

**Fear Appeals and Localising Climate Change:  
Neither is a Panacea to Motivate Action on Climate Change**  
*A Social Psychological Perspective*

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## Abstract

This thesis was interested in exploring the questions of why individuals typically do not respond strongly to climate change, and how individual motivations to do so might be strengthened. More specifically, this thesis explored two widely cited barriers to climate change action and the solutions commonly suggested to overcome them. The first barrier is the lack of personal experience with climate change, which is believed to inhibit relevant emotional processes. The second, not unrelated, barrier is that people typically perceive climate change as a distant threat, one that is not relevant to them personally, where they live, and in the present time.

To test these explanations, two public surveys of residents of both the UK (n = 616) and Switzerland (n = 316) explored the relationships among negative emotions, perceptions of geographically proximal and distant climate change risks, and variables that capture people's willingness to address climate change. The findings supported the idea that stronger negative emotions were positively related to more readiness to act against climate change. The relationship between spatially close versus distant risk perceptions and measures of different forms of action was, however, more complex. Specifically, the findings revealed a strong association between global risk perceptions and policy support and a strong association between local risk perceptions and personal intentions. One explanation for these (unexpected) associations is that they are due to spontaneous matches with regard to psychological distance: Local risk perceptions are psychologically *proximal on the spatial dimension* and personal intentions can be regarded as *proximal on the social dimension*. Likewise, the *spatially remote* global risk perceptions can be matched to support for policies, which can be regarded as *distant on the social dimension*.

Studies 3 and 4 tried to experimentally untangle the complex relationships between psychological distance and people's perceptions and actions that were

observed in the survey research. Specifically, in both studies participants were manipulated to adopt either a spatially proximal or distant perspective on climate change. Study 3 (n = 80) measured participants emotional responses to climate change and looked at how these predicted different attitudinal and behavioural responses under a proximal or distant framework, whereas Study 4 (n = 330) more directly explored the possible effects of activating negative emotions (i.e., fear) in combination with different distance frames as part of attempts to promote action on climate change. The findings of Studies 3 and 4 suggest that decreasing the psychological distance of climate change and inducing fear can both be potentially useful strategies to promote action on climate change. However, the operation of both these strategies is more complex than is often assumed and these complexities have implications for the effectiveness of each strategy. For one thing, both attempts to reduce distance and increase fear can initiate multiple psychological processes that simultaneously increase and decrease the likelihood of acting on climate change. Because these processes work in opposition, reduced distance and increased fear can have positive effects, negative effects, or no effect at all.

Together, the findings across studies highlight that psychological distance is neither an insurmountable obstacle to action against climate change – it depends on what kind of action is being considered (Studies 1 & 2) – and nor is decreasing psychological distance a panacea to motivate action – this can trigger the same kind of defensiveness that have been observed in response to other strategies, such as the use of emotion (Studies 3 & 4). In the general discussion, the theoretical implications of these insights for different theoretical models of distance, emotion, and action are considered, as are the implications for the practice of promoting public engagement with and action on climate change.

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## Chapter 1 – Introduction

*“[...] climate change and its effects matter fundamentally to everyone: what is at issue is not comfort, or lifestyle, but survival. Food security is at stake, climate refugees might hamper political security, and more uncomfortable changes will put humanity under strain.”*  
(Kirby, 2008, p. 23)

Climate change poses a great threat to natural and human environments (IPCC, 2007c). As expressed in the above quote, the negative effects will affect everyone directly or indirectly. One might think, then, that people would be highly motivated to take relevant action. But they are not (e.g., Bord, O’Connor, & Fisher, 2000; O’Neill & Hulme, 2009; Whitmarsh, 2009a). This thesis is interested the questions of why individuals do not respond more strongly to climate change and how their motivation to do so could be strengthened. More specifically, this thesis explores two often mentioned barriers to climate change action and the solutions commonly suggested to overcome them. The first barrier is that people cannot experience climate change personally and therefore the emotional processes that might otherwise motivate action remain dormant (e.g., Weber, 2006, 2010). One solution to this barrier could be to induce relevant emotions such as fear (e.g., Maibach, Roser-Renouf, & Leiserowitz, 2008). Yet, despite the success of this approach in other domains (e.g., promoting health-related behaviours, Witte & Allen, 2000) this approach is received very critically within the climate change communication community (e.g., Hulme, 2008; Moser, 2007; O’Neill & Nicholson-Cole, 2009; Wolf & Moser, 2011) and has rarely been tested empirically (for exceptions, see Meijnders, Midden, & Wilke, 2001a; van Zomeren, Spears, & Leach, 2010). The second, not unrelated, barrier is that people typically perceive climate change as a distant threat that is not relevant to them personally (e.g., Leiserowitz, 2006;

Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). With regard to this barrier, researchers interested in climate change communication seem to unanimously support the idea that focussing on locally and personally relevant consequences of climate change will solve the problem (CRED, 2009; Moser & Dilling, 2007; Nicholson-Cole, 2005; O'Neill & Nicholson-Cole, 2009; Spence, Poortinga, Butler, & Pidgeon, 2011; Weber, 2010). Yet, despite this strong support, previous attempts to implement this “localising” approach have not been as successful as anticipated (e.g., Shwom, Dan, & Dietz, 2008; Spence & Pidgeon, 2010).

Thus, while important barriers to individual action on climate change have been identified and relevant solutions have been proposed, more research is necessary to better understand how, when, and why these solutions do (not) work. The main goal of this thesis is therefore to explore in more detail how fear and psychological distance independently and – as this introduction will explain in more detail – interactively may influence how people think about climate change and respond to it. To this end, the remainder of this introduction will first explain what climate change is, what the expected consequences are, and can be done to minimize its negative effects. I will then explain why individual responses to climate change are important and why individuals are currently not responding more strongly. Next, the suggested strategies to increase individual action on climate change are explained in more detail and analysed from two theoretical perspectives: Dual-process theory (Epstein & Pacini, 1999; Evans, 2008) and Construal Level Theory (Trope & Liberman, 2003, 2010). The introduction then finishes by explicating the rationale of this thesis and providing an overview of the empirical studies that will follow.

## **Consequences of climate change and possible responses**

### **What climate change is, why it matters, and how societies should respond**

Because of human behaviour, specifically energy consumption and the greenhouse gas emissions this creates (i.e., carbon dioxide, methane), the Earth's average temperature and other climate-related phenomena (e.g., rainfalls, wind, humidity) have been changing since the industrial revolution (e.g., Rosenzweig et al., 2008; Stott, Stone, & Allen, 2004) and will continue to do so (e.g., Füssel, 2009; IPCC, 2007a). To illustrate, average global temperatures have risen by about 1°C between 1900 and 2010, and in many places around the world summers have already become hotter and drier (IPCC, 2007a). Thus, heatwaves like the one in 2003 in Europe, which caused about 35,000 excess deaths (IPCC, 2007a), are expected to occur much more frequently (IPCC, 2007c). Other expected negative consequences are loss of biodiversity, more frequent severe storms, rising sea level, droughts and water scarcity during the summer, and more intense rainfalls with floods during the winter (IPCC, 2007a). These changes will affect individuals, both materially, for example when a flood destroys their home or when their health suffers from heat exhaustion (cf. Maibach et al., 2008), and psychologically, for example when they worry about climate change (Swim et al., 2010). But changes will also affect larger groups of people, for example when they have to resettle because of sea level rising or because farmers' growing areas lack the necessary water (IPCC, 2007a). Although the planet is already committed to a certain level of climate change (IPCC, 2007a), the decisions and actions humans take today have the capacity to influence the extent of future climate change (see for example the different scenarios in IPCC, 2007d). Generally speaking, the earlier and more comprehensively humans act against climate change, the less extreme future changes will be (IPCC, 2007c). It is therefore very important that humans do act decisively, and that they do so now (Stocker, 2012).

Acting on climate change typically means trying to reduce the extent of future changes and impacts by reducing greenhouse gas emissions (e.g., reduction of energy consumption) and enhancing greenhouse gas sinks (e.g., afforestation). The main goal of these “mitigation” strategies is reducing the extent of climate change and thereby avoiding the dangers associated with this (IPCC, 2007c). While it is extremely important to limit climate change to a certain magnitude (cf. J. B. Smith et al., 2009), given the level of change to which the planet is already committed based on past actions, mitigation alone is not enough. In fact, the critical limit that prevents “dangerous climate change” (maximal 2°C increase in average global temperatures relative to pre-industrial levels) is likely to be exceeded (Meinshausen et al. 2009; New, Liverman, & Anderson, 2009; G. P. Peters et al., 2013; Rogelj et al., 2011). For this reason it is also important to prepare for, and deal with, the negative consequences of climate change – thereby reducing the vulnerability of people and nature against its likely effects – as well as taking advantage of the positive consequences of climate change. Relying solely on this second response to climate change, known as adaptation (IPCC, 2007c), however, would not be a viable option either because it would exceed societies’ and the natural environment’s capacity to adapt (IPCC, 2007a). In sum, for an optimal response to climate change, both strategies of mitigation and adaptation are needed in conjunction (IPCC 2007b).

