effect on climate change attitude, but influence the recall ability in the way that distal and threatening phrasing evoke greater recall. These results could imply that doom and distance directly influence the recall ability. They could also indicate that an increase in knowledge is an immediate effect and not related at all to the attitude change - as illustrated in the working model of AF. This would be especially supported, if the effect of doom and distance on attitude change would have been confirmed in the hypothesised direction. With this not being the case, the only indication this study can offer is that knowledge is influenced by doom and distance phrasing. Whether that induces attitude and behaviour change as suggested in the conventional model of CCC (see Fig.1) is unclear. The exact nature of the relationship between recall ability and attitude change is therefore unclear. They could be linear as suggested in the conventional model of CCC, they could be opposing - meaning that doom and distance increase knowledge but decrease climate change attitude or not related at all. Which one of these applies has to be investigated in future studies.

Finally, results from the manipulation check have shown significant differences between the proximal and distal groups concerning geographical distance, but not for temporal, social and hypothetical distance. This could be an indication of insufficient operationalisation of these variables in the different experimental conditions. Even though this is quite likely for social distance, because it was decided not to make it a major focus of this thesis to avoid potential identification bias (see chapter 3.3.2), it is not very likely for the other variables. Hypothetical distance, for example, was operationalised with as much difference between the experimental conditions as possible by describing the scenarios as inevitable or as only one possibility. The same applies for temporal distance, although an argument could be made for expanding the time span for the distal conditions even further in the future in future studies. However, as these implementations appear to be operationalised as different as they could have been, a second interpretation might explain the results even better: These factors are not relevant to the perception of doom and distance. If this would be the case, it would have quite relevant and impactful implications for the work of CCC practitioners.

5.2 Limitations

The research reported in this thesis examines the effect of the message properties doom and distance on attitude and recall ability. With this narrow focus come a number of limitations of the model, the methods, sample and therefore implications of the results of this thesis.

5.2.1 Limitations of the model

With the empirical background of this thesis being limited to doom and distance, the model in itself is very limited. The other Stoknes barriers could not be researched in detail. The influence of cognitive dissonance and the multiple self-identities of the receiver, for example, would have to be reviewed more extensively and incorporated in the model with a higher degree of understanding for their mechanisms in order to draw conclusions about their effects on AF. The same applies for the Stoknes-barrier of denial, which could play an important role in the interaction of the message details and the receiver's response. Even though denial may play an important role in the occurrence of AF, this study did not measure receiver's denial of the presented information. In addition, the literature review on doom and distance is not exhaustive - for example visible in the discussion of fear response responses apart from flight/fight in appendix J. Especially the doom-chapter does not exhaustively represent research on fear appeals and fear appeal responses. For example, fear in this model has only been accounted for as a message property and as an "arousal" response. But other studies suggest that fear as well as other emotions such as worry or compassion are mediators between the message phrasing and the receiver response (e.g. Dillard, 1994; Lewis, Watson, & White, 2010; Myrick & Nabi, 2017; Gustafson et al., 2020). Numerous models have proposed different fear appeal mechanisms, and fuller review than the one conducted in this thesis might conclude on a more complex model of AF. For example, the Parallel Process Model suggests two different mechanisms set off by fear appeals (e.g. Leventhal, 1970, 1971; Witte, 1992), that were not accounted for in the AF model proposed in this study. Another limitation to the proposed model of AF is the CLT(see pp.11-12) it is based on, as the theory is only partly suited to study psychological distance (Brügger, 2020).

Furthermore, the concentration on the Stoknes model is a limitation in itself. Stoknes (2015) proposes that AF is a phenomenon that is robust to sender, receiver and channel properties but solely depends on the properties of the message. Contradicting this universal effect, there is a growing body of evidence for differences in the effectiveness of fear appeals depending on gender (Smith & Stutts, 2003; Lewis, Watson & Tay, 2007; McLean & Anderson, 2009; Tannenbaum et al., 2015; Sreenivasan & Weinberger, 2018) and cultural background (Kim & Ahn, 2019). Other studies discuss the influence of age (Witte & Allen, 2000; Wickersham, Zaval, Pachana & Smyer, 2020) and political orientation (Hine & Gifford, 2010; You & Ju, 2019). In addition to the receiver properties, there are further message properties - for example accompanying colors (Wauters, Brengman & Mahama, 2014) or the concreteness of the accompanying pictures (Duan, Takahashi & Zwickle, 2019) - that potentially have to be accounted for in an exhaustive AF model. These were not included in this study.

This thesis is limited to the research of communication between one sender and many different receivers, with a minimum of sender properties. One-to-one communication between sender and receiver that know each other may paint an entirely different picture of receiver recall ability, attitude and behaviour change (Kerr, 2009). Additionally, this thesis has not accounted for interaction between receivers (which is likely to occur in real-life climate change communication) or their perception of social norms that might lead

them to adopt or reject the message more willingly. Finally, only changes in climate change attitudes and the recall ability of message details was investigated. This limits the discussion of implications of this study for attitude change interventions and especially for behaviour change, as there is substantial evidence of the existence of a gap between attitude formation and its translation into actual behaviour (e.g. Boulstridge & Carrigan, 2000; Higham, Reis, & Cohen, 2016; Schäufele & Hamm, 2016; Shaw, McMaster & Newholm, 2016; Wiederhold & Martinez, 2018).

5.2.2 Limitations of the methodology

Because this is an exploratory study and because no other kind of experimental set-up would have been possible during the corona pandemic, this thesis used a simplified setup. This setup limited both the detail and scale of this study, and forms a limitation to the proposed model of AF. There was no measurement of the arousal of participants, which could have indicated differences that determine AF or empowerment. Furthermore, even though Stoknes (2017) proposes that repeated exposure leads to AF, there was only one exposure. In the interpretation of the results, it is important to keep this distinction in mind: this thesis researches transient AF - meaning AF occurring after only one exposure (see the Introduction chapter) - which might be a different phenomenon than Stoknes' (2017) AF. This thesis failed to measure pre-existing AF to climate change specifically or to apocalyptic messages generally. This may be especially relevant because the data for this thesis was collected in the midst of the corona pandemic in Europe. Furthermore, most of the measures of this thesis - except for the recall ability - were measured on self-reporting scales. They bring the usual potential biases of empirical self-reports: the desire to answer socially desirable (Grimm, 2010) and the desire to be consistent (Cialdini, 2007) in pre-and post measures, and fatigue as a reaction to repeatedly answering the same questions. Not as easily manipulated were the multiple choice questions measuring recall ability. Still, as usual with multiple choice formats, it is unclear to which degree the participants were able to answer out of knowledge or guessed correctly. Even though the "I don't know" option was included to give them a possibility to answer truthfully, this part of the study was not pilot-tested and could therefore pose a limitation.

Furthermore, it was not possible to control whether participants watched the videos with a certain degree of interest, and therefore - even though the on average high recall scores hint towards it - were randomised as planned. The climate change interest was generally high, but this might not pose a valid measurement of attentiveness. Even though pre-tested, the intervention still raises a number of questions that limit the implications of the results. Pre-tested was only the text-format of the intervention. Therefore, properties of the videos - speed of talking, perceived warmth of the narrator's voice and gender, the length of picture exposure etc. might have posed biases. Any potential differences in these aspects between the four experimental conditions may have provided a bias. While European identification was equally distributed among the four experimental conditions, it was not very high overall and therefore the operationalisation of "European" as "proximal" may have been insufficient. Furthermore, the sample included some participants that did not have European citizenship or did not come from the countries specifically mentioned out in the manipulation. Other studies furthermore suggest that European vs. Southern hemisphere is not the correct operationalisation of proximity or distance. Henderson, Wakslak, Fujita and Rohrbach (2011), for example, suggest that spatial and geographical distance are nowadays no longer a problem, because people are used to connecting to each other from different sides of the planet and worry about each other's fates. Therefore, Loy and Spence (2020) suggest instead to activate people's global identity as part of humanity to bridge the perceived distance. Finally, by just assessing European identification and political orientation, a number of other possibly relevant identities has been neglected (Stoknes, 2015; Diamond, 2020).

Similarly problematic could be the operationalisation of the empowering conditions. Because of the 3:1 ratio of positive to negative information in the message, they may have failed to convey any urgency whatsoever and therefore failed to lead to any change in attitude. The ambiguous interpretation possibilities for the non-significant differences of temporal, social and hypothetical distance in the experimental groups introduce another limitation. With only geographical distance having been reliably manipulated, this thesis has not necessarily tested the effect of all four distance spheres. Instead, the only conclusion that can be drawn from this thesis is that there appear to be no effects large enough to be detected by a small sample of the manipulation of the geographical distance and doom of a message on climate change attitudes.

5.2.3 Limitations of the sample

Linked to the limitations of the methodology, but not necessarily overlapping are limitations of the sample. Overall, the people that participated in this study reported a high interest in climate change, high self-efficacy and even higher climate change attitudes. This poses limitations in the following ways: First, climate change interest might have biased the attentiveness with which participants followed the manipulation, therefore being unrepresentative of real life CCC. Second, the high levels of self-efficacy might have prevented any AF from occurring. As explained in the empirical background of this paper, literature suggests that self-efficacy moderates the effect of doom and distance phrasing on the communication target and determines whether empowerment or AF are evoked. Specifically, AF is only evoked when self-efficacy is low. Therefore, the high levels of self-efficacy in this sample might have prevented this study from showing AF in the form of attitude change. Third, high levels of climate change attitude might have prevented a statistically significant attitude change, as there was not much room for improvement. This argument is unlikely, though, as there was statistically significant attitude change between pre- and post-attitude measurements, just not depending on doom and distance phrasing. Further limitations include age and education. Although a wide age range was covered, the average age was still relatively young. This is due to the large number of students among the participants. In other words, the sample is not very representative of the general population. This may have introduced a bias and therefore poses a limitation of this study. Participants of the study were in general highly educated and a considerable part of the sample consisted of people that were professionally linked to environmentalism or Sustainable Development. Consequently, the conclusions drawn from the analysis can only be applied to a very specific sample.

5.3 Implications

5.3.1 For AF

This study has not found any support for the assumption that doom and distance lead to AF which lead to a change in attitudes. As the overall goal of this study was to improve climate change communication, a lack of determining effects large enough to show in this sample is already a significant result in itself. Stoknes (2015) proposed AF to be robust against individual differences. But this study shows that - at least for one-time exposure - that there is no robust effect of doom and distance on the message receiver's climate change attitude. Therefore, one implication for CCC apparently is that the challenge of

communicating climate change proximally and positively may not have as much importance as assumed. Instead, with the recall ability of message information being higher in the threatening groups, this thesis provides support for the conventional model of CCC. Still, both the Stoknes model - based on significant empirical research - and the literature review of this study support the claim that threatening messages are not in themselves effective in improving climate change attitudes, not to mention climate change behaviour. Therefore, this thesis proposes a different approach to interpret the results. With the effect of message phrasing being different on attitude and on recall ability, AF seems to be a phenomenon only occurring for attitude change, but not for recall ability. The assumption is supported by the extensive literature on fear appeals and the fact that this thesis replicated the results of Spence & Pigeon (2010), that equally find no benefit of proximal or empowering phrasing on recall ability. Therefore, one implication for AF could be to ignore its effects on knowledge and instead concentrate on attitude and behaviour.

Having shown a difference between recall ability between the distal and proximal groups, but also no difference in the reported temporal, social and spatial distance, this thesis concludes that geographical distance is of greatest importance among the four different spheres. This goes against scholars like Henderson, Waksalak, Fujita and Rohrbach (2011) who, as discussed above, suggest that spatial and geographical distance are nowadays no longer relevant. For AF, these results imply that special attention should be paid to the research and application of the manipulation of geographical distance.

5.3.2 For the Stoknes model

This study is based on the theoretical framework of the Stoknes model. Therefore, the results of this thesis have implications for the Stoknes model on CCC. For example, with doom and distance interacting in their effect on recall ability but not on attitude, Stoknes' assumption that they lead to dissonance and denial cannot be supported. Furthermore, the results of this thesis show that the interaction of both factors works in two directions. Not only has distance been shown to modulate the doom effect of the CC message, but also doom has been shown to modulate the distance effect on recall ability. Supporting the statement made in the empirical background, the visualisation of the Stoknes CCC barriers therefore is insufficient. Doom and distance are not two separate barriers but highly intertwined. This is furthermore supported by the literature review of this thesis, highlighting the moderating effect of self-efficacy on the effect of doom and distance in the communication target (Howansky, 2015).

5.3.3 For CCC

Due to the empirical and exploratory nature of this study, it is too early to draw conclusions with recommendations for climate communication. The limitations are too many to recommend either threatening, empowering, distal or proximal communication.

Still, this study has implications for the details of the message that is being communicated. Apparently, one major contributor to the perception of distance is the geographical dimension of it, whereas manipulation of the temporal variable and of the certainty of the consequences were not perceived as such by the participants. Therefore, this thesis recommends for climate practitioners to use geographical distance and not temporal or hypothetical distance if they need to manipulate it.

Even though statistically significant, the effect of doom and distance on recall ability shown in this study is not of relevance for CCC. They indicate the benefit of threatening and distal messages if the sender's goal is to increase the receiver's knowledge. Whether that is beneficial for the formation of climate

change attitudes or behaviours is doubtful. Knowledge is neither a determinant nor a good predictor of attitude or behaviour change - see for example James, Reddy and Jinabhai (2007), Eriksen & Gill (2010) and Crutora (2012).

This thesis does not have many implications for the general practice of climate change communication, but it does have implications for the research of effective CCC, and more specifically for the Stoknes model (2015). Importantly, it has been shown that doom and distance do not stand alone but that they interact. Therefore, the visualisation of doom and distance as consecutive barriers is insufficient in representing their interactive relationship. Furthermore, with the climate change attitude of all participants increasing between the pre-and post-measures, this thesis provides no indication of denial following the doom and distance barriers.

It is important that these and future studies investigate the effect of doom and distance phrasing, as both message properties are often used for example in the reports of the IPCC, a key institution for climate change research (Wardekker & Lorenz, 2019) or reports of the United Nations. In fact, the latest UN progress report on the Sustainable Development Goals was phrased apocalyptically (see UN, 2020), following in the footsteps of the conventional model of CCC (Fig. 2). Therefore, knowing whether this is an effective or ineffective CCC, is of utmost importance.

5.4 Future research

As previously stated, AF is a phenomenon that is not new, but so far underrepresented in psychological literature. This is a first study into the working mechanisms, given the limitations of model, methodology and sample discussed in the previous chapter. Therefore, before undertaking any future research into AF, it should be established first whether there is such a phenomenon at all, followed - if the results are confirmatory - by an investigation into the determining factors, mechanisms and solutions to avoid it.

Therefore, the first recommendation of research following this paper is to replicate the present study with a larger sample size and a more representative sample, investigating whether the tendencies found for climate change attitudes are true effects or just results from possible biases of this study. Even though it is an ambitious recommendation, it is especially recommended to recruit a sample that is representative of all age groups, educational backgrounds, political orientations and levels of climate change interest and attitudes. If such an effect can be found, further research should specify the working mechanisms and the different types of responses, and especially how the message details eventually translate into behaviour change. This would for example include studies into temporal distance with a wider time range. In addition, with the influence of social distance not being included in this study but mentioned by Stoknes (2015) as a solution to overcome the distance barrier, future research should investigate the potential of socially distant communication to avoid fatigue in communication targets. Furthermore, different manipulations of distance - such as for example through abstract or concrete pictures (Duan, Takahashi & Zwickle, 2019) should be investigated.

With the sample of this study being highly biased, this thesis cannot give an indication for individual differences in the immediate (meaning transient) effect of doom and distance phrasing on attitude and recall ability. Therefore, future studies with broader samples need to investigate whether there are personal differences in the effect of doom and distance on different receivers.

If there is no effect of message phrasing on transient AF, future studies could improve the methodology underlying this thesis by increasing the manipulation of proximity to be closer to the direct living

environment of the message receivers. Also, if future research would reveal no effect of a one-time exposure on attitudes, further studies should investigate the effect of repeated exposure to doom/distance messages. It should furthermore be investigated whether AF is a personality trait or a result of the situation (state), under which conditions it could translate from a state to a trait and how this potential translation could be prevented. In addition, investigation of long-term effects should also account for any potential interaction with other apocalyptic messages in order to reveal whether AF is topic-specific or a general response to apocalyptic messages. This could be especially relevant in times where apocalyptic messages such as the Corona pandemic dominate the news: In case of multiple and diverse doom messages people could be more or less likely to change their attitudes and behaviour than after exposure to one (or more) climate change messages. Therefore, one future research question could be whether AF is topic-specific or represents a general response to accumulating “bad news”, and which messages under what conditions may trump or reinforce each other.

Another addition to this paper would be to examine whether recall ability and attitude are separate mechanisms or determine each other. Also, the model proposed in this thesis is one of a linear relationship, in which either AF or climate change empowerment result from arousal determined by the receiver’s self-efficacy. By showing no effect of message phrasing on attitude, the results of this study indicate that neither of these two options necessarily have to follow a threatening message, but that there might be a third option: no change. If this is the case, the linearity might not account for the actual mechanism of AF/empowerment, but instead a threshold mechanism would be more valid.

Widening the scope would include research into the influence of properties of the sender, the channel or the receiver (following the model by Shannon & Weaver, 1949 as well as Berlo, 1977) as well as environmental factors. For example, the characteristics and credibility of the sender affects the effect of the message on the receiver (Kerr, 2009; Zhang, Ritchie, Mair & Driml, 2019). Receiver’s perception of possible attitudes of the sender can lead to a perceived social norm (Lea & Spears, 1992) that influences the effect of the message (e.g. Schwartz, 1977; Grønhøj & Thøgersen, 2012; Zhang, Wang & Zhou, 2013; Van der Werff & Steg, 2015; Farrow, Grolleau & Ibanez, 2017). Furthermore could personal beliefs of the receiver influence their assessment of the message and therefore the occurrence of AF (Smerecnik & Ruiter, 2010)? Both the build and social environment can determine the effect of the message on the receiver. For example in situations where message receivers are not ‘on their own’ when exposed to the messages. They are likely to have some kind of interaction with others before or after the exposure. This interaction can influence their attitude change - for example through the previously mentioned social norms.