Mitigating climate change and adapting to climate change requires action at all levels of society (Adger, Arnell, & Tompkins, 2005), including the individual and collective as well as local, national and global. For example, international institutions such as the United Nations or economic and political unions (e.g., European Union) might make agreements and encourage governments to respond to climate change (Adger et al., 2005). Governments might enact laws that support mitigation and adaptation or influence decisions of companies and households by taxes and subsidies. Local governments and cities might, for instance, ban the driving of cars in certain areas to reduce CO<sub>2</sub> emissions or build a dam to protect their

citizens from floods (Rosenzweig, Solecki, Hammer, & Mehrotra, 2010). Communities might develop and implement voluntary mitigation or adaptation initiatives (e.g., Betsill, 2001; Ebi & Semenza, 2008; Haxeltine & Seyfang, 2009; Heiskanen, Johnson, Robinson, Vadovics, & Saastamoinen, 2010). Business sectors, single businesses and organisation might change the way they operate or introduce new climate-friendly services and products (e.g., Berkhout, 2012; IPCC, 2007c). Finally, households and individuals might respond directly (e.g., by driving less or changing the kind of food they buy) or indirectly (e.g., by voting for a climate-friendly politician, supporting relevant regulations) to climate change.

However, despite numerous pleas from scientists, environmental organisations, and some politicians to respond to climate change, current levels of mitigation and adaptation seem to be generally insufficient. Indeed, greenhouse gas emissions remain high or are even increasing (Olivier, Janssens-Maenhout, & Peters, 2012), and are in line with those scenarios that lead to the highest increases in temperature (e.g., G. P. Peters et al., 2013). The maintenance of greenhouse emissions is not surprising, given that responses to climate change are currently insufficient at all levels of implementation. For example, international attempts to limit greenhouse gas emissions typically fail (cf. Wolf & Moser, 2011) because they often are at odds with individual nations' interests (cf. Barrett & Stavins, 2003; Beccherle & Tirole, 2011; von Stein, 2008). Similarly, the extent of local and national governments' efforts to mitigate and to adapt are also limited at best (Brody, Grover, Lindquist, & Vedlitz, 2010; Ford, Berrang-Ford, & Paterson, 2011). To some extent, the insufficient action by governments seems to be rooted in the fear that unpopular measures could backfire or that regulations will be too costly to implement (Ockwell, Whitmarsh, & O'Neill, 2009). Thus, policy-makers tend to favour "softer" solutions such as voluntary individual lifestyle changes (cf. Whitmarsh, O'Neill, & Lorenzoni, 2013). Yet, relying on voluntary changes also does not seem very promising, as the pattern of insufficient action is also observable at the level of individuals. For example, a recent international opinion poll showed that only a minority of



the public is willing to spend money to address climate change (PEW research center, 2010). In line with this, the proportion of Europeans who say they have taken action to fight climate change seems to be declining rather than increasing (European Commission, 2011). Similarly, only around a third of the general population actively try to drive or fly less (Defra, 2007). Because of the inadequacy of current responses – at all levels of society – the trends will continue to follow the high-emission scenarios can be expected to continue, with ever more severe consequences for the natural and human environment (see IPCC, 2007d). Thus, action – at all levels of society – is urgently required to meet the challenges of climate change.

### **Why individuals matter in responding to climate change**

The scale of greenhouse gas emissions, and the climate change impacts these create, is likely to give the impression that individual actions – as opposed to actions of larger entities such as organisations and nations – do not matter when it comes to responding to climate change (cf. Lorenzoni et al., 2007). Yet, individuals do play a key role in mitigating and adapting to climate change (Wolf & Moser, 2011). While it is true that a single person's behaviour has little impact on global emissions and climate change impacts, at an aggregate level individuals and households have a considerable influence. To illustrate, households emitted 38% of all national CO<sub>2</sub> emissions in 2005 in the United States (Gardner & Stern, 2008) and similar figures are known for European households (e.g., Committee on Climate Change, 2010; Federal Statistical Office, 2009; see also Lorenzoni et al., 2007).

More important though, is the potential for individuals and households to reduce greenhouse gas emissions. Households can cut as much as 20% of their carbon emissions without any noteworthy discomfort (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009). Those households willing to change their lifestyles more substantially can even cut as much as 40% of their greenhouse gas emissions (A. Druckman & Jackson, 2010). Individual behaviour is probably even more important with regard to adaptation. The responsibility of many adaptive responses entirely lies with individuals. For example, house owners can take

voluntary steps to protect their homes from floods or plant trees to have more shade during hotter summers. Individuals also matter because of their democratic voice and role as voters. Most mitigation and adaptation measures directly affect people's everyday lives. For instance, increased fuel taxes (to reduce CO<sub>2</sub> emissions) hurt people's pockets. Similarly, building codes to improve flood prevention may require people to amend their houses, for example to fit water resistant doors. If public support is weak, it will be nearly impossible to implement such measures. Also, depending on the public's attitude towards climate change responses, policy-makers who advance mitigation and adaptation measures may either be re-elected or find themselves out of office. Last but not least, individuals are also educators, business-people, politicians, diplomats, and presidents. Despite their professional, institutional, or political role, they are individuals. As such, they "are ultimately the actors who initiate, inspire, guide, and enact the necessary" mitigation and adaptation measures (Wolf & Moser, 2011, p. 547).

### **Barriers to individual engagement with climate change**

Given the substantial contribution individuals could make in responding to climate change, it is important to understand why current levels of individual action are so low (see also Whitmarsh, Seyfang, & O'Neill, 2011) and how the motivation to mitigate and adapt could be increased. The way the barriers that hinder people from responding to climate change are viewed strongly resembles how researchers generally think about environmental problems. That is, a distinction is made between constraints that have to do with the context people live in and those that describe what happens within people (e.g., Kaufmann-Hayoz & Gutscher, 2001; Tanner, 1999).

The first set of constraints, that is, barriers that are *structural* or *external*, are part of the wider physical, socio-economic, socio-cultural, legal, political, and administrative context people live in (Kaufmann-Hayoz & Gutscher, 2001) and beyond people's immediate influence (cf. Gifford, 2011; Swim et al., 2010). For example, it is extremely difficult for a

person to change the physical environment she lives in. If someone lives in a region where winters get really cold (e.g., - 20°C), it is probably impossible *not* to use energy (e.g., gas, electricity) to keep one's home comfortable, even with the best home insulation in place. Also, living in a place where public transport is not available means that refraining from driving a car is extremely difficult. And even factors that seem at first glance more malleable are often very rigid. It is, for example, difficult to substantially change one's salary without taking on further training or education – something that takes time and usually means temporarily earning less. Because many of the actions that address climate change involve money (e.g., installing more home insulation, buying a more fuel-efficient car, moving to a place that is less prone to flooding), the financial resources available to a person are another important factor that can constrain relevant action on climate change (Lorenzoni et al., 2007; Semenza et al., 2008).

Another external barrier, whose influence is probably underestimated (Griskevicius, Cialdini, & Goldstein, 2008), concerns social norms and expectations (Lorenzoni et al., 2007; Semenza et al., 2008). As member of social groups, people have a desire to belong (Baumeister & Leary, 1995). To achieve this goal, it is often easier if people adhere to social norms and expectations. Thus, if the norm is to buy and possess things, it may be difficult to reduce consumption and thereby save resources and energy for producing these goods (T. Jackson, 2011). Social expectations to own a certain kind of car (cf. Swim et al., 2010) may make it difficult to exchange it for a smaller or a more fuel-efficient but less appealing model (cf. Midden, Kaiser, & Teddy McCalley, 2007). Social expectations may also get in the way of giving up driving. Illustrative of this, a respondent in Lorenzoni and colleagues' (2007) exploration of barriers to climate change action said: "I don't want to but I could give up my car. [...] Having a car is a convenience engrained in our perception of liberties. It's all alright to have a car, full stop." (p. 451). Relatedly, the perception of what others do not think and do not do may also deter people from taking action on climate change. More specifically, if

people think that not much is being done about climate change by other countries, national and local governments, businesses, industries, and other people, this may discourage them from taking any action (Lorenzoni et al., 2007). Lorenzoni and colleagues (2007) argue that this perceived inaction by others is linked to lack of trust and concerns about free riding, that is, the feeling that others would profit from the benefits without having any costs to bear.

However, even though structural barriers undoubtedly exist, they do not determine all behavioural options that could help to mitigate climate change or adapt to it. For example, if someone lives in an area where public transport is not available, she or he could still upgrade home insulation. Thus, many people could respond more strongly to climate change than they do, despite structural barriers (cf. Gifford, 2011). To get a more complete picture of current inaction, it is therefore helpful to also consider the second set of constraints that might facilitate and impede responses to climate change.

Researchers have identified a variety of *internal* or *psychological* factors that impede action on climate change (Gifford, 2011; Lorenzoni et al., 2007; Semenza et al., 2008; Swim et al., 2010). To discuss these barriers, it is helpful to organise them into different phases. For example, both Gifford (2011) and Swim and colleagues (2010) use three similar phases to group different barriers. The first phase describes a state where people are *ignorant* about the existence of climate change (Gifford, 2011; Swim et al., 2010). The second phase includes *various psychological processes* that may prevent intentions to act. Finally, the third phase includes barriers that arise *during or after taking action*.<sup>1</sup> However, before going into the details about these three phases, it should be mentioned that the arrangement of barriers into

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<sup>1</sup> While Gifford's (2011) and Lorenzoni and colleagues' (2007) analyses of barriers was concerned with climate change *mitigation*, an almost identical three-phase model was suggested by Moser and Ekstrom (2010) for inaction on adaptation. Specifically, they suggested the following three phases: understanding, planning, and managing. Yet, what they subsume under planning has little to do with psychological processes but rather with how to find and choose "good" and viable solutions.

three phases has not been empirically tested (cf. Swim et al., 2010) and that different barriers “often overlap or work in conjunction to exacerbate the constraints to engagement” (Lorenzoni et al., 2007, p. 449). It should also be noted that sequence of the three phases is not necessarily linear – sometimes behaviour can also precede knowledge or processes located in the second phase (Bem, 1967; see also Lorenzoni et al., 2007). Thus, while these phases are a useful organizational tool, they should be taken as set in stone. In what follows, I will discuss in more detail the barriers pertaining to these three phases.

In terms of the *first phase*, that is, not knowing that climate change exists, it could be argued that if people are not aware of climate change, then there is no reason why they should take any personal action or support relevant policies. To remedy this problem, it seems therefore logical to provide people with the necessary scientific information (cf. Lorenzoni et al., 2007). Yet, there are at least three problems with this line of reasoning. First, even though awareness of climate change seems to be a logically necessary pre-condition to act *purposefully* on climate change (cf. Wolf & Moser, 2011), people can take actions that help mitigating climate change or adapting to its consequences for entirely different reasons. To illustrate, insulating one’s house has economic benefits and riding a bicycle is good for health (see Gifford, 2011; P. C. Stern, 2000). Thus, people may act in ways that have positive climate change consequences, without being aware of it. Second, recent polls strongly suggest that not many people are genuinely ignorant about the phenomenon of climate change (BBC World Service, 2007; Brechin & Bhandari, 2011; Kittipongvises & Mino, 2013; Tobler, Visschers, & Siegrist, 2012b; Whitmarsh et al., 2011). Third, providing information is often less effective than might be expected. One important reason for this is that people interpret information within the context of existing societal values, personal attitudes and beliefs and experiences (Hart & Nisbet, 2011; Kahan et al., 2012; Lorenzoni et al., 2007; Sturgis & Allum, 2004; see also below).

This analysis suggests that ignorance (alone) is unlikely to explain why people are not responding more strongly to climate change. Or, as Lorenzoni and colleagues (2007, p. 446) put it: “it is not enough for people to know about climate change in order to be engaged; they also need to care about it, be motivated and able to take action”. It can therefore be argued that once people are aware that there is a phenomenon that scientists call climate change, there are a “*variety of psychological processes*” (Gifford, 2011) that can prevent people in the *second phase of inaction* (Gifford, 2011) from acting on climate change. In what follows, I will discuss in detail how some of these barriers may prevent action on climate change.

The first barrier in this second phase is related to ignorance and concerns the *correctness of people’s knowledge* about climate change. There are a number of characteristics that make climate change a difficult issue to understand. For example, Sterman and Sweeney (2007) argue that people – not only laypeople but also those who are scientifically trained – use too simplistic mental models to represent climate change. More specifically, people seem to use mental models that essentially equate greenhouse gas emissions with greenhouse gas concentration in the atmosphere. As a consequence, people seem to believe that reducing greenhouse gas emissions would directly translate into a drop in greenhouse gas concentrations and average global temperature. However, as long as greenhouse gas emissions exceed removal, the concentration of greenhouse gases in the atmosphere increases. Sterman and Sweeney (2007, p. 63) conclude that: “Such beliefs – analogous to arguing a bathtub filled faster than it drains will never overflow – support wait-and-see policies, but violate basic laws of physics.”

Another barrier that has important implications for how people understand climate change is that it is very *difficult to have relevant personal experiences* with it. “Climate” is the average weather over a long period of time, typically 30 years (e.g., IPCC, 2007d). As such, climate is an abstract statistical concept that, by definition, cannot be experienced directly (Weber 2010). Although it is possible to experience weather, for example as short-

term variations in temperature or rain, or extreme events such as heat waves and cold winters, humans cannot experience long-term changes with their senses (cf. Marx et al., 2007; Weber & Stern, 2011; Weber, 2010). Even people who have daily experiences with the weather (e.g., farmers and fishers) are unlikely to receive sufficient information to reliably detect climate change (cf. Weber & Stern, 2011; Weber, 2010). Detecting climate change is even more difficult for the average person in Western societies who spends most of his or her day indoors with little contact to the natural environment (Moser, 2010; Schultz, 2002). To illustrate, a recent study found that less than six per cent of the participants strongly agreed that they had personally experienced climate change (Akerlof, Maibach, Fitzgerald, Ceden, & Neuman, 2013).

This lack of direct experience has several implications that may help to understand why people do not respond more strongly to climate change. First, the lack of personal experiences may explain the common finding that *people generally perceive climate change as a distant threat* that is unlikely to affect them personally. For example, Leiserowitz (2006) conducted a survey in the US and in which he asked participants to rate the likelihood of different risks at the local and global level. Participants rated all risks (i.e., standards of living, water shortages and rates of serious disease) as being more likely globally than locally. Moreover, while on average global impacts were rated as “likely”, local impacts were rated as “somewhat unlikely” (Leiserwotitz, 2006, p. 52). Similarly, when asked about which scale of climate change impacts concerned them most, the majority of participants indicated that they were most concerned about the impacts on people around the world and non-human nature. Impacts on themselves, their family, or their local community were of only very little concern. In a qualitative study (Lorenzoni et al., 2007, p. 450), one participant expressed her view of climate change as (temporally) distant phenomenon as follows:

“This [climate change] is a threat that is 50, 100, 200 years away possibly. We could all be dead anyway, and it'll be completely

different by then. So if you take action now I mean, it might be helpful, and you're going to have a few people out there who believe strongly about this. But the majority of people aren't going to be bothered about it, until it's clear and immediate. It's a long way off before it gets worse.”

Another person referred to perceived (spatial) distance as follows: “And you hear about the sort of ice flows melting, or whatever and it's just, they're such a distance” (Lorenzoni et al., 2007, p. 450).

The finding that people perceive climate change as a distant issue seems very robust: Several other studies and literature reviews support the idea that people generally perceive climate change as a distant threat, as something that affects strangers, happens in remote times and places, rather than here and now (Bord, Fisher, & O'Connor, 1998; Fleury-Bahi, 2008; Lorenzoni, Leiserowitz, De Franca Doria, Poortinga, & Pidgeon, 2006; Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Milfont, 2010; O'Neill & Nicholson-Cole, 2009; Safi, Smith, & Liu, 2012; for an exception, see Brechin & Bhandari, 2011).

Although this perception of climate change is to some extent correct – many effects of climate change are temporally still far away and from the perspective of many Western countries distant strangers in developing countries are more likely to be severely affected by climate change (IPCC, 2007a) – this perception of climate change as a distant threat is problematic for several reasons. Specifically, it can be argued that the perceived distance makes it difficult to visualize climate change (Meijnders, Midden, & Wilke, 2001b). Also, it is likely that the distant representation of climate change is associated with low levels of personal relevance (cf. Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Meijnders et al., 2001b; Weber, 2006, 2010). Thus, people are unlikely to see climate change as an urgent issue (Moser & Dilling, 2004). This could thus lead to the perspective that climate change risks are irrelevant to the individual and that there is no need for personal action.