Finally, with this study failing to show a beneficial effect of doom and distance phrasing on attitude change, AF could not be a relevant concept at all. If that is the case, future studies need to propose different models of effective CCC - starting with a potential confirmation of the conventional model of CCC (Fig. 1).

6. Conclusion

It was this thesis’ aim to improve climate change communication by understanding whether the AF phenomenon is a barrier to the adoption of pro-environmental attitudes in receivers of climate change messages. A model was developed proposing that doom and distance phrasing of a message lead to a lower recall of message details and to a decrease in positive climate change attitudes. To test this model, a methodology was developed. Results show an effect of doom and distance phrasing on recall ability, but not on attitude change. Instead, just the simple exposure to the message led to a statistically significant

increase in positive climate change attitudes in all participants of the study. Also, the effect of doom and distance was not in the direction that it inhibited recall ability; instead doom and distance seemed to enhance instead of inhibit attitude change and recall ability in comparison to the experimental control groups. Therefore, the results of this thesis do not support the assumption that doom and distance phrasing lead to AF in message receivers. Despite a large number of limitations of for example the scale of literature review and experimental set-up, this thesis has the following implications. First, it shows that the Stoknes model of CCC that is underlying the model of AF proposed by this paper is both insufficiently visualised and too simple. Second, AF does not result from a single exposure and is likely not independent from sender and receiver properties. Finally, the results of this thesis concerning climate change attitude change contradict all literature on fear appeals. Therefore, it has to be further tested whether doom and distance are enhancing or inhibiting attitude change, and whether there is a phenomenon like AF at all, which factors determine AF occurrence and whether is topic-specific or general, and whether it is a situational state or a general personality trait.

7. Acknowledgement

This thesis was not only a combination of Sustainable Development and Social Psychology research, but also a cooperation project between two cities in two countries. I want to thank my Dutch supervisor Hans Marien for the uncomplicated nature of his supervision, and his adaptability to and support of my development. My Swedish supervisor, Frans Lenglet, I want to thank for the detailed review and discussions to deliver the best work possible. To my colleague Youri Lohuis in Groningen I am grateful for the exchange, creativity and support during methodology development and analysis. Thank you Benjamin de Graaf for recording the audio files and for your artistic input in them. Furthermore, I want to thank Win for his peer review and interest in my paper. Your feedback reminded me how important psychology is for Sustainable Development, and that I am on the right path of making a difference through combining my interest in both. Thanks also to the authors of the scales I have used both in the pilot and in the final study.

Kyara and Emmy, you have tirelessly supported me with detailed comments, review and constant endorsement in the difficult weeks of writing during the corona crisis. I am grateful to my Swedish family and especially my “guest parents” and to my German family for their love, their time and their belief in me not just throughout this thesis, but for the entire time of my Master studies. Finally, I thank my father Gerriet Harms for the financial support, his critical review and the willingness to read everything I have written. This would have not been possible without you all.

8. References

- Ackerman, C. (2020). What is Self-Efficacy Theory in Psychology?. Available at: <https://positivepsychology.com/self-efficacy/> [2017-04-17]
- Akhtar, M., 2008. What is self-efficacy? Bandura's 4 sources of efficacy beliefs. *Positive Psychology UK*.
- Ajzen, I., 1985. From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39). Springer, Berlin, Heidelberg.
- Ajzen, I., 1991. The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), pp.179-211.
- Armenta, B.E., 2010. Stereotype boost and stereotype threat effects: The moderating role of ethnic identification. *Cultural Diversity and Ethnic Minority Psychology*, 16(1), p.94.
- Bandura, A., 1977. Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, 84(2), p.191.
- Bendor, R. (2018) *Interactive Media for Sustainability*. Springer.
- Berlo, D. K. (1977). Communication as process: Review and commentary. *Annals of the International Communication Association*, 1(1), 11-27.
- Bin, S. and Dowlatabadi, H., 2005. Consumer lifestyle approach to US energy use and the related CO2 emissions. *Energy policy*, 33(2), pp.197-208.
- Bissing-Olson, M.J., Iyer, A., Fielding, K.S. and Zacher, H., 2013. Relationships between daily affect and pro-environmental behavior at work: The moderating role of pro-environmental attitude. *Journal of Organizational Behavior*, 34(2), pp.156-175.
- Boulstridge, E. and Carrigan, M., 2000. Do consumers really care about corporate responsibility? Highlighting the attitude-behaviour gap. *Journal of communication management*, 4(4), pp.355-368.
- Bracha, H.S., 2004. Freeze, flight, fight, fright, faint: Adaptationist perspectives on the acute stress response spectrum. *CNS spectrums*, 9(9), pp.679-685.
- Brecher, J., 2015, May. Protecting the Future: A Strategic Proposal to Stop Climate Change. In *New Labor Forum* (Vol. 24, No. 2, pp. 18-24). Sage CA: Los Angeles, CA: SAGE Publications.
- Bride, B.E., Radey, M. and Figley, C.R., 2007. Measuring compassion fatigue. *Clinical social work journal*, 35(3), pp.155-163.
- Brügger, A., Morton, T.A. and Dessai, S., 2016. "Proximising" climate change reconsidered: A construal level theory perspective. *Journal of Environmental Psychology*, 46, pp.125-142.

Brügger, A. (2020). Understanding the psychological distance of climate change: The limitations of construal level theory and suggestions for alternative theoretical perspectives. *Global environmental change*, 60, 102023.

Cannon, B., 1994. Walter Bradford Cannon: Reflections on the man and his contributions. *International Journal of Stress Management*, 1(2), pp.145-158.

Christensen, R., & Knezek, G. (2015). The Climate Change Attitude Survey: Measuring Middle School Student Beliefs and Intentions to Enact Positive Environmental Change. *International Journal of Environmental and Science Education*, 10(5), 773-788.

Cialdini, R.B., 1993. Influence: The psychology of persuasion (Rev. ed.). *New York: Morrow*.

Cialdini, R.B. and Cialdini, R.B., 2007. *Influence: The psychology of persuasion* (Vol. 55, p. 339). New York: Collins.

Crawley, S., Coffé, H. and Chapman, R., 2020. To what extent do interest group messages shape the public's climate change policy preferences?. *British Politics*, pp.1-20.

Crowell, M., Edelman, S., Coulton, K. and McAfee, S., 2007. How many people live in coastal areas?. *Journal of Coastal Research*, 23(5 (235)), pp.iii-vi.

Csutora, M., 2012. One more awareness gap? The behaviour–impact gap problem. *Journal of consumer policy*, 35(1), pp.145-163.

Davis, R., Campbell, R., Hildon, Z., Hobbs, L. and Michie, S., 2015. Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health psychology review*, 9(3), pp.323-344.

Diamond, E.P., 2020. The Influence of Identity Salience on Framing Effectiveness: An Experiment. *Political Psychology*.

Dillard, J.P., 1994. Rethinking the study of fear appeals: An emotional perspective. *Communication Theory*, 4(4), pp.295-323.

Duan, R., Takahashi, B. and Zwickle, A., 2019. Abstract or concrete? The effect of climate change images on people's estimation of egocentric psychological distance. *Public Understanding of Science*, 28(7), pp.828-844.

Dunlap, R.E. and Brulle, R.J. eds., 2015. *Climate change and society: Sociological perspectives*. Oxford University Press.

Dupar, M., McNamara, L. and Pacha, M.J., 2019. *Communicating climate change: a practitioner's guide: insights from Africa, Asia and Latin America*. Available at https://unfccc.int/sites/default/files/resource/Communicating%20climate%20change_Insights%20from%20CDKNs%20experience.pdf [2020-05-19]

- Esa, N., 2010. Environmental knowledge, attitude and practices of student teachers. *International Research in Geographical and Environmental Education*, 19(1), pp.39-50.
- Eriksen, C. and Gill, N., 2010. Bushfire and everyday life: examining the awareness-action 'gap' in changing rural landscapes. *Geoforum*, 41(5), pp.814-825.
- Ertz, M., Karakas, F. and Sarigöllü, E., 2016. Exploring pro-environmental behaviors of consumers: An analysis of contextual factors, attitude, and behaviors. *Journal of Business Research*, 69(10), pp.3971-3980.
- Evans, D.R., Boggero, I.A. and Segerstrom, S.C., 2016. The nature of self-regulatory fatigue and "ego depletion" lessons from physical fatigue. *Personality and Social Psychology Review*, 20(4), pp.291-310.
- European Commission, 2020. *Climate change consequences*, Available at https://ec.europa.eu/clima/change/consequences_en [2020-03-10]
- European Environmental Agency, 2020a. *Climate Change Mitigation*. Available at <https://www.eea.europa.eu/themes/climate> [2020-02-24]
- European Environmental Agency, 11 Feb 2020b. *Global emissions trends*, Available at <https://www.iea.org/articles/global-co2-emissions-in-2019> [2020-02-24]
- Farrow, K., Grolleau, G. and Ibanez, L., 2017. Social norms and pro-environmental behavior: A review of the evidence. *Ecological Economics*, 140, pp.1-13.
- Festinger, L., 1957. *A theory of cognitive dissonance* (Vol. 2). Stanford university press.
- Figley, C.R., 2002. Compassion fatigue: Psychotherapists' chronic lack of self care. *Journal of clinical psychology*, 58(11), pp.1433-1441.
- Flannigan, M.D., Amiro, B.D., Logan, K.A., Stocks, B.J. and Wotton, B.M., 2006. Forest fires and climate change in the 21 st century. *Mitigation and adaptation strategies for global change*, 11(4), pp.847-859.
- Flannigan, M.D., Stocks, B.J. and Wotton, B.M., 2000. Climate change and forest fires. *Science of the total environment*, 262(3), pp.221-229.
- Floyd, D.L., Prentice-Dunn, S. and Rogers, R.W., 2000. A meta-analysis of research on protection motivation theory. *Journal of applied social psychology*, 30(2), pp.407-429.
- Fritsche, I., Jonas, E., Kayser, D.N. and Koranyi, N., 2010. Existential threat and compliance with pro-environmental norms. *Journal of Environmental Psychology*, 30(1), pp.67-79.
- Stephanie Glen. "Cronbach's Alpha: Simple Definition, Use and Interpretation" From StatisticsHowTo.com: Elementary Statistics for the rest of us!
<https://www.statisticshowto.com/cronbachs-alpha-spss/>

Glock, S. and Kneer, J., 2009. Are deterrent pictures effective? The impact of warning labels on cognitive dissonance in smokers. *Applied Psychology: Health and Well-Being*, 1(3), pp.356-373.

Goodman, J. & Robinson, O. (2019). *Forest fires: Are they worse than in previous years?*. Available at <https://www.bbc.com/news/world-49515462> [2020-04-20]

Grimm, P., 2010. Social desirability bias. *Wiley international encyclopedia of marketing*.

Grønhoj, A. and Thøgersen, J., 2012. Action speaks louder than words: The effect of personal attitudes and family norms on adolescents' pro-environmental behaviour. *Journal of Economic Psychology*, 33(1), pp.292-302.

Gustafson, A., Ballew, M.T., Goldberg, M.H., Cutler, M.J., Rosenthal, S.A. and Leiserowitz, A., 2020. Personal Stories Can Shift Climate Change Beliefs and Risk Perceptions: The Mediating Role of Emotion. *Communication Reports*, pp.1-15.

Hamilton, M., 1959. Hamilton anxiety scale. *Group*, 1, p.4.

Hargreaves, T., 2011. Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of consumer culture*, 11(1), pp.79-99.

Hayashi, Y., Morichi, S., Oum, T.H. and Rothengatter, W. eds., 2014. *Intercity Transport and Climate Change: Strategies for Reducing the Carbon Footprint* (Vol. 15). Springer.

Henderson, M. D., Wakslak, C. J., Fujita, K., & Rohrbach, J. (2011). Construal level theory and spatial distance: Implications for mental representation, judgment, and behavior. *Social Psychology*, 42(3), pp. 165–173. <https://doi-org.ezproxy.its.uu.se/10.1027/1864-9335/a000060>

Higham, J., Reis, A. and Cohen, S.A., 2016. Australian climate concern and the 'attitude-behaviour gap'. *Current Issues in Tourism*, 19(4), pp.338-354.

Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K.L., Engelbrecht, F. and Guiot, J., 2018. Impacts of 1.5 °C global warming on natural and human systems,[in:] Global warming of 1.5 C. An IPCC Special Report on the impacts of global warming of 1.5 C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, V. In *The Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*.

Hoegh-Guldberg, O., Mumby, P.J., Hooten, A.J., Steneck, R.S., Greenfield, P., Gomez, E., Harvell, C.D., Sale, P.F., Edwards, A.J., Caldeira, K. and Knowlton, N., 2007. Coral reefs under rapid climate change and ocean acidification. *science*, 318(5857), pp.1737-1742.

Homburg, A. and Stolberg, A., 2006. Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology*, 26(1), pp.1-14.

Howansky, K., 2015. *Getting warmer: the optimal distance for motivating climate change mitigation* (Doctoral dissertation, Rutgers University-Graduate School-New Brunswick).

Hübner, G. & Woznica, A. (2015). Fragebogen „Kleidung und Konsum“. Hamburg, Germany.

Hunter, E. and Rööß, E., 2016. Fear of climate change consequences and predictors of intentions to alter meat consumption. *Food Policy*, 62, pp.151-160.

Intergovernmental Panel on Climate Change. (2018). *Global Warming of 1.5° C: An IPCC Special Report on the Impacts of Global Warming of 1.5° C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. Intergovernmental Panel on Climate Change.

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A. and Hertwich, E.G., 2016. Environmental impact assessment of household consumption. *Journal of Industrial Ecology*, 20(3), pp.526-536.

Jackson, K.M. and Aiken, L.S., 2000. A psychosocial model of sun protection and sunbathing in young women: the impact of health beliefs, attitudes, norms, and self-efficacy for sun protection. *Health Psychology*, 19(5), p.469.

James, S., Reddy, S.P., Taylor, M. and Jinabhai, C.C., 2004. Young people, HIV/AIDS/STIs and sexuality in South Africa: the gap between awareness and behaviour. *Acta Paediatrica*, 93(2), pp.264-269.

Jensen, B.B., 2002. Knowledge, action and pro-environmental behaviour. *Environmental education research*, 8(3), pp.325-334.

Jones, C., Hine, D.W. and Marks, A.D., 2017. The future is now: reducing psychological distance to increase public engagement with climate change. *Risk Analysis*, 37(2), pp.331-341.

Jones, S.C. and Owen, N., 2006. Using fear appeals to promote cancer screening—are we scaring the wrong people?. *International Journal of Nonprofit and Voluntary Sector Marketing*, 11(2), pp.93-103.

Jugert, P., Greenaway, K.H., Barth, M., Büchner, R., Eisentraut, S. and Fritzsche, I., 2016. Collective efficacy increases pro-environmental intentions through increasing self-efficacy. *Journal of Environmental Psychology*, 48, pp.12-23.

Keegan, K.M., Albert, M.R., McConnell, J.R. and Baker, I., 2014. Climate change and forest fires synergistically drive widespread melt events of the Greenland Ice Sheet. *Proceedings of the National Academy of Sciences*, 111(22), pp.7964-7967.

Kerr, R. A. (2009). Amid worrisome signs of warming, 'climate fatigue' sets in. *Science*, 326 (5955), pp. 926-928.

Kim, K. and Ahn, S.J., 2019. The moderating role of cultural background in temporal framing: focusing on climate change awareness advertising. *Asian Journal of Communication*, 29(4), pp.363-385.

- Klöckner, C.A., 2013. A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global environmental change*, 23(5), pp.1028-1038.
- Knowles, E.S. and Riner, D.D., 2007. Omega approaches to persuasion: Overcoming resistance. *The science of social influence: Advances and future progress*, pp.83-114.
- Koger, S.M., Leslie, K.E. and Hayes, E.D., 2011. Climate change: Psychological solutions and strategies for change. *Ecopsychology*, 3(4), pp.227-235.
- Kolandai-Matchett, K. and Armoudian, M., 2020. Message framing strategies for effective marine conservation communication. *Aquatic Conservation: Marine and Freshwater Ecosystems*.
- Kollmuss, A. and Agyeman, J., 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, 8(3), pp.239-260.
- Kwasnicka, D., Dombrowski, S.U., White, M. and Sniehotta, F., 2016. Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. *Health psychology review*, 10(3), pp.277-296.
- Laerd Statistics. (2018). *One-way ANOVA*. Lund Research Ltd. Available at <https://statistics.laerd.com/statistical-guides/one-way-anova-statistical-guide.php> [2020-04-20]
- Landry, N., Gifford, R., Milfont, T.L., Weeks, A. and Arnocky, S., 2018. Learned helplessness moderates the relationship between environmental concern and behavior. *Journal of Environmental Psychology*, 55, pp.18-22.
- Lanzini, P. and Thøgersen, J., 2014. Behavioural spillover in the environmental domain: an intervention study. *Journal of Environmental Psychology*, 40, pp.381-390.
- Leventhal, H., 1970. Findings and theory in the study of fear communications. In *Advances in experimental social psychology* (Vol. 5, pp. 119-186). Academic Press.
- Leventhal, H., 1971. Fear appeals and persuasion: the differentiation of a motivational construct. *American Journal of Public Health*, 61(6), pp.1208-1224.
- Lea, M. and Spears, R., 1992. Paralanguage and social perception in computer-mediated communication. *Journal of Organizational Computing and Electronic Commerce*, 2(3-4), pp.321-341.
- Lewis, I., Watson, B. and Tay, R., 2007. Examining the effectiveness of physical threats in road safety advertising: The role of the third-person effect, gender, and age. *Transportation research part F: traffic psychology and behaviour*, 10(1), pp.48-60.
- Lewis, I., Watson, B., Tay, R. and White, K.M., 2007. The role of fear appeals in improving driver safety: A review of the effectiveness of fear-arousing (threat) appeals in road safety advertising. *International Journal of Behavioral Consultation and Therapy*, 3(2), p.203.