A second reason why the inability to have personal experiences with climate change is problematic is that learning from personal experiences often involves affective processes (Weber, 2010). Affective processes (i.e., emotions) are important because they catch people's attention (see Weber, 2010), which is a limited resource (Weber & Johnson, 2009). In light of the many issues that compete for people's attention every day, it is clear that getting attention is an important precondition for people to further process climate change information, to realise its urgency, and to take action on climate change (cf. Marx et al., 2007). Illustrative of this, recent polls show that when people are asked to indicate how relevant an issue they think climate change is relative to other problems, they rank climate change relatively low (cf. Pidgeon, 2012). Put differently, affective processes matter because they make the risk of climate change salient and thus personally relevant (Marx et al., 2007). More importantly, affective processes such as worry or fear can be important drivers to respond to threats (E. Peters & Slovic, 2000). Roeser (2012) even argued that “emotions might be the missing link in communication about climate change, in a two-fold way: they lead us to more awareness of the problems and to being motivated to do something about climate change” (p. 1034). In sum, the difficulty of personally experiencing climate change, and the absence of visceral emotions when thinking about it, is thought to reduce the likelihood that people will support mitigation and adaptation measures (cf. Lorenzoni et al., 2006; Weber, 2006).

Aside from the problems associated with not experiencing climate change as immediate and personally meaningful, a further crucial feature of this issue that may impair action is the degree of *uncertainty* about the exact effects of climate change. Although it is clear that climate change will have consequences, the magnitude of these effects, especially on a regional level, can only be estimated with some extent of uncertainty (IPCC, 2007a). However, communicating this uncertainty is very challenging and can easily lead to misunderstandings. For example, research concerned with how risks that are uncertain are best communicated suggests that many people may not have the necessary skills to process

information that involves uncertainty (e.g., E. Peters, Hibbard, Slovic, & Dieckmann, 2007; Reyna, Nelson, Han, & Dieckmann, 2009). One method that may facilitate individuals' processing of uncertainty information is to use clearly defined phrasings for different levels of uncertainty. To illustrate, the IPCC (2007c) uses a scale consisting of seven verbal descriptions of how likely certain outcomes of climate change are. For example, if the likelihood of an impact is estimated to lie between 66% and 90% it is described as "likely" and events that are estimated to occur with a likelihood of 90% to 99% are described as "very likely". However, the use of verbal descriptions can itself lead to misunderstandings and wrong conclusions (Budescu, Broomell, & Por, 2009; Budescu, Por, & Broomell, 2012). More specifically, it seems that the general public tends to interpret these verbal descriptions as less likely than what the IPCC intends to communicate; especially the terms "likely" and "very likely" (Budescu et al., 2009, 2012). These findings suggest that the public might underestimate the likelihood of climate change consequences and therefore believe that action is not necessary.

In addition to basic problems of understanding, there are further reasons why uncertainty may be problematic. Research from cognate fields suggests that uncertainty decreases environmentally friendly behaviour, probably because people "tend to interpret any sign of uncertainty [...] as sufficient reason to act in self-interest over that of the environment" (Swim et al., 2010, p. 65). The effect of uncertainty on action may be both passive, in the sense that it makes the case for action less clear, or active, in the sense that it can be used actively to excuse inaction (see Budescu et al., 2009; Gifford, 2011; Swim et al., 2010). The latter suggests that uncertainty might feed into scepticism.

Scepticism – sometimes also referred to as "denial" (e.g., Swim et al., 2010) or as its antipode "belief in" or "knowledge about" climate change – may act as a barrier to individual action for several reasons. First, if people do not believe that climate change is a real and human-made phenomenon, it is unlikely that they will be concerned about it, and even less

likely that they will act upon it (Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011). Indeed, there are a number of studies that confirm this expectation by showing that higher levels of scepticism in the general public are associated with lower levels of concern about climate change and less support for mitigation and adaptation (Akter, Bennett, & Ward, 2012; Blennow & Persson, 2009; Joireman, Truelove, & Duell, 2010; Leiserowitz, 2006; Morton, Bretschneider, Coley, & Kershaw, 2011; Safi et al., 2012). Of course, scepticism can relate to the issue of climate change itself, or more specifically to trust in the scientists, governments and other institutions that argue for the existence of this phenomenon (cf. Swim et al., 2010). Like issue-based scepticism, a lack of trust in communicating institutions should undermine attempts to change behaviour (e.g., Kunreuther, Slovic, & MacGregor, 1996; Siegrist, Cvetkovich, & Roth, 2000; for supportive evidence see Dietz, Dan, & Shwom, 2007; Lorenzoni et al., 2007; however, for an opposite finding, see Vainio & Paloniemi, 2013).

Deficits of trust and scepticism about the reality of human-made, and dangerous, climate change are important because these influence how people process information about climate change (cf. Cook & Lewandowsky, 2011; Kahan, 2012; Lorenzoni et al., 2007; Whitmarsh, 2011). To illustrate, Corner and colleagues (Corner, Whitmarsh, & Xenias, 2012) conducted an experiment in which participants read two newspaper articles. One article took a sceptical perspective on climate change while the other argued that climate change was a real problem – thus the contrast between the two articles created uncertainty about the message of climate change. Participants evaluated the articles in line with their pre-existing attitudes: Those who were more sceptical about climate change rated the sceptical newspaper articles as more reliable and more convincing than the newspaper articles that described climate change as a real problem. Conversely, those who were less sceptical about climate change rated the “pro-climate change” article as more reliable and more convincing. This suggests that people process climate change information in a biased way that is consistent with their existing beliefs.

In addition to these general features of climate change as an issue – that is, the lack of personal experience, the distance of possible impacts, and the uncertainties and attendant scepticism surrounding these impacts – a range of individual differences can also feed into relevant actions / inaction (e.g., religion, values, worldviews, political orientations, environmental attitudes; for overviews, see Gardner & Stern, 2002; Gifford, 2011; P. C. Stern, 2000; Swim et al., 2010; Wolf & Moser, 2011). For example, it has repeatedly been shown that people who have negative (i.e., weak) attitudes towards the environment are unlikely to support mitigation (Dietz et al., 2007; O'Connor, Bord, & Fisher, 1999; Shwom, Bidwell, Dan, & Dietz, 2010). One might wonder why environmental attitudes are related to people's willingness to address climate change. Yet, this relationship is not so surprising when considering that climate change has until recently almost exclusively been framed as an environmental problem (cf. Barnett, 2010). It is important to note that while this framing of climate change seems to be the dominant one, there are other ways of thinking about climate change. For example, climate change can be considered from an economic (N. Stern, 2007), public health (Ebi & Semenza, 2008; Maibach et al., 2008), moral judgment (Markowitz & Shariff, 2012), or ethical perspective (Hayward, 2012; Nolt, 2011).

Finally, the *third phase* of climate change inaction describes how the negative effects of performed actions may outweigh its positive effects. For example, people who buy a fuel-efficient car might drive longer distances than with their previous cars (Gifford, 2011). Or people might perform one action and subsequently rest on their laurels and refrain from any further action (Weber, 2010). Another problem can arise when people are motivated to act but have false beliefs about which actions are effective and which are not (Truelove & Parks, 2012; Whitmarsh, 2009a). For example, many people recycle in order to mitigate climate change (e.g., Whitmarsh, 2009a). Yet, other behaviours such as improving one's house insulation or switching to more sustainable ways of transportation would be much more effective to reduce households' carbon emissions (Dietz et al., 2009; Gardner & Stern, 2008).

## **Promoting individual action on climate change**

The large number of barriers to action on climate change, of which only a fraction was outlined above (for more see Gifford, 2011; Lorenzoni et al., 2007), illustrate that there are many reasons why people do not act on climate change. Knowing which barriers exist is extremely helpful to understand where individuals struggle and how they can be assisted in acting more. Ideally, researchers and practitioners would know how relevant each of these barriers is in preventing individual action and how promising it would be to address it. Unfortunately, this question has, to the best of my knowledge, not yet been addressed empirically.

However, when reading the literature on individual (in-)action on climate change and on possibilities to increase people's motivation to act, some barriers appear more often than others. In particular, it seems that three related barriers are frequently mentioned, often together, suggesting the following analysis of why people do not act more on climate change (Lorenzoni et al., 2007; Marx et al., 2007; O'Neill & Nicholson-Cole, 2009; Swim et al., 2010; Weber & Stern, 2011; Weber, 2006, 2010): People cannot personally experience climate change. This leads to the cognitive appraisal of climate change as a distant threat that is not personally relevant. The affective consequence of not experiencing climate change is that levels of worry are too low to motivate action (e.g., Weber, 2006). The solution suggested to the barrier of "intangibility" and its consequences is often to make climate change more personal and local (e.g., CRED, 2009). A second strategy that is sometimes mentioned is to elicit negative emotions such as fear. The rationale behind each of these strategies will be the focus of the next sections.

*Eliciting emotions as a means to overcome lack of experience.* Even though there is some evidence that personal experiences with climate change are possible (e.g., Akerlof et al., 2013), waiting until the impacts of climate change are so pronounced that people have personal experiences is impractical because even the more pessimistic climate change

scenarios do not project sufficient experiential impacts in countries such as the UK by 2050 (cf. Pidgeon, 2012). An alternative to waiting for climate change to become more extreme and perceptible is to purposefully elicit the emotions and concern that experience would otherwise trigger. This idea is based on the finding that emotions such as worry or fear can be important drivers to respond to threats (E. Peters & Slovic, 2000). Not surprisingly then, playing on emotions such as fear is a commonly articulated strategy to change people's behaviour and motivate action.

The role of fear as a driver of personal action is particularly well documented with regard to health-related behaviours (e.g., de Hoog, Stroebe, & de Wit, 2007; Maloney, Lapinski, & Witte, 2011; Witte & Allen, 2000). The Extended Parallel Process Model (Witte & Allen, 2000; Witte, 1998), a prominent model of fear appeals often applied in the health literature, proposes the following mechanisms as explanation for how and why fear appeals can motivate people to protect themselves from a threatening issue. First, when people perceive a threat as serious and personally relevant, they become scared and motivated to reduce their fear. Second, people engage in patterns of thought or behaviour to reduce their fear, by taking measures that remove or lessen the threat. Ideally, these responses would be productive and directed towards addressing the threat itself (e.g., by adopting protective behaviour: danger control), but responses to fear can also be unproductive, especially when people become focussed on managing their emotions rather than the threat itself (e.g., via denial: emotion control; see Witte, 1998). Within the model, the key determinant of productive versus unproductive responding is the degree to which people can see a viable response strategy (response efficacy) and believe themselves to be capable of enacting this response (self-efficacy). When all these things are in place, fear can be a useful emotion for triggering behavioural responding. To illustrate, a meta-analysis of 93 studies (Witte & Allen, 2000) showed that there is a positive average correlation ( $r = .16$ ) between fear and behavioural outcomes. Importantly and in line with the Extended Parallel Process Model

(Witte & Allen, 2000; Witte, 1998), the effects of fear become larger with more fearful messages and when audiences additionally receive information that increases their efficacy beliefs.

Consistent with these findings and the Extended Parallel Process Model (Witte & Allen, 2000; Witte, 1998), it has been argued that using affect in the context of climate change can make this issue “more salient and motivate behavior” (Marx et al., 2007, p. 56). Accordingly, several researchers have argued that eliciting negative emotions such as worry or fear could help overcoming the inaction on climate change (Maibach et al., 2008; Moser, 2007; Roeser, 2012; Spence & Pidgeon, 2009; Weber, 2006).

Yet, at the same time, and despite the successful application of fear appeals in other domains (e.g., health promotion and disaster prevention, Maloney et al., 2011; Neuwirth, Dunwoody, & Griffin, 2000; Terpstra, 2011; Witte & Allen, 2000), there is a relatively strong sense in the climate change community that using fear is like “like playing with fire” (Moser, 2007, p. 69) and that it would be better not to attempt using fear to motivate action on climate change (e.g., Hulme, 2008; Moser, 2007; O’Neill & Nicholson-Cole, 2009; Wolf & Moser, 2011). There are a number of reasons why fear appeals might be problematic (e.g., O’Neill & Nicholson-Cole, 2009; Weber, 2010), yet the main reason for opposition to employing these seems to be their potential to trigger defensive processes that do not help to overcome the threat (e.g., Moser, 2007). More specifically, when individuals experience fear they may engage in maladaptive coping strategies (e.g., defensive avoidance, downplaying or denying the threat, reactance, or dismissing the message as manipulative) that reduce their fear rather than addressing the threat itself (Moser & Dilling, 2004; Moser, 2007; Witte & Allen, 2000; Witte, 1998).

Of course, theoretical considerations for and against using fear in the context of climate change are important. But whether this strategy is helpful or not to increase individual action is ultimately an empirical question. Indeed, there is some indirect evidence suggesting

that eliciting fear can help in the context of climate change: Research based on correlational data shows that when people are afraid of climate change (or have similar negative feelings) they perceive climate change as more of a risk, have more favourable attitudes towards mitigation, and are more willing to mitigate (Leiserowitz, 2006; N. Smith & Leiserowitz, 2012). Similarly, studies from the context of disaster prevention suggest that fear also increases risk perceptions and the likelihood of taking preventive (i.e., adaptive) measures against the possible consequences of climate change (e.g., Terpstra, 2011).

Moreover, some researchers have used experiments to address the question of whether fear appeals can effectively increase people's motivation to act on climate change. However, the evidence from studies that manipulated fear instead of measuring it is less conclusive than the correlation-based findings. On the one hand, van Zomeren and colleagues (2010) found that fear arousing messages increased participants' intentions to act in environmentally friendly ways. Interestingly, this effect was not contingent on people's (self- or group-) efficacy beliefs. Van Zomeren and colleagues (2010) argue that efficacy beliefs may be helpful in addition to fear – but they are not necessary for fear to lead to behavioural intentions. Consistent with the positive effects of fear appeals on intentions, another study (Meijnders et al., 2001a) found that fear appeals lead to more favourable attitudes towards using light bulbs (i.e., save energy to mitigate climate change). However, fear appeals had no effect on behavioural intentions or actual behaviour. Similarly mixed evidence comes from a study by Spence and Pidgeon (2010). They framed climate change either in terms of what can be gained when people mitigate or what can be lost when climate change is not mitigated. The loss frame increased fear relative to the gain frame and more fear in turn increased the levels of perceived severity of climate change impacts. As suggested by the Extended Parallel Process Model (Witte & Allen, 2000; Witte, 1998), increased perceived severity is important to motivate action. The loss frame therefore met an important precondition to engage people



more strongly with climate change. However, attitudes towards climate change mitigation were more favourable in the gain frame than in the loss frame.

In conclusion, while caution is certainly warranted when eliciting fear, this does not mean that fear appeals are useless in terms of increasing people's motivation to act on climate change. There is compelling evidence from cognate fields (e.g., Witte & Allen, 2000) that fear appeals can motivate harm-reducing behaviour. Importantly, spontaneously occurring fear has been positively related to people's engagement with climate change. However, it seems less clear to what extent purposefully elicited fear is helpful to motivate action on climate change.

*Localising as a means to overcome psychological distance.* The “localising” strategy suggests communicating climate change in local and personal terms. That is, instead of explaining what climate change means on a global level (e.g., disappearing islands in the Pacific Ocean)<sup>2</sup>, the idea is to highlight the local consequences of climate change. The rationale behind this frequently suggested strategy (CRED, 2009; Ebi & Semenza, 2008; Lorenzoni et al., 2006, 2007; Moser & Dilling, 2007; Moser, 2010; Myers, Maibach, Roser-Renouf, Akerlof, & Leiserowitz, 2013; Nicholson-Cole, 2005; O'Neill & Nicholson-Cole, 2009; Rayner & Malone, 1997; Spence et al., 2011; Weber, 2006, 2010) seems to be that this approach decreases the psychological distance, makes the consequences of climate change more visible, easier to imagine, more personally relevant, promotes emotional engagement with climate change, and ultimately enhances people's motivation to act (CRED, 2009; Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Weber, 2010).

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<sup>2</sup> In this thesis the terms “distant” and “global” climate change are used interchangeably to refer to climate change that occurs far away from individuals. Strictly speaking, however, the terms “distant” and “global” have different meanings. While “distant” refers to “far away in space or time”, “global” means “the whole earth” (cf. Devine-Wright, 2013).