Lewis, I.M., Watson, B. and White, K.M., 2010. Response efficacy: The key to minimizing rejection and maximizing acceptance of emotion-based anti-speeding messages. *Accident Analysis & Prevention*, 42(2), pp.459-467.

Liberman, N., Trope, Y., & Stephan, E. (2007). Psychological distance. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (p. 353–381). The Guilford Press.

Loria, K. (2018). *The quest to save the fragile reefs Earth's oceans depend on*. Available at <https://www.businessinsider.com/coral-reef-bleaching-ocean-acidification-solutions-2018-4?r=US&IR=T> [2020-04-20]

Loy, L.S. and Spence, A., 2020. Reducing, and bridging, the psychological distance of climate change. *Journal of Environmental Psychology*, 67, p.101388.

Maddux, J.E. and Rogers, R.W., 1983. Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of experimental social psychology*, 19(5), pp.469-479.

Maddux, J.E., 1995. Self-efficacy theory. In *Self-efficacy, adaptation, and adjustment* (pp. 3-33). Springer, Boston, MA.

Marcora, S.M., Staiano, W. and Manning, V., 2009. Mental fatigue impairs physical performance in humans. *Journal of applied physiology*, 106(3), pp.857-864.

Martin, J. and McLellan, A.M., 2013. *The education of selves: How psychology transformed students*. Oxford University Press.

Meerow, S. and Neuner, F.G., 2020. Positively Resilient? How Framing Local Action Affects Public Opinion. *Urban Affairs Review*, p.1078087420905655.

McLean, C.P. and Anderson, E.R., 2009. Brave men and timid women? A review of the gender differences in fear and anxiety. *Clinical psychology review*, 29(6), pp.496-505.

Moser, S.C. and Dilling, L., 2011. Communicating climate change: closing the science-action gap. *The Oxford handbook of climate change and society*, pp.161-174.

Myricka, A.C. and Brandb, B.L., 2015. Dissociation, Dissociative Disorders, and PTSD. *From: Comprehensive*.

Myrick, J.G. and Nabi, R.L., 2017. Fear arousal and health and risk messaging. In *Oxford Research Encyclopedia of Communication*.

Nickels, N., Kubicki, K. and Maestripieri, D., 2017. Sex differences in the effects of psychosocial stress on cooperative and prosocial behavior: evidence for ‘flight or fight’ in males and ‘tend and befriend’ in females. *Adaptive Human Behavior and Physiology*, 3(2), pp.171-183.

Nordhaus, T. & Shellenberger, M. (2009). *Apocalypse Fatigue: Losing the Public on Climate Change*. Available at https://e360.yale.edu/features/apocalypse_fatigue_losing_the_public_on_climate_change [2020-03-15].

OECD (2009). *The Role of Consumers and Corporations in Tackling Climate Change*. Available at <https://www.oecd.org/industry/inv/corporateresponsibility/43357880.pdf> [2020-04-20]

Ockwell, D., Whitmarsh, L. and O'Neill, S., 2009. Reorienting climate change communication for effective mitigation: forcing people to be green or fostering grass-roots engagement?. *Science Communication*, 30(3), pp.305-327.

O'Leary, A. and Brown, S., 1995. Self-efficacy and the physiological stress response. In *Self-efficacy, adaptation, and adjustment* (pp. 227-246). Springer, Boston, MA.

Osbaldiston, R. and Schott, J.P., 2012. Environmental sustainability and behavioral science: Meta-analysis of pro environmental behavior experiments. *Environment and Behavior*, 44(2), pp.257-299.

Peters, G.J.Y., Ruiter, R.A. and Kok, G., 2013. Threatening communication: a critical re-analysis and a revised meta-analytic test of fear appeal theory. *Health psychology review*, 7(sup1), pp.S8-S31.

Pookulangara, S. and Shephard, A., 2013. Slow fashion movement: Understanding consumer perceptions—An exploratory study. *Journal of retailing and consumer services*, 20(2), pp.200-206.

Poortinga, W., Whitmarsh, L. and Suffolk, C., 2013. The introduction of a single-use carrier bag charge in Wales: Attitude change and behavioural spillover effects. *Journal of Environmental Psychology*, 36, pp.240-247.

Robuck, A. (2018). *Why don't Americans care about chemicals?*. Available at https://www.salon.com/2018/03/18/why-do-not-americans-care-about-chemicals_partner/ [2020-01-23]

Rogers, R.W., 1975. A protection motivation theory of fear appeals and attitude change1. *The journal of psychology*, 91(1), pp.93-114.

Rogers, R.W., 1983. Cognitive and psychological processes in fear appeals and attitude change: A revised theory of protection motivation. *Social psychophysiology: A sourcebook*, pp.153-176.

Romero-Canyas, R., Larson-Konar, D., Redlawsk, D.P., Borie-Holtz, D., Gaby, K., Langer, S. and Schneider, B., 2019. Bringing the heat home: Television spots about local impacts reduce global warming denialism. *Environmental Communication*, 13(6), pp.740-760.

Romsdahl, R.J., Wood, R.S., Harsell, D.M. and Hultquist, A., 2019. Framing local climate change policies in the US Great Plains. *Journal of Environmental Policy & Planning*, 21(6), pp.734-753.

Roosendaal, B., McEwen, B.S. and Chattarji, S., 2009. Stress, memory and the amygdala. *Nature Reviews Neuroscience*, 10(6), pp.423-433.

Rupia, E.J., Binning, S.A., Roche, D.G. and Lu, W., 2016. Fight-flight or freeze-hide? Personality and metabolic phenotype mediate physiological defence responses in flatfish. *Journal of Animal Ecology*, 85(4), pp.927-937.

Saif, (2019). Power of an Individual and Overcoming Apocalypse Fatigue. Available at <https://medium.com/age-of-awareness/overcoming-apocalypse-fatigue-and-power-of-an-individual-1820f7ff9f61> [2020-02-04].

Salomon, E., Preston, J.L. and Tannenbaum, M.B., 2017. Climate change helplessness and the (de) moralization of individual energy behavior. *Journal of Experimental Psychology: Applied*, 23(1), p.15.

Sawitri, D.R., Hadiyanto, H. and Hadi, S.P., 2015. Pro-environmental behavior from a social cognitive theory perspective. *Procedia Environmental Sciences*, 23, pp.27-33.

Schauer, M. and Elbert, T., 2015. Dissociation following traumatic stress. *Zeitschrift für Psychologie/Journal of Psychology*.

Schäufele, I. and Hamm, U., 2018. Organic wine purchase behaviour in Germany: Exploring the attitude-behaviour-gap with data from a household panel. *Food Quality and Preference*, 63, pp.1-11.

Schleussner, C.F., Lissner, T.K., Fischer, E.M., Wohland, J., Perrette, M., Golly, A., Rogelj, J., Childers, K., Schewe, J., Frieler, K. and Mengel, M., 2016. Differential climate impacts for policy-relevant limits to global warming: the case of 1.5 C and 2 C. *Earth System Dynamics* 7 (2): 327–351.

Shannon, C.E. and Weaver, W., 1949. *The Mathematical Theory of Communication*, by CE Shannon (and Recent Contributions to the Mathematical Theory of Communication), W. Weaver. University of Illinois Press.

Schwartz, S.H., 1977. Normative influences on altruism. *Advances in experimental social psychology*, 10(1), pp.221-279.

Seligman, M.E., 1972. Learned helplessness. *Annual review of medicine*, 23(1), pp.407-412.

Shaw, D., McMaster, R. and Newholm, T., 2016. Care and commitment in ethical consumption: An exploration of the ‘attitude–behaviour gap’. *Journal of Business Ethics*, 136(2), pp.251-265.

Sheeran, P., Maki, A., Montanaro, E., Avishai-Yitshak, A., Bryan, A., Klein, W.M., Miles, E. and Rothman, A.J., 2016. The impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior: a meta-analysis. *Health Psychology*, 35(11), p.1178.

Skinner, E.A., Edge, K., Altman, J. and Sherwood, H., 2003. Searching for the structure of coping: a review and critique of category systems for classifying ways of coping. *Psychological bulletin*, 129(2), p.216.

Smerecnik, C.M. and Ruiter, R.A., 2010. Fear appeals in HIV prevention: The role of anticipated regret. *Psychology, Health & Medicine*, 15(5), pp.550-559.

Smith, K.H. and Stutts, M.A., 2003. Effects of short-term cosmetic versus long-term health fear appeals in anti-smoking advertisements on the smoking behaviour of adolescents. *Journal of consumer behaviour: An international research review*, 3(2), pp.157-177.

- Spence, A. and Pidgeon, N., 2010. Framing and communicating climate change: The effects of distance and outcome frame manipulations. *Global Environmental Change*, 20(4), pp.656-667.
- Sreenivasan, S. & Weinberger, L.E. (2018). *Fear Appeals. An approach used to change our attitudes and behaviors*. Available at <https://www.psychologytoday.com/intl/blog/emotional-nourishment/201809/fear-appeals> [2020-05-04]
- Sterman, J.D., 2011. Communicating climate change risks in a skeptical world. *Climatic Change*, 108(4), p.811.
- Stoknes, P. E. (2015). *What we think about when we try not to think about global warming: Toward a new psychology of climate action*. Chelsea Green Publishing.
- Sullivan, A. and White, D.D., 2020. Climate change as catastrophe or opportunity? Climate change framing and implications for water and climate governance in a drought-prone region. *Journal of Environmental Studies and Sciences*, 10(1), pp.1-11.
- Suresh, A., Latha, S.S., Nair, P. and Radhika, N., 2014. Prediction of fight or flight response using artificial neural networks. *American Journal of Applied Sciences*, 11(6), pp.912-920.
- Tajfel, H. (1972). Social categorization. English manuscript of 'La catégorisation sociale'. In S. Moscovici (Ed.), *Introduction à la psychologie sociale* (Vol. 1, pp. 272–302). Paris: Larousse.
- Tajfel, H., Billig, M., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, 1, pp. 149–177.
- Tajfel, H., Turner, J.C., Austin, W.G. and Worchel, S., 1979. An integrative theory of intergroup conflict. *Organizational identity: A reader*, 56, p.65.
- Tannenbaum, M.B., Hepler, J., Zimmerman, R.S., Saul, L., Jacobs, S., Wilson, K. and Albarracín, D., 2015. Appealing to fear: A meta-analysis of fear appeal effectiveness and theories. *Psychological bulletin*, 141(6), p.1178.
- Taylor, S.E., Klein, L.C., Lewis, B.P., Gruenewald, T.L., Gurung, R.A. and Updegraff, J.A., 2000. Biobehavioral responses to stress in females: tend-and-befriend, not fight-or-flight. *Psychological review*, 107(3), p.411.
- Thøgersen, J., 2014. The mediated influences of perceived norms on pro-environmental behavior. *Revue d'économie politique*, 124(2), pp.179-193.
- Thomas, G.O., Poortinga, W. and Sautkina, E., 2016. The Welsh single-use carrier bag charge and behavioural spillover. *Journal of Environmental Psychology*, 47, pp.126-135.
- Trope, Y. and Liberman, N., 2010. Construal-level theory of psychological distance. *Psychological review*, 117(2), p.440.
- Tunmer Jr, J.F., Day, E. and Crask, M.R., 1989. Protection motivation theory: An extension of fear appeals theory in communication. *Journal of Business Research*, 19(4), pp.267-276.

Turton, S. and Campbell, C., 2005. Tend and befriend versus fight or flight: Gender differences in behavioral response to stress among university students. *Journal of Applied Biobehavioral Research*, 10(4), pp.209-232.

United Nations (2017). *The Ocean Conference Factsheet: People and Oceans*. Available at <https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/05/Ocean-fact-sheet-package.pdf> [2020-04-20]

United Nations (2020). *The Sustainable Development Goals Report 2020*. Retrieved from <https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf> [2020-04-20]

University of Cambridge (30 September 2019). *Rules of thumb on magnitude of effect sizes*. Retrieved from <http://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/effectSize> [2020-07-30]

van der Werff, E. and Steg, L., 2015. One model to predict them all: predicting energy behaviours with the norm activation model. *Energy Research & Social Science*, 6, pp.8-14.

Vytal, K., Cornwell, B., Arkin, N. and Grillon, C., 2012. Describing the interplay between anxiety and cognition: from impaired performance under low cognitive load to reduced anxiety under high load. *Psychophysiology*, 49(6), pp.842-852.

Wallace-Wells, D. (2019). *The uninhabitable earth: Life after warming*. Tim Duggan Books.

Wang, S., Hurlstone, M. J., Leviston, Z., Walker, I., & Lawrence, C. (2019). Climate change from a distance: An analysis of construal level and psychological distance from climate change. *Frontiers in psychology*, 10, p. 230. Retrieved from the supplementary material from <https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00230/full#supplementary-material>

Watts, J. (2019). *David Wallace-Wells on climate: 'People should be scared - I'm scared'*, Available at <https://www.theguardian.com/environment/2019/feb/03/david-wallace-wells-on-climate-people-should-be-scared-im-scared> [2020-02-24]

Wauters, B., Brengman, M. and Mahama, F., 2014. The impact of pleasure-evoking colors on the effectiveness of threat (fear) appeals. *Psychology & Marketing*, 31(12), pp.1051-1063.

Webster, V., Brough, P. and Daly, K., 2016. Fight, flight or freeze: Common responses for followers coping with toxic leadership. *Stress and Health*, 32(4), pp.346-354.

Wickersham, R.H., Zaval, L., Pachana, N.A. and Smyer, M.A., 2020. The impact of place and legacy framing on climate action: A lifespan approach. *PloS one*, 15(2), p.e0228963.

Wiederhold, M. and Martinez, L.F., 2018. Ethical consumer behaviour in Germany: The attitude-behaviour gap in the green apparel industry. *International Journal of Consumer Studies*, 42(4), pp.419-429.

- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 12(4), pp. 329–349.
- Witte, K. and Allen, M., 2000. A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health education & behavior*, 27(5), pp.591-615.
- Xu, Y. and Ramanathan, V., 2017. Well below 2 C: Mitigation strategies for avoiding dangerous to catastrophic climate changes. *Proceedings of the National Academy of Sciences*, 114(39), pp.10315-10323.
- Yamamoto, L. and Esteban, M., 2010. Vanishing island states and sovereignty. *Ocean & Coastal Management*, 53(1), pp.1-9.
- Yoder, E. A. (2010). Compassion fatigue in nurses. *Applied nursing research*, 23(4), pp. 191-197.
- You, M. and Ju, Y., 2019. Interaction of individual framing and political orientation in guiding climate change risk perception. *Journal of Risk Research*, 22(7), pp.865-877.
- Zehner, D. (2020). *Apocalypse Fatigue, Selective Inattention, and Fatalism: The Psychology of Climate Change*. Available at: <https://www.resilience.org/stories/2020-01-27/apocalypse-fatigue-selective-inattention-and-fatalism-the-psychology-of-climate-change/> [2020-04-20]
- Zhang, B., Ritchie, B., Mair, J. and Driml, S., 2019. Can message framings influence air passengers' perceived credibility of aviation voluntary carbon offsetting messages?. *Journal of Sustainable Tourism*, 27(9), pp.1416-1437.
- Zhang, Y., Wang, Z. and Zhou, G., 2013. Antecedents of employee electricity saving behavior in organizations: An empirical study based on norm activation model. *Energy Policy*, 62, pp.1120-1127.

Appendix

Appendix A. Manipulation check pilot study

Study. To ensure that the operationalisation in the four experimental texts properly represented the dependent variables and that identified confounders were kept constant, a manipulation check pilot study was carried out between 09 April 2020 and 20 April 2020. A total of $N = 56$ people between the age of 17 and 69 participated, with an average age of $M = 36.37$. Of those $N = 56$, $N = 22$ were male, $N = 34$ female. Participants were presented the texts and asked to state their perception of threat and distance conveyed in the text. The threat scale consisted of four items and was authored by the research team. The distance scale was taken from Wang, Hurlston, Leviston, Walker and Lawrence (2019), consisting of 18 items and eight subscales for geographic, temporal, social, hypothetical, social-temporal, geo-temporal, geo-hypothetical and social-hypothetical distance, see appendix B. The questions of all scales were mixed and randomised in order. Answers were measured on a seven-point Likert-scale. The survey was conducted online and consisted of three parts. In the first part, participants were presented the pre-survey in which they stated their perception of the threat and distance of climate change among sociodemographic data. In the second part, they were asked to read one of the four experimental texts including pictures that was randomly presented to them. In the last part, finally, they filled out the same survey used for the pre-intervention, stating their perception of threat and distance of climate change.

Statistics. A one-way ANOVA with repeated measures was carried out to test group differences in the change of perception of threat and distance of climate change between pre-and post-survey depending on the experimental condition. Before carrying out the ANOVA, the assumptions of outliers, homogeneity of variances and normal distribution were tested.