Even though many researchers advocate localising as a strategy to motivate action against climate change, empirical evidence is actually scarce and inconclusive. There is some indirect evidence suggesting that under certain conditions local risk perceptions increase the willingness to mitigate climate change. Specifically, Spence and colleagues (2011) found that people who experienced flooding (a likely effect of climate change in the study area) perceived local risks to be more likely. More importantly, the more likely study participants rated local risks, the more they were willing to reduce their energy use. This suggests that local weather events may increase individuals' willingness to respond to climate change. Yet, other work suggests that extreme local weather events do not necessarily increase concern and the willingness to respond to climate change (Dessai & Sims, 2010; Whitmarsh, 2008).<sup>3</sup>

Studies that vary perceived distance but hold everything else constant are particularly insightful because they allow more valid conclusions about the causality of the manipulated variable, in this case the precise role of “localising” climate change in shaping individual responses. To my knowledge, only three studies have directly tested this strategy, and the findings of these do not reveal a consistent picture. First, Shwom and colleagues (2008) investigated the effect of two messages about climate change that described climate change trends on either a regional or a national scale. Contrary to the common advice, participants in the more local condition did not endorse climate change policies more than those in the more distant condition. Second, and in a similar vein, Spence and Pidgeon (2010) framed climate change in local and distant terms. The effect of the manipulation was consistent with what is generally expected from this approach in that the locally framed information was rated as more personally relevant than the distantly framed information. However, and despite the increased personal relevance, zooming in on local climate change had no effect on subsequent

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<sup>3</sup> Attributing any single weather event to climate change is very complex (cf. Spence et al., 2011) if not impossible. Yet, it is important to acknowledge that the weather can influence people's perceptions and that in some circumstances local events can increase people's motivation to act on climate change.

attitudes towards climate change mitigation. Put differently, the “localising” approach seems to have stirred something in their participants but it did not carry over to their attitudes towards climate change. The final study I am aware of was by Scannell and Gifford (2013), which provided members of the general public with information posters describing either one broad global impact of climate change (sea levels rising) or a local impact specific to the area they lived in (either of the following three: forest fires, beetle infestation, rising sea levels). Relative to a third condition in which no information was provided, the locally framed information poster increased participants’ engagement with climate change (including affective, cognitive, and behavioural aspects of engagement). In contrast, people’s engagement with climate change did not differ between the globally framed poster and the control condition. Thus, in this study at least, providing information about local climate change seems to effectively increase people’s engagement in comparison to providing no information. However, Scannell and Gifford (2013) did not directly compare the local and the global frame and it is therefore not possible to draw any conclusions about specific advantages of zooming in on local climate change relative to a more global approach and it remains possible that putting climate change in any context (local or global) increased engagement relative to doing nothing at all, just to different degrees.

The seemingly unanimous endorsement of the localising approach should not create the impression that this strategy will be the solution that wins over the so far non-engaged people or that it is entirely risk-free. First of all, the slightly disappointing results of previous studies raise doubts about its effectiveness. Also, the finding that locally framed climate change leads to lower levels of perceived severity than globally framed climate change (Spence & Pidgeon, 2010) raises the question of whether this strategy might not only be ineffective but could even have counterproductive effects. As will be argued in more detail in Chapter 5, it is possible that localising elicits similar maladaptive responses as fear appeals. Thus, it might be a good idea to be a bit less optimistic about this strategy and to question

whether it is really the panacea to motivate action on climate change. At the very least, it would seem important to delve more closely into the mechanics of localising before confidently recommending this particular strategy to climate change communicators (cf., CRED, 2009)

In sum, despite accepted wisdom, available research does not consistently reveal the assumed supremacy of localised climate change communication over communication with a more distal (e.g., national or global) focus and some findings suggest that this strategy could have similar backfiring effects as fear appeals.

## **Two theoretical approaches to contextualize lack of worry and perceived distance**

In order to make predictions, test hypotheses, and ultimately advance the understanding of the role of the two mentioned barriers – lack of worry and psychological distance – it is helpful to contextualise these barriers and their suggested solutions within a theoretical framework. As the next sections will show, there are two approaches that lend themselves to theorize about the role of uncertainty, the two main barriers, and about possible solutions to overcome them. The first approach explores the different ways of processing information in general and risk-related information in particular. It is argued that affective versus analytical processing mode serve different purposes and that the lack of affective processing in the context of climate change is one of the main reasons why people do not act more. Correspondingly, from this perspective, localising climate change and eliciting feelings seem adequate strategies because they emphasise personal relevance, increase affective engagement, and motivate action.

The second approach, Construal Level Theory, argues that people think differently about the same issue and take different decisions depending on whether this issue is psychologically proximal or distant. The crucial implication for the proposed barriers and

solutions, from this perspective, is that localising climate change is likely to change *how* people mentally construe it but this strategy is unlikely to directly translate into more motivation to act. In terms of eliciting emotions, this perspective would suggest that more emotions are only beneficial for motivation when people have a mind-set that takes emotions into account (i.e., a mind-set that focuses on proximity). Thus, and as the following analysis will show, these approaches largely overlap but also disagree in some aspects.

### **Perspective one: Affective and analytical processing**

To understand how people think about climate change and its possible future consequences, it is useful to conceptualize it as a risk and turn to the relevant literature on risk perception and decision-making under uncertainty. When studying these issues, for a long time researchers have mainly focussed on rational aspects such as cost-benefit analyses (cf. Loewenstein, Weber, Hsee, & Welch, 2001; Slovic, Finucane, Peters, & MacGregor, 2004). The underlying assumption of these traditional approaches was that people “assess the desirability and likelihood of possible outcomes of choice alternatives and integrate this information through some type of expectation-based calculus to arrive at a decision” (Loewenstein et al., 2001, p. 267). Yet, people do not always decide in such a rational manner; decision-making often also involves affective processes that may diverge from analytical assessments of the risk in question (Loewenstein et al., 2001). To get a more complete picture of how people perceive risks and how they decide when they face a risk, it is therefore important to consider both *analytical* and *affective* processing.

The idea that people process risks analytically and affectively is based on more general models of human thinking, specifically on dual-process theories of information processing, thinking, and knowing (e.g., Chaiken & Trope, 1999; Sloman, 1996; see also Slovic et al., 2004). These theories argue that people have two different processing modes that operate in parallel and serve different functions (Table 1 gives an overview of the attributes

ascribed to the two processes, see Darlow & Sloman, 2010; Epstein & Pacini, 1999; Evans, 2008; Marx et al., 2007; Slovic et al., 2004).

Table 1

*Properties distinguishing the affective and the analytical processing mode*

<i>Affective processing</i>	<i>Analytical processing</i>
Evolutionarily old, shared with animals	Evolutionarily new, uniquely human
Unconscious	Conscious
Affective, pleasure-pain oriented	Logical: reason-oriented
Nonverbal	Linked to language
Vivid images	Abstract symbols
Automatic	Effortful, controlled
Fast / high capacity	Slow
Experiential	Rational
Implicit	Explicit
Intuitive, holistic	Analytic
Associative	Rule-based
Driven by similarity and association	Driven by structured, relational knowledge
Unrelated to general intelligence and working memory capacity	Related to general intelligence and working memory capacity

The *affective* processing mode (sometimes also referred to as intuitive, experiential, heuristic, associative, unconscious) is believed to be evolutionarily older than the analytical processing mode (cf. Epstein & Pacini, 1999; Slovic et al., 2004). Affective processing is thus “a very basic human ability” (Weber, 2010, p. 334). Among other things (see Table 1) this processing mode is fast and does not need any conscious effort. It relies on intuition, experiences, concrete exemplars, images, and associations (Epstein & Pacini, 1999; Slovic et

al., 2004). Importantly, affective processing turns personal experiences into feelings which then influence how people make decisions and act (Loewenstein et al., 2001; see also Weber, 2010).

In comparison, the *analytical* processing mode is thought to be slow, deliberative, and conscious. It deals with abstract symbols, words, and numbers. It is responsible for calculations and logical operations and used to think about the future or hypothetical events (Epstein & Pacini, 1999; Slovic et al., 2004). Also processes that occur analytically must typically be learned explicitly and are contingent on individual's general intelligence and their working memory capacity (see Evans, 2008; Weber, 2010).

The existence of two processing modes raises the question as to whether and how they relate to each other. It is usually argued that the two systems work in parallel and that they interact and influence our behaviour and decisions in conjunction (Darlow & Sloman, 2010; Marx et al., 2007; Slovic et al., 2004; Weber, 2010). For example, analytical processing can influence how people respond to emotions (cf. Marx et al., 2007). A person who is afraid of flying might be able to calm herself by thinking about the low accident rate in air traffic.

In terms of empirical evidence for the real-life relevance of each processing mode, a growing body of research suggests that analytical and affective processing are *both* relevant for risk-related decision-making, for example in the context of people's health (e.g., Gibbons, Houlihan, & Gerrard, 2009), natural hazards (e.g., Terpstra, 2011), and for various other everyday situations (Van Gelder, de Vries, & van der Pligt, 2009). Generally speaking, it seems that analytical processing may help to digest complex information (e.g., verbal and statistical, see Marx et al., 2007). Affective processing, which typically deals with personal experiences and vivid information (e.g., film, video, other people's narrations, cf. Marx et al., 2007), is important because it is more likely to capture people's attention than analytical processing (cf. Weber, 2010). More importantly, the elicited affect "is an effective motivator of action" (Marx et al., 2007, p. 51; see also Weber, 2006).

Sometimes the processing modes may disagree and the same information may lead to different perceptions and decisions when it is processed either affectively or analytically (e.g., Dijksterhuis, Bos, Nordgren, & Van Baaren, 2006; Hertwig, Barron, Weber, & Erev, 2004). Illustrative of this, the vivid term “mad cow disease” is perceived as more fearful than the abstract terms “bovine spongiform encephalitis” or “Creutzfeld-Jakob disease” – even though all three terms refer to the same disorder (Sinaceur, Heath, & Cole, 2005). A question that follows from this possible discordance concerns the relative influence of the two systems: Is either of the two processes more relevant than the other or are they equally important?

Some researchers have argued that the two modes are similarly important but that they respond to different properties of the situation, especially to the presence or absence of numerical and affective information (Slovic et al., 2004; Van Gelder et al., 2009). Other authors have found evidence that when the two processing modes are in discordance, it is typically the affective one that dominates (Fagerlin, Wang, & Ubel, 2005; Jenni & Loewenstein, 1997; Loewenstein et al., 2001; see also Marx et al., 2007; Weber, 2010). To illustrate, Miceli and colleagues (2008) found that their participants’ likelihood estimations of different flood consequences (i.e., analytical processing) was not related to protective behaviours. By contrast, the extent to which participants worried about these possible consequences (i.e., affective processing) was associated with protective behaviours. Similarly, a number of studies suggest that people who have made (affective) experiences with flooding are more prepared to take various preventive actions (Grothmann & Reusswig, 2006; E. L. Jackson, 1981; Zaleskiewicz, Piskorz, & Borkowska, 2002).

Thus, from the dual-process perspective it could be argued that in order to effectively respond to a risk, it is necessary that people engage in both processing modes. Analytical processing helps to deal with abstract information and may contribute to a better factual understanding of the risk. And affective processing seems indispensable because it motivates action. However, although both processing modes can potentially contribute to motivate



(more) action on climate change, it seems that in practice this ideal cooperation is not happening. For one thing, there seems to be a general lack of experiential / affective processing in the context of climate change (Marx et al., 2007; Weber, 2006, 2010; see section on barriers). This is problematic because it probably contributes to the widespread perception that climate change is a distant issue that is not personally relevant (e.g., Leiserowitz, 2006; Lorenzoni et al., 2007) and because affective processing would be helpful to motivate protective action (e.g., E. Peters & Slovic, 2000; Witte, 1998; see also Marx et al., 2007; Weber, 2006). For another, affective processing might occur for a different reason than for concern or worry and further hamper action on climate change. Specifically, responding to climate change requires sacrifices and displeasing changes from individuals (e.g., lifestyle changes such as spending holidays at home) which may result in negative affective reactions towards climate change mitigation (cf. Gifford, 2011; Lorenzoni et al., 2007).

The absence of affective processing as well as negative affective evaluations of climate change responses are likely to create the impression that action on climate change is unnecessary and undesired. This affective analysis is particularly important because affective processing tends to dominate analytical processing in general and especially when they are in conflict (Fagerlin et al., 2005; Jenni & Loewenstein, 1997; Loewenstein et al., 2001; see also Marx et al., 2007; Weber, 2010). This means that even though an analytical analysis of climate change may lead to the conclusion that responses are necessary, this analytical conclusion will be of secondary importance and not increase action as long as it disagrees with the outcome of affective processes (cf. Weber, 2010).

From the dual-process perspective the two proposed solutions to overcome climate change inaction – localising and fear appeals – are very promising: Focussing on local climate change impacts is expected to increase the salience of personal consequences, which in turn should lead to more affective involvement and ultimately enhance people's willingness to respond to climate change (Lorenzoni & Pidgeon, 2006; Weber, 2006, 2010). Similarly,

directly playing at people's emotions should also increase people's motivation to act (Lorenzoni & Pidgeon, 2006; Marx et al., 2007; Weber, 2006, 2010). From this perspective there are two notable features of previous studies that have tried to increase individual action on climate change through localising and eliciting emotions. First, the failure of previous attempts to increase people's motivation to respond to climate change by making its local consequences more salient are surprising if not disappointing (Shwom et al., 2008; Spence & Pidgeon, 2010). According to this theoretical perspective they should be more effective. Second, it seems somewhat surprising that the more direct – and therefore potentially more effective – strategy of appealing to people's emotions has not been implemented more often, especially given that there is ample evidence from cognate fields that this approach is a powerful motivator of protective action (cf. Maibach et al., 2008; Spence & Pidgeon, 2009).

### **Perspective two: Construal Level Theory**

Construal Level Theory (Trope & Liberman, 2003, 2010) is the second theoretical approach that is helpful to discuss the two proposed solutions to increase individual action on climate change. Construal Level Theory starts from the assumption that humans can only directly experience the present situation. Everything that is removed from the current situation needs to be mentally construed. To illustrate, eating ice-cream directly triggers sensory reactions that are transmitted to the brain and signal that this is a pleasant experience. However, the memory or anticipation of eating ice-cream or watching someone else eating ice-cream does not lead to the same sensory reactions. In these cases, people need to mentally construe what it means to have ice-cream.

According to Construal Level Theory, humans can distance themselves from their present situation along four dimensions of psychological distance. The first dimension is time. Some things happen right now (e.g., eating ice-cream), while others happened in the past (e.g., eating ice-cream as a child) or will only happen in the future. The second dimension concerns space. People can think about things that are close (e.g., about ice-cream while

waiting in a queue of an ice-cream seller) or distant (e.g., ice-cream in the supermarket freezer). Third, things may be socially close (e.g., a friend) or distant (e.g., a stranger). Fourth, some things are certain (e.g., eating ice-cream right now) while others are hypothetical (e.g., planning to have ice-cream after lunch next Sunday). Put differently, psychological distance refers to the perception of when, where, to whom, and whether an event occurs (Trope & Liberman, 2010). Construal Level Theory argues that these dimensions are linked to each other. For example, imagining eating ice-cream in the future means that it is also a hypothetical activity. An empirical example of how different dimensions of psychological distance are linked is provided by Wakslak (2012). She investigated how strongly people spontaneously associate the dimensions of geographical distance and likelihood (i.e., hypotheticality). More specifically, the participants in her study read about two proteins that might be found in the blood of cats. The crucial difference between the two proteins was that one was uncommon – and therefore unlikely to be found in cats – while the other was common – and therefore likely to be found in cats. In line with the idea that dimensions of psychological distance are linked to each other, Wakslak (2012) found that study participants expected the common and more likely protein to be found among cats living nearby. By contrast, participants believed the uncommon and less likely protein to be more prevalent among distant cats. In other words, participants matched the dimension of hypotheticality and spatial distance.

Importantly, thinking about psychologically proximal versus distant things affects how they are mentally represented. Construal Level Theory proposes that the further away an object is from the present situation of a person, the more effort is necessary to construe it, and the more abstract and generalised the resulting mental representation will be (high-level construal). Conversely, the present situation offers a lot of context-specific information and is rich in details; it involves none or only little mental construal (low-level construal). A metaphor that nicely illustrates the differences between concrete low-level versus abstract

high-level construals is that “from a distance we see the forest, and as we get closer, we see the trees” (Trope & Liberman, 2010, p. 444); with a proximal perspective, people may see details such as difficult types of trees, branches, leaves, as well as other plants and various types of animals. However, when people see the same things from farther away, they form a more abstract representation of it. The details dissolve into a higher-order representation.

Varying psychological perspectives have multiple consequences on how individuals process and represent information. For example, Liberman and colleagues (2002) asked participants in an experiment to imagine themselves in various situations such as going to a camping trip in either the distant (in a year) or near future (next weekend). Then participants were asked to group various objects (e.g., tent, matches, blanket) into as many categories as they thought appropriate. As expected, participants who had a more distant perspective and therefore a more general and abstract thinking style grouped the objects in fewer categories than those who had a more proximal perspective and a more concrete mind-set. In addition to these effects on categorization, psychological distance seems also to influence other mental processes such as causal attribution, construal of the self, visual perception, perception of other people’s actions, or how pictures and words are processed (for an overview, see Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2010). The bottom line here is that when people think of an object as close versus distant on any of the four dimensions of psychological distance, they form different mental representations of it, make different choices, and have different preferences (Trope & Liberman, 2010). To quote the founders of the theory: “We make choices and set preferences with respect to our construals of objects rather than the objects themselves” (Trope & Liberman, 2010, p. 451).

An important function of psychological distance and the corresponding level of mental construal is that they influence what information people preferentially attend to when they think about an object or when they make decisions. For instance, Ledgerwood and colleagues (Ledgerwood, Trope, & Chaiken, 2010) found that participants with a proximal and concrete

perspective (i.e., low-level construal) considered primarily low-level incidental circumstantial information (i.e., other people's opinion) when they evaluated a policy. Conversely, when participants with a more distant (abstract) mind-set evaluated the same policy, they were guided by their values, which are commonly regarded as broad orientations that are relatively stable across time and different situations (i.e., high-level construal). Eyal, Sagristano, Trope, Liberman, and Chaiken (2009) found the same pattern with regard to behavioural intentions: When intentions were represented in the distant future (i.e., high-level construal, abstract), values better predicted intentions, whereas (low-level, context-specific) feasibility considerations were better at predicting intentions in the near future (see also Rabinovich, Morton, & Postmes, 2010).