Results. For the distance, the main effect of time showed a statistically significant difference at the different time points, $F(1,50) = 6.219$, $p < .05$, partial $\eta^2 = .111$, but only for the whole group of participations, not in between groups $F(3,50) = .432$, $p = .731$, partial $\eta^2 = .025$. For threat, there was no significant time effect, neither were distance and threat significantly interacting. Despite these findings, the graphics looked promising (see Appendix C). Therefore, it was proposed that the sample was too small for significant findings, but that the operationalisation was promising.

Adjustments. As participants took $M = 2092.1$, $SD = 1347.7$ seconds ($M = 34.8$ minutes), the survey was longer and more complex than anticipated. Therefore, the texts were shortened from about 1.900 words to around 1.200 words. Following specific feedback, some pictures were exchanged - see appendix D. Both threatening conditions received a before-after picture to keep them similar. As multiple participants reported the pictures to be too positive, or, as one of them reported - "stock-imagy", all pictures were checked for believability and matching to each other. Not included in the first draft, after feedback and additional literature review, one example of people suffering or fighting climate change was added to the end of all four texts.

Appendix B. Distance scales and threat scale for pilot study

To measure the distance, the scale by Wang, Hurlstone, Leviston, Walker and Lawrence (2019) was used with the items shown in table A. For the threat scale, the following four items were formulated by the author of this thesis, loosely based on the Hamilton anxiety scale (1959):

1. "I am afraid of climate change"
2. "I believe that climate change is a threat to me"
3. "I am deeply worried about climate change"
4. "I believe that climate change will not affect me at all".

Table A. Distance scales by Wang, Hurlstone, Leviston, Walker and Lawrence (2019)

Subscale	Item
Geo	<ol style="list-style-type: none"> 1. I feel geographically far from the effects of climate change 2. Serious effects of climate change will mostly occur in areas far away from here 3. My local area will be affected by climate change 4. Climate change will have consequences for every region, including where I live
Social	<ol style="list-style-type: none"> 1. I don't see myself as someone who will be affected by climate change 2. Serious effects of climate change will mostly affect people who are distant from me 3. My family and I will be safe from the effects of climate change 4. I can identify with victims of climate related disasters
Temp	<ol style="list-style-type: none"> 1. Climate change is happening now 2. We will see the serious effects of climate change in my lifetime 3. If climate change is to happen, it will happen in the remote future
Soc-temp	<ol style="list-style-type: none"> 1. The region where I live is already experiencing serious effects of climate change
Geo-temp	<ol style="list-style-type: none"> 1. Climate change will not change my life, or my family's lives anytime soon
Hypo	<ol style="list-style-type: none"> 1. Climate change is virtually certain to affect the world 2. It is almost certain that climate change will change my life for the worse 3. It is extremely unlikely that climate change will affect me
Geo-hypo	<ol style="list-style-type: none"> 1. My local area is very unlikely to be affected by climate change
Social-hypo	<ol style="list-style-type: none"> 1. It is virtually certain that my family will be safe from the effects of climate change

Appendix C. Graphs pilot study

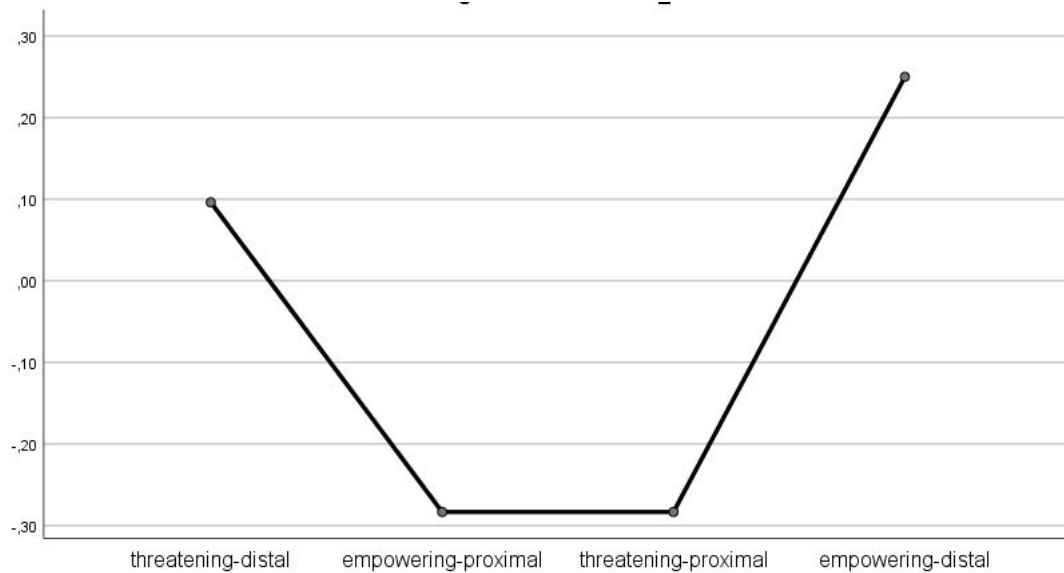


Fig. A. Mean difference between pre-intervention perception of geographical distance to post-intervention perception of geographical distance of climate change in all four experimental groups

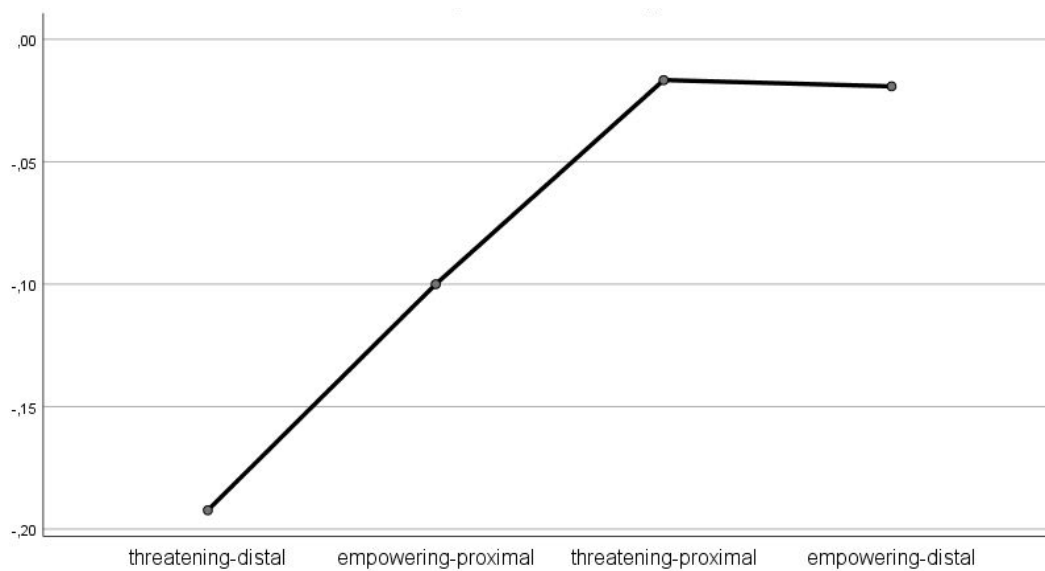


Fig. B. Mean difference between pre-intervention perception of social distance to post-intervention perception of social distance of climate change in all four experimental groups

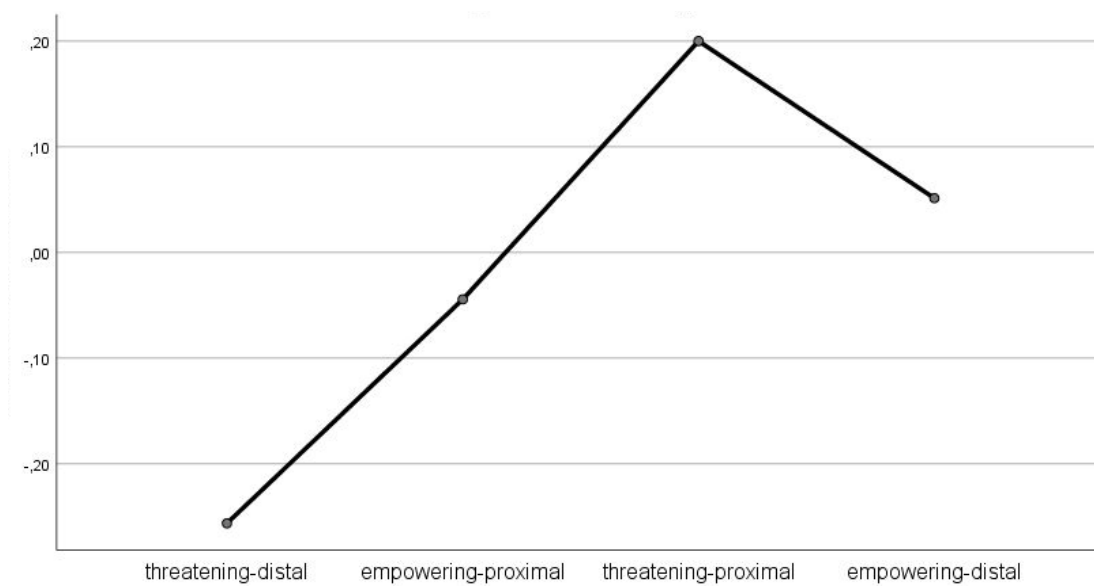


Fig. C. Fig. A. Mean difference between pre-intervention perception of temporal distance to post-intervention perception of temporal distance of climate change in all four experimental groups

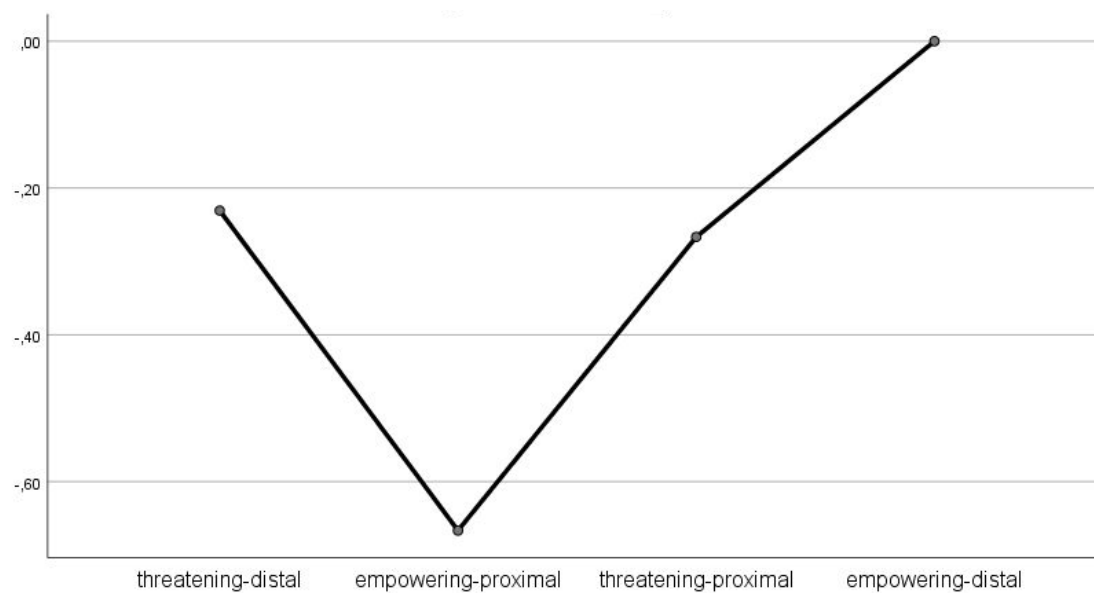


Fig. D. Fig. A. Mean difference between pre-intervention perception of tempo-social distance to post-intervention perception of geographical distance of climate change in all four experimental groups

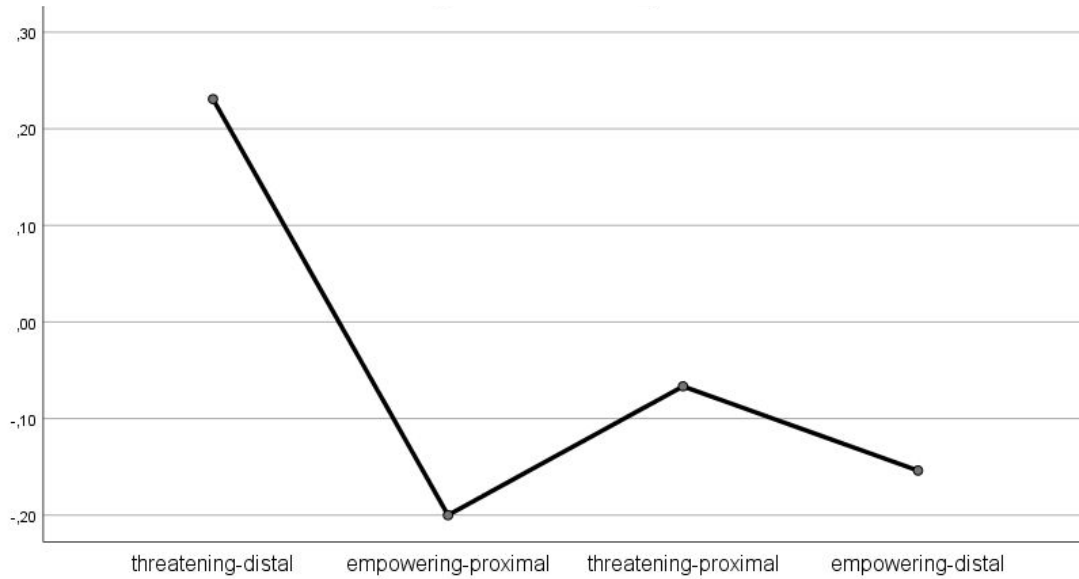


Fig. E. Fig. A. Mean difference between pre-intervention perception of geo-temporal distance to post-intervention perception of geo-temporal distance of climate change in all four experimental groups

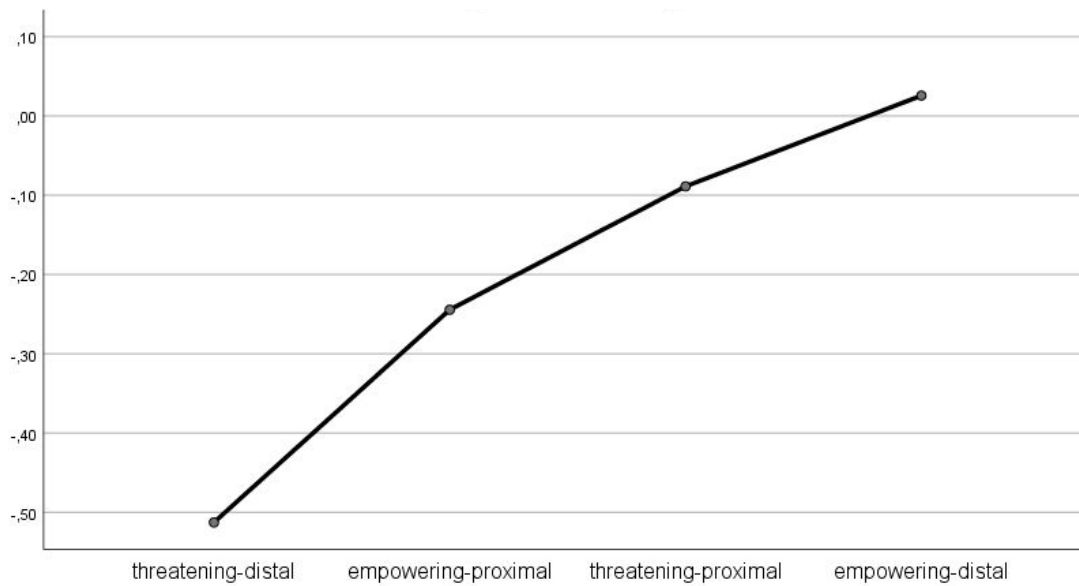


Fig. F. Fig. A. Mean difference between pre-intervention perception of hypothetical distance to post-intervention perception of hypothetical distance of climate change in all four experimental groups

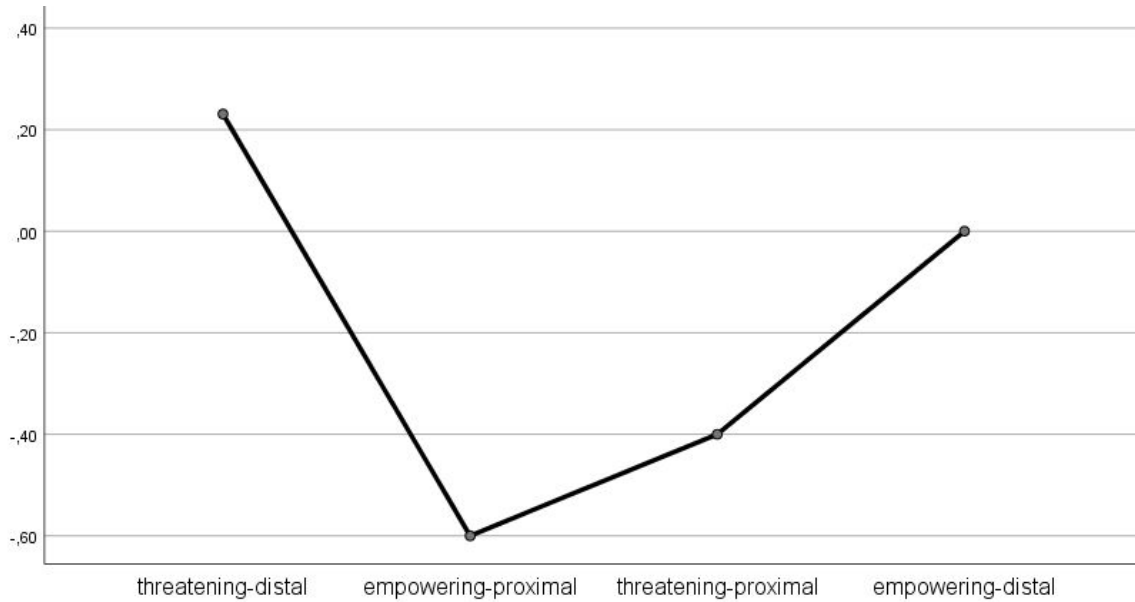


Fig. G. Fig. A. Mean difference between pre-intervention perception of geo-hypothetical distance to post-intervention perception of geo-hypothetical distance of climate change in all four experimental groups

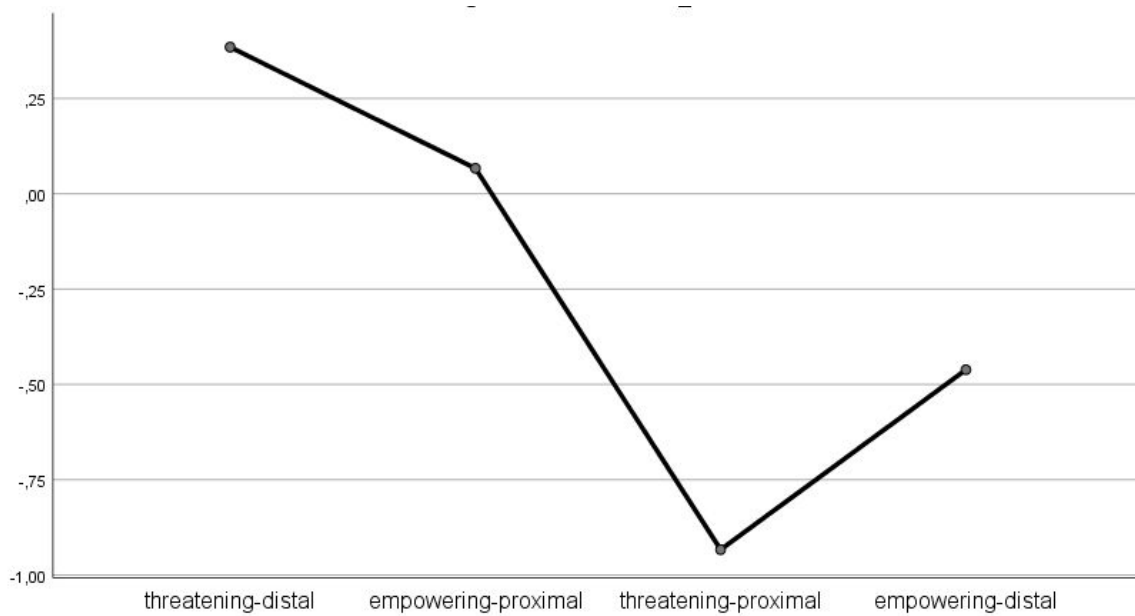


Fig. H. Fig. A. Mean difference between pre-intervention perception of social-hypothetical distance to post-intervention perception of social-hypothetical distance of climate change in all four experimental groups

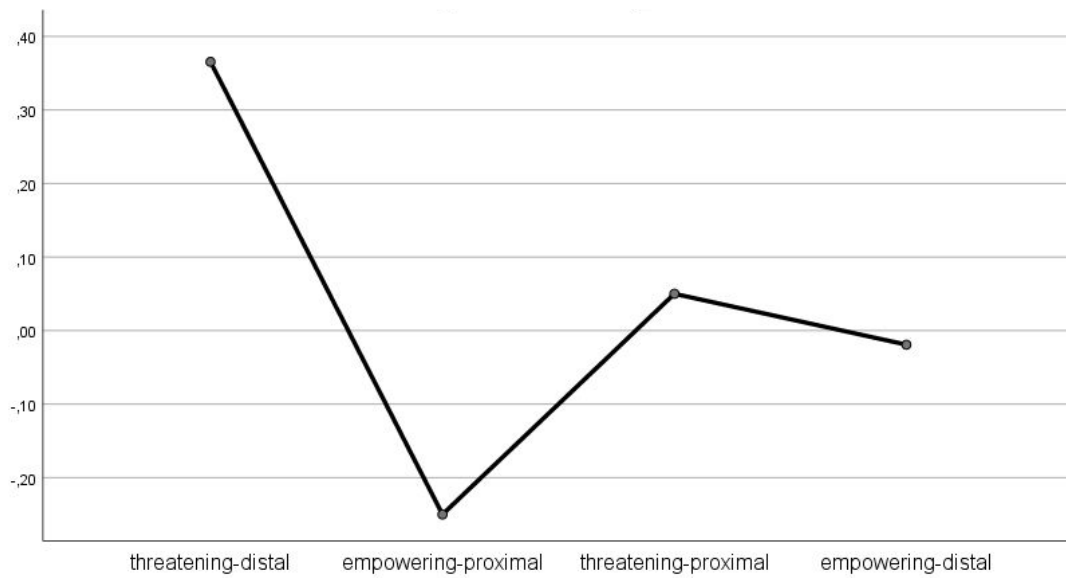


Fig. I. Fig. A. Mean difference between pre-intervention perception of the threat of climate change to post-intervention perception of threat of climate change in all four experimental groups

Appendix D: Responses of qualitative analysis of the pilot study

1. Comments from participants who did not perceive the pictures to be fitting:

<p>Story 1:</p> <ul style="list-style-type: none"> - No caption explaining what we see in the pictures. Source of the picture is not given. Stereotypical images of people living in the Amazonas and “poor people”, like the image of someone carrier wood. - Twee keer een plaatje van een ijsbeer, ik zou 1 keer zo'n plaatje gebruiken. Eventueel zou ik ook kijken of je meer cohesie kan creëren door plaatjes van dezelfde grote (verticaal en horizontaal) te gebruiken en met dezelfde scherpste en kleur intensiteit - no titels and descriptions at the figures and tables. The polar bear was sad, but the second time it got frustrating. - Pictures are fine, but not always fit to specify part of text. 	<p>Story 2:</p> <ul style="list-style-type: none"> - Pictures are fine, but not always fit to specify part of text. - E.g. the one with the crops. I know there was something about salt-resistant crops in the text, but the picture was too "everything's fine". - The pic öffnet hikers in snow landscape seemed out of context. The pic with hands around the earth needs to be lower in the text. Top many pics of Wadden, rather add a threatening pic of damaged nature. Btw: i didnt get ur point on Swedish forest Management - The picture of the students was a bit out of context. - Might be personal preference, but the images detracted from the text for me due to being a bit too stock image-y.
<p>Story 3:</p> <ul style="list-style-type: none"> - Most of them were photos, but there was one piece of digital art where there was a windmill under water. Usually such pictures are not seen in academic texts - Starts out like a weird holiday picture and ends with a sort of apocalypse style 	<p>Story 4:</p> <ul style="list-style-type: none"> - all the happy children - The colored world map gave the impression that in our region (US/Canada) everything is fine (green) - No speak of polar bears. No decriptions for each image so dont connect - both yes ans no

2. Answers to the question “ Is there anything we could have done to make this text feel more threatening/empowering to you”

<p>Story 1:</p> <ol style="list-style-type: none"> 1. More sad animals pics 2. no because it s too far from people 3. Add more graphs to show the acceleration of climate change; use numbers to underline the facts given 4. Deel te text op in kopjes mey subkopjes. Dan weet je als lezer beter waar het over gaat en wanneer je naar een nieuw aspect toe gaat
--

5. Perhaps some examples closer to home.. I guess, that defeats the other purpose though
6. I think if you describe the photos, tables and name them in your text it would make more impact in combination with your text.
7. Maybe give some more examples on how climate change is already affecting the world right now
8. I feel like people from developed countries won't feel as threatened by the text because it wasn't about their future and countries or things directly regarding them like the future of industries
9. Shorter worried sentences like: "Say NO to plastic or we are doomed!" under appropriate picture.
10. Plus 4 answers of "No"

Story 2:

1. there are no scientific definitions and the term "climate change" is an oxymoron because the climate has and always will change. climate is scientifically defined as a weather pattern for 30.
2. The text shorter and more humor
3. make it shorter, add catchy summarising Headlines
4. Shorter Text. I must admit that even I was supposed to read everything, I didn't...
5. Focus more on just 1 subject
6. I would have liked an ending with more concrete stuff I can do. Earlier in the text suggestions were made (less meat, shopping etc.) and that is the usual mantra, very focused on individual consumption patterns. You talk about a movement of people at the beginning of the text, and ask When will you join? at the end. So if want to join right away, how do I do it? Individual choices vs joining the collective. How can I do both. And maybe you even suggested how in the text, but I didn't perceive it.
7. Maybe some more examples of great initiatives, brands/people of groups that make behaviour change really visible and inspiring, that always really empowers me (such as fashion brands or food programs). I felt as if the information about negative consequences was larger than the empowering information, but could be me.
8. Too many times, u talk about hope. U would gain strength if u highlight innovation by inspiration. Hope sounds too much like dreaming when u are looking for action. Plus, u would help the reader to mentally connect nature protection with job chances and commerce. That might help get people on board who are less connected to nature.
9. In the beginning there were a lot of facts about the impact and consequences of climatic change. So I expected a discouraging text in the first, reminded by articles in journals. The empowering end surprised me. It felt good but the first negative feeling hasn't been overwritten. Maybe it's possible to begin the text differently, to transport an empowering feeling right from the start.
10. I understand the current outlook is somewhat bleak and I believe the text portrays this accurately, however some people might become pessimistic and will see no point to trying anymore. Perhaps focusing a bit more on the possibilities will help.
11. No suggestions
12. Perhaps make it more succinct, even though I am aware that is very difficult with something as far reaching and impactful as climate change.
13. Plus three answers of "No"

Story 3:

1. Some people are very scared of international migration caused by the climate change, but perhaps adding that to the list of threats would be distasteful
2. No, it made me anxious and thats precisely what is needed to make people act!
3. No, it made me anxious and thats precisely what is needed to make people act!
4. Showing more impressive pictures with details
5. Actually to me it is clear that climate change is a threat but i dont want to worry about it all the time. the contents are not new to me and they are scary. wouldnt know what to change on that text or what the purpose is.
6. Give examples of how individuals have been affected
7. Perhaps, emphasize the parts that deal with numbers, And scientific facts, to paint underline.
8. it is threatening enough
9. I mean the text could have been more correct. Using three points (...) or having mistakes in writing ("threes" should be "trees" in the text) makes the whole thing less believable. It is not threatening, if you find it hastily done, I would say.
10. Make it more realistic, felt a bit over the top for me
11. Don't know
12. Plus three answers of "No"

Story 4:

1. Headlines
2. Make it shorter and with more "targeted" sentences
3. Repeat the task at the page of the texts
4. You really talk about what other people are now doing to battle climate change: so you give hope. By specifying what I could do to battle climate change, you would have made me feel more empowered.
5. It's not 100% empowering, i am also more scared for the future despite hopeful initiatives
6. The text felt, at points, quite flippant about the consequences - "people with expertise in keeping water at bay (very topical metaphor there!) are going to become very popular" - what is this, high school? The text level seemed to change between technical and familiar, and made a lot of points, which made anything difficult to identify with. It was not clear if we were supposed to care more about the people or the corals. The grammar mistakes didn't help.
7. The text seemed empowering to me. However mentioning aspects one could change that are closer to my everyday life (driving car...) would maybe be more empowering for me.
8. Yes, first sentence is text should be that we can change world if we care enough
9. Give examples what everybody can do. The text gave the impression that everything is being taken care of.
10. Realistic solutions that I can take into my own life to help battle the climate change. Hard to connect when there are no footnotes, references. The information could be from anywhere
11. I think its to global or better to far away for espacially the people on the northern hemisphere. To me it seems to be more effective if the people can see/feel what climate change means to their environment the place where they live so reports for countries respectively regions if its a big country shows more effect. Another way could be to show the influence for example on product chains which could have their starting point far away but which ends e. g. on our table like plastics in seafood. Further more I think most people need simple advice what they can do

concretely an what is most efficient, so a list with concrete to dos which is ranked by efficiency would help much.

12. Plus two answers of “No”

3. Responses to the question: Is there anything we could have done to make the text more distant/close to you?

Story 1:

1. Don't talk about being coastal to Dutchies, cuz we relate
2. more “local” examples
3. Do not know actually what you mean with “make the issue feel more distal
4. It was too obvious to let me think it would not affect me. So maybe less obvious
5. Text is fine, maybe you need photo gallery with photos from many different places written countries names over every photo. I'm sure you can find such photos from almost every country in world.
6. Plus nine answers of “No”

Story 2:

1. more science. and that would let the reader know that climate change is constant, the climate in any region is a mere 30 year rolling data set that defines "normal".
2. The text shoryer
3. No, I'm already fully aware and the text emphasised this for me (I live in a dutch coastal city).
4. Not that I would know
5. It was OK.
6. No, that was just right.
7. I perceived Dutch coast and Swedish forest as the two local examples. I live in a big city far from both. Give me an example that hits right in the metropolitan home. And maybe you did, but I don't remember it now, so rephrasing it in that case.
8. Maybe even information or pictures about/from our hot summers in the Netherlands?
9. Include a real negative example again in the field of commerce: some if the fruit farmers in Germany cant produce anymore (apples close to Hamburg).
10. No you have chosen good examples to make that clear
11. No
12. No for people from Europe, and specifically the Netherlands, the text used appropriate examples. For people from different parts of the world perhaps less so
13. I felt the text had much more impact than the pictures. The pictures were more closely related to me geographically, but the thing that affected me most was the section on the North Sea Wadden sea. Maybe because I've lived near a coast all my life, maybe because I connect water and living conditions more closely than I do with for example mountains or forests.
14. See above.

Story 3:

1. All in all this goal was very well fulfilled.

2. Again, make it personal.
3. Verhalen bv showing a picture of climate change in my neighbourhood
4. for me from northern germany, the examples are well chosen and close. so the survey addresses to people around here and i feel closely connected to the issues
5. see previous
6. More pictures with climate changes, for example Glaciers Before and after, the same for the forests...
7. No, I guess that was done well. Maybe something related to your health or work even you are young would make it even closer to your life.
8. Well done, maybe target things even more close to me like certain cities or direct consequences slightly more graphic
9. Plus six answers of "no"

Story 4:

1. Speak about the climate change effects in Europe
2. I am deeply concerned about climate change so I think I am a bit biased here haha!
3. Do you want me to think that the climate issue is far away? Of course far away are big problems, but also here, as we see in the drought in holland last year
4. No, you succeeded in that (the imagery - virtually void of white people helped too).
5. Maybe mentioning less often migration factors since migration can lead to change in the social environment you live in although the environmental change is far away from you. It makes the climate change closer to me
6. No because we have a lot of basic knowledge about climate changes before reading this text
7. Give examples of changes in the area where your peer group lives
8. Shouldn't it be the other way round?
9. Plus five answers of "no"

Appendix E: Experimental texts and videos

E.1 Threatening distal

Youtube: https://www.youtube.com/watch?time_continue=1&v=noa5QbLWr3g&feature=emb_title



Polar bears are already suffering from the vanishing of their natural habitat. @ westernjournal

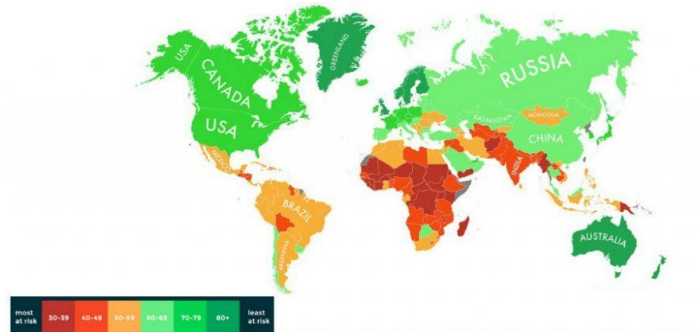
Years of research and global developments have shown: Climate change **may be** unstoppable. **Even worse**, Scientists assume that global temperatures could continue to rise for **decades** to come. And this data also shows who is **responsible** for this trend: [Pause] humans. Climate change is a result of humanity's hunger for fossil fuels and never-ending consumption. Now **planet earth** and all its inhabitants have to pay the price.



Logo of the Intergovernmental Panel on Climate Change @ IPCC

But it is still uncertain how exactly a future with a changing climate could look like. Some predictions come from the Intergovernmental Panel on Climate Change (**the IPCC**). The IPCC is a global organisation of more than 1.000 scientists that create models and forecasts on how our planet will change in the **next decades**. In their latest report, they predicted a global warming of at least 2.5°C - **in the next century**.

Any efforts to change this warming - even if they **could** be agreed upon - **may** already be out of reach. The world is getting hotter.



Global map of likelihood to survive global warming @ The Eco Experts

More than **1,5 billion humans** live in regions that have already seen a temperature rise greater than **1.5 degrees Celsius** - as is visible on a map of who is going to suffer most from climate change. **Their fate** could be sealed - because the planet **may already** have surpassed the point at which most ecosystems are able to bounce back.

To what extent **specific regions** will be affected depends on a multitude of different factors. The two most important ones could be **geographic location and resilience**. The impacts of climate change aren't spread **evenly** around the planet. Some regions, such as **small island states in the Southern hemisphere**, have already and could continue to be exposed to **more threats** than states which have smaller coastal lines or a more stable economy.

Even though warming could affect all of humanity, it will **most likely** be worse for those living in the lower latitudes and for disadvantaged people and communities. Calculations also show that the major threat is for **inhabitants of the Southern hemisphere**. But how exactly will their lives look in 50 or 100 years?



Flooded village in Bangladesh @ AFP/REHMAN ASAD

One topic analysed by the IPCC is sea level rise. Scientists predict that a global increase could reach **50cm** by the year **2100**. Sea level rise could pose a **serious threat to the coastal life** around the world. It can lead to an increased intensity of storms, flooding, and damage to coastal areas. Even life further inland could be threatened, because rising seas **can contaminate soil** and groundwater with salt. In many cases, the coastal region is where large population centers are located. Therefore, rising sea levels **could** lead to the displacement of millions of **people living close to the coasts**. Some states, as the previously mentioned island states, **may completely vanish under rising sea levels**.

Coasts are also where fragile wildlife habitats are located. Their endangerment does not just come from storms and floods, but **from human pollution itself**. Take coral reefs for example.



Coral reef before and after the bleaching @ HelloGiggles.com

Coral reefs are some of the most **biodiverse marine ecosystems** in the world. They are home to more than 4,000 species of fish and provide refuge and feeding areas for marine life. This is possible because corals have a symbiotic relationship with microscopic algae that live on them. They give the reefs their vibrant colors. But when sea temperatures rise, the coral reefs expel the algae and turn white. Once this happens the coral is deprived of energy and **dies**.

This mechanism, called **bleaching**, has become increasingly widespread in recent years. In **2006**, severe bleaching struck the southern part of Australia's Great Barrier Reef, the largest coral reef system in the world. In 2016, one third of the Great Barrier Reef died off in just one hot season. Another bleaching event in 2017 also devastated the reef. Together, these events have killed an estimated **half** of the magnificent Great Barrier Reef **in just two years**. If continued at this speed, all global coral reefs could vanish by the year **2050**.



Coral reef suffering from the impacts of climate change @ The Ocean Agency/XL Catlin Seaview Survey

Why is that important for humans? Because bad news for the ocean **could** also mean bad news for humanity. Many people's lives depend on the health of the ocean in front of their doors. About **25%** of fish species spend some part of their life cycle in reefs. Without these reefs, many species will go **extinct or lose a majority of their population**. Millions of people worldwide depend on fish as their major food source - or even work in the fishing industry. **All of them could** lose their livelihood if corals vanish. Consequently, the dying of reefs will leave millions of people in the Southern hemisphere starving. One **could** assume that it is safer to live further inland, not depending on the ocean.



Comparison of healthy, unaffected rainforest on the right and destroyed habitat to the left @ Victor Moriyama / Getty Images

But that is not true. The major source for food and work further inland in **many Southern hemisphere** countries are **forests**. And they are equally threatened by climate change. Scientists assume that over **one-third** of the Amazon rainforest could be killed **by even modest temperature rises**. Research, conducted by leading experts suggests that even a giant reduction in deforestation and carbon emissions could fail to save the South American jungle. Already under the most optimistic climate change scenarios, the destruction of large parts of the forest may be **irreversible**, and humans living with or from it could lose their lives and livelihoods. Even if all emissions **could** be cut to zero tomorrow, **a majority** of the forest may be **lost**. If humanity **could** contain warming to a 2°C temperature increase, which at the current state would be one of the **best-case scenarios**, 20-40% of the Amazon **could die off** within the **next 100 years**. A 3°C rise **could see 75%** of the forest destroyed over the following century, while a 4C rise could kill **85%**.

The reasoning behind it is simple: temperature increase leads to **droughts, fires and infertile land**. And that is - even more than the dying of coral reefs - a direct **threat to all life in them**.



Snake skeleton after wildfire @ AIZAR RALDES/AFP/Getty Image

The world's terrestrial biodiversity is concentrated in forests: they are home to **more than 80 percent of all species of animals, plants and insects**. When a fire destroys areas bigger than football fields all at once, the biodiversity on which humans depend for their survival also **disappears in the inferno**. Population centers located around it could not just lose their main source of food and work, but also suffer from massive health impacts. Wildfires produce harmful smoke which **can cause fatalities** and negatively impact millions of people. They produce fine particles which **can** even after short exposure lead to **serious illness and death**.



Indigenous people that have lived in harmony with nature for centuries have to watch how hundreds of years old forests lid up in flames @ rainforests.net

Some countries therefore will experience climate change way worse than others. Australia, for example, may have to fight battles at more than one front. They have to fear for both their coral reefs **and** their tropical rainforests. It is already now visible that seasons are changing. Extreme summer heat is increasing, while rain is becoming scarce. And it could get much worse in the future.

It is unclear how that may affect the Australians, but it is quite certain that it will be significantly worse for the numerous tribes of Aboriginal Australians who in many regions still depend on the health of the ecosystem surrounding them. Other than inhabitants of big population centers, they still live from and with nature. And they are powerless against this global phenomenon. The catastrophe that may be coming their way is neither caused by them nor can they do anything about it. If humankind proceeds to increase emissions and drive the global climate up, they could suffer from displacement, drought, hunger and disease. Conflicts among over food and water may arise. But there is absolutely nothing they can do about it.

E.2 Empowering proximal

Youtube: https://www.youtube.com/watch?v=9PA2frib-kk&feature=emb_title



*With changing seasons, ski resorts no longer have sufficient snow for winter paradise experiences
@ Max Whittaker/Getty Images*

Years of research and global development show: Climate change **is happening**. Scientists predict that global temperatures will continue to rise in the next years and in the decades to come. And this data also shows who is responsible for this trend: [Pause] We are. Climate change is a result of humanity's hunger for fossil fuels and never-ending consumption. Now **planet earth** and all its inhabitants have to pay the price.



Logo of the Intergovernmental Panel of Climate Change @ americanforests.org

Predictions of the impacts of this behaviour come from the Intergovernmental Panel on Climate Change (**IPCC**). The IPCC is a global organisation of more than 1.000 scientists that create models and forecasts on how our planet will change in the **next few years**. In their latest report, they predicted a global warming of at least 2.5°C - **in the next decade**.



European representatives at the United Nations Climate Conference in Paris, 2015 @ Presidencia de la República Mexicana

To stop this development, **192 countries** have signed a climate agreement in Paris in 2015. They committed to a global fight against climate change and to stop a temperature increase of more than 1.5°C. Critics argue that the goals are too low and that countries are not keeping their promises - but the fact is, that this agreement was an **important first step for a global, united fight** against climate change.

Not just **our leaders** are realising that climate change is an urgent threat. Many **Europeans** are worried how climate change will be affecting them in the future. Especially the young generation, as clearly visible in the Fridays for Future movement, initiated by the Swedish Greta Thunberg. Unfortunately, the extent to which specific regions will be affected depends on a multitude of different factors.

But one thing is for sure: even though **we in Europe** are less exposed than others, **we will** experience climate change. It will not just happen in some small island states on the other side of the world. It will **hit all of us**. People living far from the coast like for example in **Central or Eastern Europe** will be spared from storms and floods - but they will be exposed to more extreme temperature changes than **EU-citizens** living at the coast. In contrast, the countries with great coast lines will see less extreme temperatures, but will experience the raging power of the ocean.

As frightening as that may be, it is also an opportunity.



*If all people join hands and embrace cooperation, we can save this planet together @
empirecentrum.com*

An opportunity for all of humanity to combine forces. An opportunity for **all beings to fight together**. Together, **we are** a global community. Together, **we can** make a stand and beat climate change. **We, here in Europe**, have the resources to do that. We have the financial and scientific capacities, we have experienced staff and a new generation of researchers just finishing their education. **We have the potential** to help solve problems nearby and far away.

One topic we have to pay attention to is sea level rise. Scientists predict that a global increase could reach **50cm** by the year **2030**. Sea level rise poses a **serious threat to the coastal life** around the world. This increase means that water will flood whole regions, cities and agricultural land. Millions of people living at the coast will lose their homes and livelihoods. Some states, as the previously mentioned island states, **may completely vanish under rising sea levels**. One of them will be the Netherlands - because the country is **already located below sea level**.



Centuries of experience have told the Dutch how to protect their coast against the incoming water @ iamexpat.nl

But there is also good news. Most of **us**, especially in **Europe and in the young generations**, have recognised the threat. And it has already led to a boom of development and creative problem solving. For a new generation of Dutch people, climate change is considered neither a hypothetical nor an unbeatable challenge. Instead, **it's an opportunity**. The Netherlands has been constructing flood barriers for centuries and added a massive network of dams and levees to their coastal protection. Hundreds of years of trial and error **have put the Dutch ahead of the curve** when it comes to planning for rising waters.

Among their most impressive inventions are a number of architectural features that can temporarily store and redirect incoming water, as well as salt-resistant crops. Especially the latter ones are **truly an innovation**, because until recently, food production on salinized soil was considered impossible.

Similar creativity is applied to protect the ecosystems that could be destroyed by rising waters.



The Wadden Sea is a unique, precious ecosystem @ Meyer/ imago images

The endangered North Sea Wadden Sea, for example, was recognised as a **Unesco world heritage** site in 2009. Ever since, **national and international protection programs** have been launched to protect this unique habitat for fish and bird species. Gas drilling plans that would have put further stress on the ecosystem and threatened to destroy large areas for building and transportation traffic are under review after 14 Dutch villages united in their protest.



Researchers in Germany constantly supervise and evaluate their forests @ Thüringen Forest

Similar efforts are underway to protect **our European forests**, whose survival is threatened by changing climate. In Germany, a fund of 500 million Euro has been created to finance a forest rescue plan. Solutions range from introducing more robust tree species to naturally allowing forests to adapt to the new climate conditions. While the exact plan is still in development, this is **good news** and an excellent example for other countries to follow.

Europe also has an excellent infrastructure of universities and other research facilities. Forest management all over Europe is learning from the masters of ancient forest management to adapt to climate change and to prevent large-scale forest fires as in Sweden in 2018.

We have not only the resources to prevent forest fires, but we can go a lot further. We can research, learn, and understand how forests have to be designed to withstand the future.



The Fridays for future movement has set off a climate movement of a whole generation @ Christoph Soeder

And **we all can** contribute to its protection by making choices that consider the impacts of our behaviour. The road towards sustainability includes daily decisions of **every citizen** – and that includes you. When you travel, do you have to drive or fly or can you take a train? And is your journey really necessary? Can you choose a local energy provider, or a provider that only produces renewable energy? If you need new clothes, can you purchase them in a local charity shop? When you're shopping for groceries, do you look for regional brands or products? Have you tried out farmers markets to support your regional agriculture?

There are so many brands out there that already offer more sustainable choices to the conventional products. "People tree" and "armedangels" are only two brands among many that offer sustainable fashion. A quick internet search can show which provider in your region offers renewable energy - and where to find second hand shops in your city.



Humans are part of nature - so we also have to learn how to live with it - here at an urban gardening workshop @ insideart

In many big cities, there are also projects you can participate in that aim for a more sustainable lifestyle. In Berlin, for example, architect Van Bo Le-Mentzel is revolutionising affordable, sustainable urban living. His concept to reduce citizens' environmental footprint by offering apartments that are under 10 square meters big but still offer the daily necessities - important for fast growing, densely populated cities. These tiny apartments are only one example of how we can revolutionise urban living. Combined with urban gardening and community projects, Tiny apartment parks or villages of Tiny Houses can do what we lack most: reunite with nature. Rethink what is really necessary in life. Affordable housing. Minimalism. Local activism. It is so easy to fight, if we all stand together. When will you join?

E.3 Threatening proximal

Youtube: https://www.youtube.com/watch?v=_9rCxSplP6s&feature=emb_title



With changing seasons, ski resorts no longer have sufficient snow for winter paradise experiences - here in France @ Anne-Christine Poujoulat/AFP/Getty Images

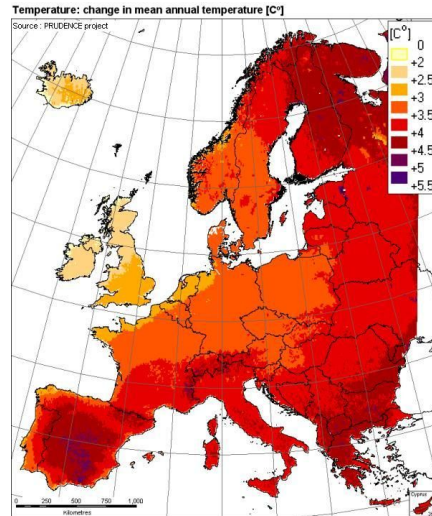
Years of research and global developments have shown: Climate change **is** unstoppable. **Even worse**, scientists assume that global temperatures will continue to rise **not just in the next few years** but for **decades** to come. And this data also shows who is **responsible** for this trend: [Pause] We are. Climate change is a result of humanity's hunger for fossil fuels and never-ending consumption. Now **planet earth** and all its inhabitants have to pay the price.



Logo of the Intergovernmental Panel of Climate Change @ americanforests.org

But it is still uncertain how exactly a future with a changing climate could look like. Some predictions come from the Intergovernmental Panel on Climate Change (the **IPCC**). The IPCC is a global organisation of more than 1.000 scientists that create models and forecasts on how our planet will change in the **next few years**. In their latest report, they predicted a global warming of at least 2.5°C - **in the next decade**.

Any efforts to change this warming - even if they **could** be agreed upon - **may** already be out of reach. The world is getting hotter.



Map of average temperature increase in the European countries due to climate change @ EU Science Lab

Millions of Europeans are already suffering from the impacts of climate change. Many have already seen temperatures rise greater than 1.5 degree Celsius. **Their fate** could be sealed - because the planet **may already** have surpassed the point at which most ecosystems are able to bounce back.

Even if we would cut all emissions to zero tomorrow, change **would be unstoppable**. A set of mechanisms will lead to systemic changes in ecosystems all around the planet. **We all** have long surpassed the point at which ecosystems can bounce back with the stress **we** are putting them under.

Climate change has long ago reached the **European Union**. It is **threatening life as we know it**. Even we Europeans, with all our resources and knowledge, **can't do anything** about it. Money will not buy us out of it. Even our world-leading universities will not be able to work out strategies and plans, because we simply do not know **even a fraction** of what will happen.

People living far from the coast like for example in **Central or Eastern Europe** will be exposed to extreme temperature changes, destroying agriculture and make some places inhabitable. In contrast, **Europeans living at the coast** will see less temperature changes, but will experience the raging power of the ocean.



Storm Ciara that hit the Dutch coast in February only gave a taste of what the future could bring @ I am Expat

Sea levels will rise by at least **50cm** by **2030**, which poses a **serious threat to the coastal life** in Europe. Storms and floods of an intensity never seen before will hit the **coasts of Europe**. **Millions of people** living close to the coasts will lose their homes and livelihoods as coastal regions will be taken by the sea and never resurface again. In the **Netherlands** alone, the number of people living below sea level will increase to more than **4 million** in the next few years. In the **UK** they will be **1.5 million** in the **UK**, in **Germany 1 million**. Water will move inland and flood villages, cities and agricultural land. Soil and groundwater will be contaminated by the incoming salt water.

If it was only wet feet to worry about, we could potentially do something about it. But the situation is **much worse...**



Thousands of dead fish at Mar Menor, Spain @ ambienteuropeo

Climate change has changed the acidity and salinity of the Baltic and North sea in the past years. That changed fish populations and will eventually lead to the **extinction** of key fish species essential to human survival. If this happens, the whole European fishing industry will have to fish in almost empty seas, unable to feed **millions of European citizens**.

One fragile ecosystem essential for many fish populations is the Wadden sea. But instead of saving it, local governments still allow gas extractions that destroy the unique habitat - to further feed **our** hunger for fossil fuels and never-ending consumption.



The future is dark for the North Sea Wadden Sea @ stocksy

Scientists predict it to be **destroyed by 2050**, if current global warming trends continue. If sea levels will continue to rise and the structure of the sea will be destroyed due to drilling and construction traffic, the

death of the tidal system becomes inevitable. This would have disastrous consequences, not just for the birds that would lose their havens if the flats disappeared.

And if that stress wasn't enough, huge gas companies are planning to extend these drills - supported by governments that are betting on natural gas during the transition period towards a fossil fuel-free society - but are instead supporting the growth of the fossil fuel industry. But **we cannot afford** to concentrate our efforts on the coast. Climate change will not attack at one front, it will surround us with challenges that **threaten everyone's survival**.



A forest destroyed by bark beetles - only a taste of what's coming @ BILD

One of these challenges will be to protect the European forests. Forests are some of the most valuable resources **we** have. They are one of the most efficient ways to reduce carbon dioxide emissions, in Germany for example they are able to absorb 62 million tonnes of CO₂ every year, which is about 7% of the country's total emission. Therefore, the death of trees is not only caused by climate change, but it is also causing climate change itself. If we lose parts of our forests, it will be difficult for us to compensate for this loss with other climate action measures.

Compared to the Wadden sea, they are even more essential for biodiversity and human survival. Forests are home to more than **80 percent** of all terrestrial species of animals, plants and insects. So, when forests disappear, the biodiversity on which humans depend for their survival also disappears.



Fire fighters have to helplessly watch how the forest is lit up in flames. There is nothing they can do to stop it now. @ LA Times

And they **are disappearing**. In the past, forests covered almost a third of the German landscape. But two summers of extreme heat and a plague of pests and timber diseases have reduced their area by the equivalent of **200,000** football fields. In **Sweden**, in 2014, forest fires destroyed **14.000** hectares. In 2018, they destroyed **25.000** hectares. The situation is getting worse by the minute - and it is doubtful that we can change anything, because forests are a slow ecosystem that take decades to recover.

In the next few years, we will experience forest fires as we saw them in Australia and California - but **at our doorstep**. Our sky will be clouded in smoke and ash. That does not just pose a threat to human health, but - if it happens several years in a row - this will lead to large-scale failed harvests and therefore, hunger. In only a few years, we will see a scale of world hunger that is unimaginable from where we stand now. But this time, we are not going to watch from another continent, we will be right in the middle of it.



This is how many cities will look like in the future - here the fish market in Hamburg @ imago images/Jannis Große

Hamburg, for example, is already fighting climate change at multiple fronts. While their dams and water barriers are already barely able to contain the increasing water, their forests are haunted by droughts and pests. In only a few years, Hamburg's inhabitants will be trapped between not just two but many fronts of threats moving slowly but constantly towards them.

The most frightening thought is: Many of these threats we do not even know about yet.

Climate scientists at the university of Hamburg are trying to prepare the city for what is coming. But they are not very optimistic that we can stop what is already in motion. Instead, they suggest, we need to concentrate on preventing even worse from happening by stopping emissions and pollution now.

But we have known about climate change for years, and nothing has changed yet. So the question we would really need the scientists to answer is: How? And: is it not too late anyway?

E.4 Empowering distal

Youtube: https://www.youtube.com/watch?v=rDYOIIE4nYc&feature=emb_title



One of the key symbols of climate change: polar bears in their shrinking habitat @ sciencefriday

Years of research and global developments have shown: Climate change **may be** unstoppable. **Even worse**, Scientists assume that global temperatures could continue to rise for **decades** to come. And this data also shows who is **responsible** for this trend: [Pause] humans. Climate change is a result of humanity's hunger for fossil fuels and never-ending consumption. Now **planet earth** and all its inhabitants have to pay the price.



Logo of the Intergovernmental Panel on Climate Change @ IPCC

But it is still uncertain how exactly a future with a changing climate could look like. Some predictions come from the Intergovernmental Panel on Climate Change (**the IPCC**). The IPCC is a global organisation of more than 1.000 scientists that create models and forecasts on how our planet will change in the **next few decades**. In their latest report, they predicted a global warming of at least 2.5°C - **in the next century**.



The South African representative signing the Paris climate agreement @ Xinhua / Alamy Stock Photo

To stop this development, **192 countries** have signed a climate agreement in Paris in 2015. They committed to a global fight against climate change and to stop a temperature increase of more than **1.5°C**. Critics argue that the goals are too low and that countries are not keeping their promises - but this agreement was an **important first step for a global, united fight** against climate change.

Not just **world leaders** are realising that climate change is an urgent threat. Many **people around the globe** are worried how climate change will be affecting them in the future. Unfortunately, the extent to which **specific regions** will be affected depends on a multitude of different factors. The two most important ones could be **geographic location and resilience**. The impacts of climate change aren't spread **evenly** around the planet. Some regions, such as **small island states in the Pacific area**, have already and could continue to be exposed to **more threats** than states which have no coastlines or a more stable economy.

Therefore, even though warming could affect all of humanity, it will **most likely** be worse for those inhabitants **of the Southern hemisphere** and for disadvantaged people and communities. As frightening as that may be, it is also an opportunity.



The education of a climate-conscious next generation could be a great chance for many countries @ PhillyinthePhilippines (YouTube)

As **they** have been exposed to the raging ocean with all its different moods for centuries, the people most threatened by climate change also already have the greatest resilience. And: **they** have **a chance** to learn from the mistakes of high-income countries. If governments understand their chance and invest in

education and green development, the so-called developing countries could be the **world leaders of tomorrow**.

One threat they are already experienced in dealing with is sea level rise. Scientists predict that a global increase could reach **50cm** by the year **2100**. Sea level rise **could pose a serious threat to the coastal life** around the world. It can lead to an increased intensity of storms, flooding, and damage to coastal areas. Even life further inland could be threatened, because rising seas **can contaminate soil** and groundwater with salt. Some states, especially in **South-East Asia**, **may completely vanish under rising sea levels**.



Villages in French Polynesia show how the people here have long adapted to living with nature @ zruvalcaba via stock.xchng

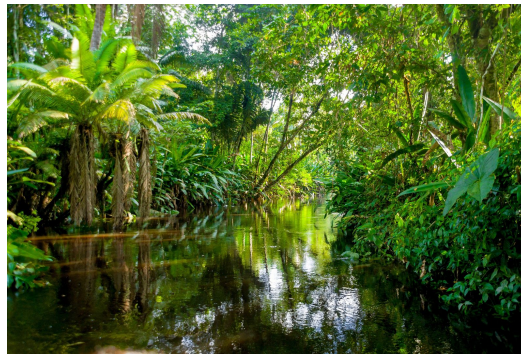
But on the bright side, this threat has already led to a **boom of development** and creative problem solving centuries ago. In some of these states, climate change is considered neither a hypothetical nor an unbeatable challenge. Instead, it's an **opportunity**.

As sea levels rise, people with expertise in keeping water at bay are going to become very wanted. Many of them will likely come from South-East Asia. **Polynesia**, for example, has been building flood-safe houses for centuries. Hundreds of years of trial and error, plus a nationwide acknowledgment that climate change is a very real thing, have put them ahead of the curve when it comes to planning for encroaching waters.



Coral researchers are carefully monitoring the health of reefs around the world @ Rachel Hancock Davis/TNC

More scientific methods are employed to save the **coral reefs** that are threatened by climate change. **Around the world**, scientists are trying to come up with ways to save reefs. Efforts include identifying types of coral that are particularly resilient, and pioneering ways to quickly regrow coral so that dying reefs can be repopulated. Scientists involved in this work have achieved impressive results: in some cases they've recreated coral organisms that originally took a century or two to grow in just a few years. Their efforts are supported by governments that restrict traffic and tourism in corals to protect the remaining ones as best as possible. Together, these and other projects **may** be able to **mitigate coral dying**.



Almost too beautiful to be true: The Amazon rainforest @ Fotos593/Shutterstock

Similar efforts have to be made to protect the **Amazon rainforest**. Research predicts that it could vanish in the next century if deforestation and carbon emissions continue to rise at current speed. But there is hope. To help the forest recover, organisations like the Rainforest Trust have already saved **20 million acres** from being cut down.

Rainforests may contain the best technology to fight climate change. Trees absorb carbon and other gasses from the atmosphere and therefore increase air quality and inhibit the dangerous consequences of the gasses set free. They are essential parts of the ecosystem they are set in, because they provide shade and keep the ground and all the biodiversity living from it moist and protected. Therefore, huge efforts are put in place to understand and support the health of the rainforest and its animals, and to lower stress through deforestation and large-scale logging.

This way, similar to coral reefs, the forest **may have a chance** to develop resilience against the impacts of climate change. And similar to reefs, they are supported by a team of scientists who put all their effort into the development of sustainable forest support.



Controlled burns can contain wildfires @ Auscape/Universal Images Group/Getty Images

They are joined by local action among the inhabitants of the endangered areas. Many people are becoming conscious about their polluting behaviour and are questioning their choices regarding their impact. For example, many forest managers are now implementing practices of controlled burns that can contain forest fires to certain areas. Additionally, small and big fishing companies are returning to practices that monitor fish population and don't fish more than acceptable without endangering their overall survival.

Many locals understand that they can contribute to this protection: by not littering, e.g. by leaving trash behind that can result in wildfires, by reducing car and plane travel, by eating more regionally and sustainably grown food and reducing meat consumption.



Change in local action is supported by big companies such as People Tree, that produce Fair Fashion in India - here with workers and model Lauren Gold, model and ambassador for People Tree @ People Tree

But there are limits to how much individuals can change. Many depend on incomes from big companies - in tech, fashion or food industries. Therefore, the key to large-scale change may be the support of companies who have changed their polluting practices, such as the sustainable Fair Trade brand People Tree. Founded in 1991, People Tree has revolutionised the fashion market. They not only concentrate on fair wages, good working conditions, transparency and gender equality, but also implement environmental best practices to lower the environmental footprint of their production. This way, they are making a change to battle climate change.

Such efforts should be a priority for everyone. If all big companies supported local action like People Tree does, whole regions could be inspired and empowered to realise the value of their environment and could embrace its protection. That, of course, is a huge and difficult task that may take several more decades to accomplish. But the good news is: there already are people out there, who have pledged their lives to the fight. And they are gaining numbers by the minute.

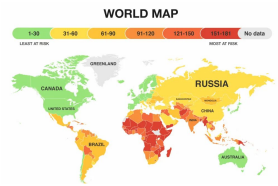

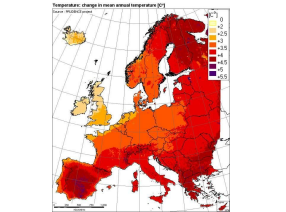

Appendix F. Pictures and subtitles including copyright

Threatening distal	Empowering proximal	Threatening proximal	Empowering distal
			
Polar bear habitats are vanishing @The New Yorker	Real snow: A thing of the past? @ Max Whittaker/ Getty Images	Real snow: A thing of the past? @ Anne-christine Poujoulat/AFP/ Getty Images	Polar bears, a symbol for climate change @ sciencefriday

The first image was supposed to convey immediately the distance as well as the threat of climate change. Therefore, a polar bear in either good condition or displaced from their natural habitat was shown in the distal conditions. The proximal conditions showed sky resorts without snow, either with a single person still in a good mood (empowering) or in a darker mood, back to the camera, a family that does not have much snow left.

			
Logo of the Intergovernmental Panel on Climate Change @IPCC	Logo of the Intergovernmental Panel on Climate Change @ americanforests.org	Logo of the Intergovernmental Panel on Climate Change @ americanforests.org	Logo of the Intergovernmental Panel on Climate Change @IPCC

The IPCC logo was only controlled for distance: either showing a local mountain and some forest crowns, or glacier ice and penguins. One additional problem was that the logos were different in size. We reduced that bias by cropping the logo with penguins and glaciers in the final video.

			
---	---	--	---

World map of climate
change risk
@ Intelligent Living

European representatives at
the Climate Conference
@ Presidencia de la
Republica Mexicana

Average temperature
increase in Europe
@ EU Science Lab

The South African
representative signing the
Paris climate agreement
@ Xinhua/ Alamy Stock
Photo

The two threatening conditions showed maps of the consequences of climate change, either worldwide (distal), especially emphasizing that Europe would not be badly hit, or for Europe specifically, with only red flags everywhere. The empowering conditions, in contrasts, showed different moments and actors in the Paris climate conference. The proximal condition showed European representatives, the distal condition the South African representative.



Flooded village in
Bangladesh
@ AFP/Rehman ASADV

Cooperation will save the
planet!
@empirecentrum.com

Storm Ciara in February
2020
@ Iamexpat.com

Education could be key to
combat climate change
@ PhillyinthePhilippines
(YouTube)

For this picture, it was more difficult to find similar motives for at least the two similar conditions. This is due to the texts deviating significantly from this point on. Therefore, the content was instead emphasised with pictures that underlined the message - flooding in Bangladesh as a threat to coastal life around the world, joined hands around the planet as a symbol of hope that included every one of us, a thunderstorm over the Dutch coast to show that severe weather events are coming closer to Europe and finally a picture of a school in the Philippines as an example of hope coming from the other side of the planet.



Coral reefs before and after
the bleaching
@ HelloGiggles.com

Flood barriers at the Dutch
coast
@ iamexpat.nl

Dead fish on a beach in
Cornwall (UK)
@ Insider

Flood safe architecture in
French Polynesia
@ zruvalcaba via
stock.xchng

For this picture, both empowering conditions showed flood-adaptation landscape/ architecture to give

examples on how people either in The Netherlands or in French Polynesia. In contrast, the threatening conditions showed dead fish and a dead coral reef. The latter two pictures could not be aligned in content because there are no coral reefs in Europe. The control-after picture was controlled as being incorporated in both of the threatening texts (even though not at the same spot), not in the proximal ones.



Bleached coral reef
@ The Ocean Agency



The Wadden Sea
@ Meyer / Getty Images



The Wadden Sea
@stocksy



Researchers monitoring coral reefs
@Rachel Hancock Davis/
TNC

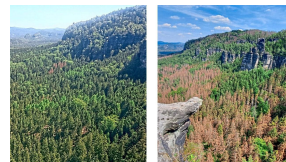
For this picture, it was possible to find four pictures that reflected the conditions exactly. Except from the coral reefs showing humans, which was impossible to find for the Wadden Sea, all four pictures transport the threat or empowerment through use of colours and sunlight either in coral reefs (distal) or the Wadden Sea (proximal).



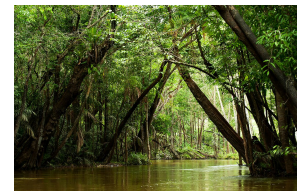
Destroyed vs. healthy
rainforest
@Victor Mariyama / Getty
Images



Researcher assessing the
health of the forest
@ Thüringen Forst



A forest before and after a
bark beetle pest
@ BILD



The Amazon rainforest
@ Fotos593/ Shutterstock

Constant to this picture in all four conditions was the subject of forest. In the proximal conditions, a German forest after the beetle pest (threatening condition) or a researcher aiming to protect it (empowering condition). The distal conditions, in comparison, showed the Amazon rainforest either after massive deforestation (threatening condition) or in it's healthy beauty (empowering condition).



Snake skeleton after wildfire
@ AIZAR RALDES/AFP/ Getty Images



Young protesters at the Fridays for Future demonstration
@ Crhistoph Soeder



Fires almost too big to fight
@ LA Times



Local activism to prevent forest fires @ AUscape/ universal Images Group/ Getty Images

Again, with the heavy deviation of the texts depending on the condition, these pictures are very different. Both threatening conditions were at this point talking about the consequences of forest fires. The empowering conditions, on the other hand, showed actions of climate activism and hope. It was chosen to use pictures of the Fridays For Future protestors, as most Europeans had that movement close to their door. In contrast, a number of African activists were shown that picked up trash for fire prevention (distal condition).



Indigenous people are suffering from climate change
@Iwgia



Tiny living workshop in Berlin
@insideart



Flooded fish market in Hamburg
@ imago images/ Jannis Große



Fair fashion in India created by People Tree
@ People Tree

The final pictures were chosen to sum up the texts and match the examples of either people or cities/companies suffering from or working against climate change.

Appendix G. Climate Change Attitude Survey (CSSA) by Christensen & Knezek (2015)

The survey consists of a total of 15 questions. The items measuring climate change attitude change were:

1. I believe our climate is changing
2. I am concerned about global climate change

3. I believe there is evidence of global climate change
4. Climate change has a negative effect on my life.
 - a. Originally, the item was formulated: “Climate change has a negative effect on our lives”, but formulation was adjusted to this study in which the participants were supposed to see themselves as individuals without an induced group context.
5. Global climate change will impact future generations
6. Human activities cause global climate change.
7. I think most of the concerns about environmental problems have been exaggerated.

The items measuring climate change self-efficacy were:

8. The actions of individuals can make a positive difference in global climate change
9. We cannot do anything to stop global climate change.
10. I can do my part to make the world a better place for future generations.
11. Things I do have no effect of the quality of the environment.
12. It is a waste of time to work to solve environmental problems.
13. There is not much I can do that will help solve environmental problems.

Appendix H. Results of the manipulation check t-tests

First, the perception of doom from the videos was checked. There were 64 participants in the empowering conditions (consisting of the experimental groups distal-empowering and proximal-empowering) and 64 participants in the threatening conditions. An independent-samples t-test was run to determine if there were differences in the participants perception of doom in the threatening and empowering conditions. There were no outliers in the data, as assessed by inspection of a boxplot. The perception scores for doom were not normally distributed, as assessed by Shapiro-Wilk's test ($p = .002$), but as independent samples t-test are robust against violation of the normality criterion, it was proceed as planned. There was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .073$). The manipulation was perceived as more threatening by participants of the threatening conditions ($M = 5.59$, $SD = 1.48$) than in the empowering conditions ($M = 4.37$, $SD = 1.68$), the difference was statistically significant, $M = 1.21$, 95% CI [.66 to 1.77], $t(126) = 4.337$, $p = .00$. Therefore, the doom manipulation was assumed to be successful.

The distance variables were checked both as a sum variable and as separate variables. In each of these analyses, the two distal conditions (distal-empowering and distal-threatening) were compared to the two proximal conditions (proximal-empowering and proximal-threatening). For the assessment of geographical distance, the boxplot showed no significant outliers and the two groups consequently consisted of 64 participants each. Neither the normal distribution as assessed by the Shapiro-Wilk's test ($p = .00$) nor the homogeneity of variances, assessed by Levene's test ($p = .00$) were given. Therefore, the results could not be interpreted.

The analysis of temporal similarly had no outliers, and homogeneity of variances ($p = .275$) but was not normally distributed in either the proximal ($p = .00$) or distal conditions ($p = .00$). The independent samples t-test showed that manipulation was perceived as more temporally distant by participants in the distal conditions ($M = 2.46$, $SD = 1.53$) than in the proximal conditions ($M = 2.37$, $SD = 1.35$), but the difference was not statistically significant, $M = .09$, 95% CI [0.41 to .59], $t(126) = 0.367$, $p = .714$. Consequently, the manipulation of temporal distance was not considered successful. The same applies for hypothetical distance, after one significant outlier of each group, as identified in the boxplot, was removed from analysis. Normal distribution was neither given in the proximal ($p = .00$), nor in the distal conditions ($p = .00$). The Levene-test showed equality of variances ($p = .717$). Contrary to the manipulation intention, the videos in the distal conditions ($M = 1.71$, $SD = 1.00$) was not perceived as more distant than in the proximal conditions ($M = 1.87$, $SD = 1.08$), and again the difference was not statistically significant, $M = 0.15$, 95% CI [0.21 to .52], $t(126) = 0.851$, $p = .396$.

Finally, social distance had no outliers, but was not normally distributed in either the proximal ($p = .00$) or distal ($p = .00$) conditions. Homogeneity of variances was given ($p = .002$) and the manipulation was perceived as more distant by participants in the distal conditions ($M = 3.78$, $SD = 1.73$) than in the proximal conditions ($M = 2.45$, $SD = 1.33$) as expected. This difference was statistically significant, $M = 1.32$, 95% CI [0.78 to 1.86], $t(126) = 4.86$, $p = .00$.

Appendix I. Results of the non-significant variables of the manipulation check

The assumption check for temporal distance revealed three significant outliers that were removed from further analysis. Again, the assumption of homogeneity of variances assessed by Levene's test was violated, $p = .000$. The Welch ANOVA showed no significant differences between the four experimental groups, Welch's $F(3, 64.733) = 2.162$, $p = .101$. The Games-Howell test showed not one significant difference between any of the experimental groups, $p > .05$, see table C. Box plot analysis for social distance revealed no outliers, but homogeneity of variances was violated. There were no statistically significant differences in the perception of social distance for the four experimental groups, Welch's $F(3, 67.644) = 10.411$, $p = .000$. For the analysis of hypothetical distance, two outliers were removed after visual inspection of the box plots. Homogeneity of variances was given, Levene's test showed $p = .561$. The ANOVA showed no statistically significant differences of the perception of hypothetical distance between the four experimental groups, $F(3, 122) = 1.286$, $p = .282$.

Table C. SPSS output table for Games-Howell test comparing geographical distance in the four experimental groups. The mean difference is significant at the 0.05 level.

Story	With story	Mean Difference	Standard Error	Sign.	Confidence interval	
					Upper	Lower
Threatening distal	Empowering proximal	2.20588	.37738	.000	1.2062	3.2055
	Threatening proximal	2.26078	.37781	.000	1.2595	3.2621
	Empowering distal	.62745	.44706	.502	-.5529	1.8078
Empowering proximal	Threatening distal	-2.20588	.37738	.000	-3.2055	-1.2062
	Threatening proximal	.05490	.28295	.997	-.6922	.8020
	Empowering distal	-1.57843	.37039	.001	-2.5626	-.5942
Threatening proximal	Threatening distal	-2.26078	.37781	.000	-3.2621	-1.2595
	Empowering proximal	-.05490	.28295	.997	-.8020	.6922
	Empowering distal	-1.6333	.37082	.000	-2.6192	-.6475
Empowering distal	Threatening distal	-.62745	.44706	.502	-1.8078	.5529
	Empowering proximal	1.57843	.37039	.001	.5942	2.5626
	Threatening proximal	1.6333	.37082	.000	.6475	2.6192

Table C. SPSS output table for Games-Howell test comparing threat in the four experimental groups. The mean difference is significant at the 0.05 level.

Story	With story	Mean Difference	Standard Error	Sign.	Confidence interval	
					Upper	Lower
Threatening distal	Empowering proximal	1.44118	.38194	.002	.4336	2.4487
	Threatening proximal	.05071	.33122	.999	-.8241	.9256
	Empowering distal	1.20588	.39172	.016	.1694	2.2424
Empowering proximal	Threatening distal	-1.44118	.38194	.002	-2.3656	-.4153
	Threatening proximal	-1.39047	.36885	.002	-2.3656	-.4153
	Empowering distal	-.23529	.42402	.945	-1.3551	.8845

Threatening proximal	Threatening distal	-.05071	.33122	.999	-.9256	.8241
	Empowering proximal	1.39047	.36885	.002	.4153	2.3656
	Empowering distal	1.15517	.37897	.018	.1498	2.1606
Empowering distal	Threatening distal	-1.20588	.39172	.016	-2.2424	-.1694
	Empowering proximal	.23529	.42402	.945	-.8845	1.3551
	Threatening proximal	-1.15517	.37897	.018	-2.1606	-.1498

Appendix J. Extensive chapter on response mechanisms to fear appeals

A variety of studies has dealt with the effect of threatening messages on the communication target. Fear and alarmism are motivational states to protect against danger, motivating an individual to remove the danger (Rogers, 1983). As such, they can even have societal impacts. The launch of the book “Silent Spring” by Rachel Carson in 1962, for example, led to the establishment of the United States Environmental Protection Agency (US EPA; Wallace-Wells, 2019).

In psychological literature, messages that use fear to induce attitude or behaviour change, are called fear appeals (Tannenbaum et al., 2015). Since early studies of fear appeals from the 1970s, decades of research have not clearly identified the effectiveness and dynamics of fear appeals (Peters, Ruiter & Kok, 2013). The only consensus is that specific key requirements have to be fulfilled for them to be effective (Rogers, 1975). Which exactly those are remains up for debate. Some researchers suggest that the threat has to be perceived as harmful to the individual (Floyd, Prentice-Dunn & Rogers, 2006; Rogers, 1975). Second, the likelihood of the occurrence of the event has to be perceived as high (Maddux & Rogers, 1983; Maddux, 1995; Rogers, 1975). Third, fear alone does not change behavior. Instead, it has to be combined with the perceived effectiveness for a coping response (Rogers, 1975). And finally, added to the protection motivation theory in 1983, the communication target has to have a self efficacy expectancy - they have to expect that they are able to perform the recommended coping response (Maddux & Rogers, 1983; Peters, Ruiter & Kok, 2013). Different studies propose that especially the last two

components are crucial in order to avoid not numbing the communication target but rather making them to act in the desired way (Maddux & Rogers, 1983; Tuner, Day & Cras, 1989). These two factors are also described in the Theory of Planned Behaviour as mentioned in the Introduction, which assumes that attitude towards the subject (e.g. is it likely to occur, is its harmful?) as well as the perceived behaviour control (perceived effectiveness and self-efficacy) influence the emergence of intentions and behaviour (Ajzen, 1985). There is empirical support for both factors; especially self-efficacy is a key determinant of the occurrence of change in attitudes and behaviours depending on judgements of the situation, the recommended behaviour and the self, as described in the self-efficacy theory of Bandura (1977). Some pro-environmental behaviour change studies even go as far as to describe self-efficacy phrasing as more effective than fear phrasing (Hunter & Röö, 2016).

Support for fear appeals comes from evolutionary science and psychology. More specifically, researchers have proposed that every individual responds to a stress induction in one out of two ways: flight or fight (Cannon, 1994). Flight or fight is a basic survival mechanism that lets an individual react quickly and with high efficiency to a threat or danger (Suresh, Latha, Nair & Radhika, 2014). Fight/flight is one of the oldest psychological theories going back to Walter Cannon in 1915. It has found support in many studies from the last century (Cannon, 1994). Whether an individual reacts to a threat with flight or fight depends on the evaluation of the self and the effectiveness of one's action (O'Leary & Brown, 1995); more specifically the evaluation of their abilities and competencies. This would support the self-efficacy theory described on the previous page (Zehner, 2020). The fight-response is a result of perceived high self-efficacy to defend against the threat, whereas the flight-response is a result of perceived low self-efficacy. Both responses are mediated not only by evaluations of situation and self, but also by the personality of the threatened individual, as shown in animal studies (Rupia, Binnin, Roche & Lu, 2016).

The literature also suggests that the two-mode-response (flight and fight) is not covering the variety of human stress responses. For example, Taylor, Kellin, Lewis, Gruenewald, Gurung and Updegraff (2000) suggest two other components: tend and befriend. Tend and befriend is not understood as an addition to the original model, but as a different gender-related perspective. (Taylor et al., 2000). Different studies argue for and find empirical support for flight-and-fight being a typically male response, whereas females respond with tend-and-befriend (Nickels, Kubicki & Maestripieri, 2017; Taylor et al., 2000; Turton & Campbell, 2007). In tend-and-befriend theory, tending response is assumed to involve nurturing activities for the protection of the self and close others. The befriend-response, which includes the formation and maintenance of social ties, may aid in adapting to the threat (Taylor et al., 2000). This is in contrast to the flight-or-fight perspective as it is not directed against the possible threat but at the possible victims of the threat. A principal components factor analysis done by Turton and Campbell (2007) showed that these four factors explain 53.5% of the total variance in stress responses.

As this leaves 46.5% unexplained, Bracha (2004) suggests a five-component-model, leaving out tend and befriend and instead include freeze, flight, fight, fright and faint. Support for the freeze-reaction comes from general coping research (Skinner, Edge, Altmann & Sherwood, 2003) as well as applied research into, for example, the responses to toxic leadership (Webster, Brough & Daly, 2016). Other studies have added a sixth component: flag (Sletzer, 2015). Opposing the original two-mode or even the four-mode response, this six-component-model is not suggesting a two-level procedure of a stressor leading to one response action, but instead suggesting a step-by-step-process response. According to Myricka and Brand (2016), this cascade model explains not only initial behavioural but neurological adaptations to increasing levels of threat. The model describes that all living beings first react to a threat with a moment of freezing and analysing the danger, then decide to either fight or flight. If both are not possible, they will fright and hope that the threat will pass. This state is associated with a high degree of arousal. If still exposed to the

threat, the threatened individual will either flag and completely shut down or faint, which are both associated with a sudden decrease in arousal and even unconsciousness (explanation according to Myricka & Brand, 2016, model proposed by Schauer und Elbert, 2010).

All of the discussed factors (flight, fight, tend, befriend, freeze, fright, flag, faint) only cover very short-term reactions to fear appeal. More important for climate change communication is the analysis of variables that have the potential to lead to long-term change, in attitudes and behaviour. There is empirical support for the assumption that such long-term effects can be the result of exposure to fear appeals (e.g. Smith & Stutts, 2003). Studies show that there are a number of other mediating and moderating factors that influence the effectiveness of fear appeals and that determine attitude and behaviour change (Jones & Owen, 2006; Lewis, Watson, Tay & White, 2007; Peters, Ruiter & Kok, 2013). Self-efficacy for climate action, for example, is not just determined by the perception of one's own abilities. It can also be impaired when other people's actions negate one's own effort (Zehner, 2020) or by the collective efficacy of a group, an individual perceives to be a member of. Collective efficacy can lead to a perception of others already doing well, so that one's own self-efficacy increases (Jugert et al., 2016). Furthermore, it can increase one's pro-environmental intentions through the perception that one's group is doing something (Jugert et al., 2016), and, therefore, as a member of the group, one should also act. This behavioural pressure is stemming from one's perception that one's group has established a behavioural norm that is salient for oneself; Farrow, Grolleau & Ibanez, 2017; Fritzsche, Jonas, Niesta Kayser & Koranyi, 2010).

Research on health behaviour suggests that the likelihood of a recommended behaviour actually being adopted is determined by the attitudes of the communication target, norms and self attitudes, norms and self-efficacy determine both intentions and behaviour (Jackson & Aiken, 2000; Sheeran et al., 2016). For pro-environmental behaviour, the literature again highlights the importance of both personal norms (own behaviour) and social norms (other people's behaviours; Thøgersen, 2014), attitudes, values and beliefs (Klöckner, 2013).

Similar to the Stoknes barrier Distance, Sreenivasan and Weinberger (2018) suggest that fear appeals can only be effective if the audience perceives the threats and recommendations as applying to them, not to others (safe driving campaigns designed for drivers and/or drinkers). Despite most of the research on these alternative responses having been conducted in the context of trauma, similar responses may also apply when confronted with threatening information about climate change. Still, so far the trauma cascade has not been linked to the topic, despite possibly explaining reactions to threatening information in news and media. Maddux and Rogers (1983) have shown that threatening messages can induce attitude change, but are only likely to do so when combined with target-feasible recommendations to avoid the harm. Stoknes (2015) has proposed a ratio of 1:3 of threatening to empowering messages to lead to an attitude change in the communication target as opposed to an exclusively threatening message. Attitude change can but does not necessarily must lead to behaviour change (Boulstridge & Carrigan, 2000; Schäufele & Hamm, 2016), measuring behaviour too would have exceeded the scale of this thesis.

Appendix K. Recall test questions for all four experimental conditions.

Story 1: threatening-distal

1. What does the IPCC stand for?
 - a. Intergovernmental Panel on Climate Change
 - b. Interdisciplinary Panel on Climate Change
 - c. International Panel on Climate Change
 - d. I don't know
2. Which regions will according to the text suffer most from climate change?
 - a. Nobody, everyone will suffer from climate change
 - b. People living on the Southern hemisphere, e.g. in some small island states in the Pacific
 - c. People suffering from poverty
 - d. I don't know
3. According to the text, why is sea level rise a problem for food production?
 - a. Because it contaminates soil and groundwater with salt
 - b. Because an increasing intensity and frequency of storms will destroy the harvest
 - c. Because it will lead to mass displacement and no workers will stay to work the fields
 - d. I don't know
4. Which countries might vanish completely under rising sea levels?

- a. Island states in Polynesia
 - b. Islands in the Northern and Baltic Sea
 - c. Those who cannot afford proper protection
 - d. I don't know
5. Why is the vanishing of coral reefs a problem?
- a. Because many fish species could go extinct if they can't find shelter in coral reefs any longer
 - b. Because they release a toxic liquid when they bleach that kills all fish
 - c. Because they are a major tourist attraction and the industry would collapse when they vanish
 - d. I don't know
6. What is the location of the coral reef system this text was talking about?
- a. Australia
 - b. Polynesia
 - c. New Zealand
 - d. I don't know
7. Why is climate change destroying the Amazon rainforest?
- a. Because it is leading to droughts that cause forest fires and infertile land
 - b. Because it leads to an increasing intensity of pests and disease in the trees
 - c. Because trees cannot stand heat and dry out
 - d. I don't know
8. How many percent of the terrestrial biodiversity life in forests?
- a. 40%
 - b. 60%
 - c. 80%
 - d. I don't know

Story 2: empowering proximal

- 1. (see story 1)
- 2. What did 192 countries agree to in the Paris agreement?
 - a. To keep the global temperature increase below 1.5°C
 - b. To meet regularly to agree on global initiatives
 - c. To convince other countries that climate change is a global threat
 - d. I don't know
- 3. Why is climate change an opportunity for a global community?
 - a. because it is a chance for all of humanity to work together
 - b. because it could be a good investment for the rich
 - c. because it gives us feedback on how we treat the planet
 - d. I don't know
- 4. Which brands are named as examples for sustainable fashion?
 - a. peopletree and armedangels
 - b. armedangels and greenbutton
 - c. greenbutton and peopletree
 - d. I don't know
- 5. Why are the Netherlands especially threatened by sea-level rise?
 - a. Because they are already located below sea level

- b. Because their flood barriers are too weak to stop the sea
 - c. Because more people in the Netherlands depend on the oceans than anywhere else
 - d. I don't know
- 6. Which is not an innovation developed by the Netherlands to fight rising waters?
 - a. salt-resilient crops
 - b. architectural flood barriers
 - c. flooding fields
 - d. I don't know
- 7. Which two countries have been discussed in relation to climate change consequences for forests?
 - a. Germany and Sweden
 - b. Sweden and France
 - c. France and Germany
 - d. I don't know
- 8. What is Van Bo Le-Mentzel working on?
 - a. Affordable, sustainable urban living in small apartments
 - b. Urban gardening workshops
 - c. Policy change for sustainable urban living
 - d. I don't know

Story 3: threatening proximal

- 1. See story 1
- 2. Who is responsible for climate change?
 - a. Humanity's hunger for fossil fuels and never-ending consumption
 - b. The fossil fuel industry
 - c. Nobody, it is a natural process
 - d. I don't know
- 3. Why might climate change be unstoppable, even if we would be able to stop all emissions immediately?
 - a. Because a set of mechanisms has already been activated that will change the global climate for years to come
 - b. Because other countries would continue to pollute
 - c. Because emissions are not the main contributor to climate change
 - d. I don't know
- 4. Which country was named as having 4 million people living below sea level when sea levels further rise?
 - a. Netherlands
 - b. Germany
 - c. France
 - d. I don't know
- 5. What adds to the destruction of the Wadden sea?
 - a. Offshore gas extractions
 - b. The shipping industry
 - c. The fishing industry
 - d. I don't know

6. Which two countries have been discussed in terms of climate change consequences for forests?
 - a. Germany and Sweden
 - b. Sweden and France
 - c. France and Germany
 - d. I don't know
7. Which percent of the terrestrial biodiversity lives in forests?
 - a. 40%
 - b. 60%
 - c. 80%
 - d. I don't know
8. Why is Hamburg especially threatened by climate change?
 - a. Because it has to fight it at multiple fronts: the sea levels are rising and the forests are haunted by droughts and pests
 - b. Because it is especially exposed to the incoming water due to its huge harbour
 - c. Because the city relies on the income of the city forests, that are destroyed by droughts and pests
 - d. I don't know

Story 4: empowering distal

1. See story 1
2. What did 192 countries agree to in the Paris agreement?
 - a. To keep the global temperature increase below 1.5°C
 - b. To meet regularly to agree on global initiatives
 - c. To convince other countries that climate change is a global threat
 - d. I don't know
3. Which regions will according to the text suffer most from climate change?
 - a. None in particular, everyone will suffer from climate change
 - b. People living on the Southern hemisphere, e.g. in small island states in the Pacific
 - c. People suffering from poverty
 - d. I don't know
4. Why could climate change be a chance for low-income countries?
 - a. Because they have experience with dealing with rising seas and could be the world leaders of tomorrow
 - b. Because it rises their problems to new awareness in high-income countries that could give them greater funds for development
 - c. Because it will hit high-income countries badly and therefore balance the global income distribution to a more equal level
 - d. I don't know
5. What is not a measurement mentioned in the text to save coral reefs?
 - a. identifying corals that are especially resilient
 - b. pioneering ways to quickly grow corals so that the reefs can be repopulated
 - c. banning all fishing in coral reefs
 - d. I don't know
6. Why is it so important to protect global forests?
 - a. Because they already are the best means to fight climate change themselves

- b. Because their shade will be even more important to find shelter when the temperatures increase
 - c. Because wood is the primary building material of the future
 - d. I don't know
- 7. What is the Fair Fashion brand called that was mentioned in the text
 - a. People tree
 - b. People's angels
 - c. People for the trees
 - d. I don't know
- 8. Why is the Paris agreement so remarkable?
 - a. Because it is an important step for a global, united fight against climate change
 - b. Because they decided on more criteria than ever before
 - c. Because they agreed on very ambitious plans
 - d. I don't know