The reasoning based on Construal Level Theory in general and these findings in particular have important implications for the ideas to increase people's motivation to act on climate change by localising and by eliciting fear. First, these findings suggest that people do not necessarily require personal experiences to be sufficiently motivated to act. When people have a distant perspective, the right information, for example high-level construal values, may be a very good motivator of action. It is also important to note that research carried out within this theoretical framework has shown that distance and personal involvement are largely independent of each other – as long as the event or decision projected into the distance will somehow and sometime become relevant to the individual (e.g., Ledgerwood, Trope, et al., 2010; Ledgerwood, Wakslak, & Wang, 2010). As such, objects that are distant to us do not automatically imply less involvement or engagement than more proximal objects.

Thus, according to construal level theory, distance is neither a barrier to action *per se* nor can it be expected that localising and personalising the consequences of climate change will have a direct effect on people's willingness to respond to climate change. Importantly, this is not to suggest that psychological distance is irrelevant in the context of how people think about climate change and possible response. Distance *does* play a role in how people

relate to climate change. But from the perspective of Construal Level Theory the influence of perceived distance is more complex than suggested by the dual-process perspective.

To recapitulate, when people have a distant focus, the main implication of this is that they are expected to rely more on abstract high-level information (e.g., their own values) for representing climate change, its consequences, and potential response strategies. Shifting people's focus to local climate change should lead people to preferentially consider concrete low-level information (e.g., other people's opinions or feasibility considerations). Considering that distance influences what evaluations and intentions are based on – rather than directly affecting people's motivation to act – it is not surprising that previous localising attempts (Shwom et al., 2008; Spence & Pidgeon, 2010) did not find any impact of distance framing on the level of policy support and attitudes towards climate change mitigation (for a more detailed discussion, see Chapter 5).

Similarly, there might be more complexity to the idea of motivating action through emotions such as fear and worry than suggested by the dual-process perspective. Specifically, theory and empirical evidence suggest that these emotions are more important when people are focussed on psychologically proximal objects or decisions (i.e., when they have a concrete mind-set). The theoretical reason for this proposition is that affective processes are evolutionarily old and had served human ancestors to react to challenges and opportunities arising from their immediate (i.e., psychologically proximal) environment (Chang & Pham, 2013; Pham, 2007). It is further argued that – through adaptation and natural selection – the orientation of affective processes towards the present has endured (Chang & Pham, 2013; see also Ekman, 1992, 1999, who argues that some emotions are innate).

Some empirical studies support the view that emotions are more important for psychological proximity. For example, emotions relating to the immediate situation are more accessible and intense than those in the distance (Loewenstein, 1996; Van Boven, White, & Huber, 2009). There is also some evidence for the idea that emotions (i.e., the whole affective

system) are primarily influencing decisions regarding proximal objects (for initial empirical support with regard to temporal proximity, see Chang & Pham, 2013) but lose their relevance as psychological distance increases. Importantly, in a study that explored attitudes towards underground carbon dioxide storage it was found that attitudes towards nearby storage were mainly influenced by affect while attitudes towards storage in general (i.e., psychologically more distant and abstract) were more strongly influenced by more abstract benefit beliefs (Midden & Huijts, 2009). Thus, from the perspective of Construal Level Theory, affective processes – similar to psychological proximity – cannot be expected to increase people’s motivation to respond to climate change *per se*. Affective processes are arguably more relevant when people have a psychologically proximal perspective (i.e., when they have a low-level construal mind-set, see also Woltin, Corneille, Yzerbyt, & Förster, 2011); but they seem less relevant when people have a distant (i.e., high-level construal) mind-set.<sup>4</sup>

To summarize, from the perspective of Construal Level Theory, the two explanations that people do not respond more strongly to climate change because they cannot experience it personally and therefore do not worry enough and because they perceive climate change as a distant threat seem incomplete. Lack of experience and perceived distance may indeed act as barriers. But these barriers are not insurmountable. Provided with the right information, that is, information that fits people’s current mind-sets, action on climate change does not necessarily require emotional engagement and is equally likely with a distant and proximal perspective. Importantly, from this perspective it can be expected that psychological distance and affective processes interact: Psychological distance is likely to determine when affect is important for perceptions and decision-making and when it is not. Specifically, it can be

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<sup>4</sup> Because emotions can differ with regard to their level of construal, their role in perception and decision-making is actually even more complex. For a more detailed discussion of this, please refer to Chapter 4.

expected that concrete (i.e., low-level construal) emotions are more relevant when people have a proximal perspective on climate change than when they have a more distant perspective.



## Chapter 2 – Summary, goals, and thesis structure

This introduction illustrated that climate change already has negative consequences on human and natural systems and will continue to do so (e.g., Füssel, 2009; IPCC, 2007a). Current levels of responding to climate change are insufficient at all levels of society and the planet is headed to an extent of change that is considered dangerous (Anderson & Bows, 2011; G. P. Peters et al., 2013). It is therefore important, and urgent, to find ways to increase individuals' motivation to mitigate climate change and to adapt to its consequences (Stocker, 2012).

Previous research has identified a number of psychological barriers that prevent individual action (Gifford, 2011; Lorenzoni et al., 2007). Two particularly important barriers are the difficulty to personally experience climate change and the fact that people see climate change as a distant issue that does not concern them (e.g., CRED, 2009; Weber, 2010). One frequently suggested approach to overcome these problems is the idea of making local and personal impacts of climate change more salient. However, empirical evidence is scarce with regard to this suggestion and the available findings are not as positive as one might expect. Moreover, the analysis of the localising approach from the perspective of Construal Level Theory (Trope & Liberman, 2010) suggests that a direct positive effect of zooming in on local climate change on people's motivation to respond to climate change is unlikely. Given the inconclusive results of previous attempts to localise climate change and the Construal Level Theory based analysis, it seems promising to explore the localising approach from this perspective.

With regard to the other important barrier, the difficulty to experience climate change and the corresponding assumed lack of affective processing, it has been noted that purposefully eliciting relevant emotions such as worry or fear *could* be helpful to motivate action (e.g., Maibach et al., 2008; Weber, 2006), especially given that this strategy has been

proven successful in another context (i.e., promoting healthy behaviour; Witte & Allen, 2000). Yet, while researchers interested in climate change communication seem to almost universally acclaim the idea of localising climate change to promote action among the public (e.g., CRED, 2009; Lorenzoni & Pidgeon, 2006; Moser & Dilling, 2007; Nicholson-Cole, 2005; O'Neill & Hulme, 2009; for a more critical appraisal of this strategy, see Devine-Wright, 2013), they caution or even advise against eliciting negative feelings such as fear to motivate action on climate change (e.g., Hulme, 2008; Moser, 2007; O'Neill & Nicholson-Cole, 2009; Wolf & Moser, 2011). While caution with fear appeals is certainly warranted given its potential to backfire (e.g., Good & Abraham, 2007; Witte & Allen, 2000), the unanimous (and at times vehement) reluctance to use negative emotions seems disproportionate. Thus, given the compelling evidence from cognate fields that fear appeals can promote harm-reducing behaviour, it seems worthwhile to examine possible beneficial effects of fear.

Given these ideas, the overarching objective of this thesis was to empirically address the question of how negative emotions (in particular fear) and psychological distance (in particular spatial distance) influence how people think about climate change and whether or not they are willing to support climate change response measures. To this end, four studies, organised in three empirical chapters<sup>5</sup>, were carried out that examined the role of fear and psychological distance based on both cross-sectional correlational data and experiments. That is, negative emotions and psychological distance were either assessed and related to other variables or were systematically varied to explore the direct (and indirect) consequences of this.

The first two studies were more explorative in nature. As such, these made use of a larger set of variables and broader measures to capture connections between psychological

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<sup>5</sup> Note that each empirical chapter is intended to be read as a stand-alone piece of work, and hence there is some repetition of ideas in the respective introductions.

processes and behaviourally-relevant outcomes. To illustrate, Studies 1 and 2 (Chapter 3) asked people about whether they had any negative feelings about climate change and how strong these were. Psychological distance was explored with two different perspectives on climate risks: One set of items asked people about their perception of local (i.e., spatially proximal) risks while a second set of items assessed their sense of global (i.e., spatially distant) risks. These first two studies also explored the relevance of other social-psychological variables (e.g., scepticism, environmental attitudes) in terms of support for climate change responses (both mitigation and adaptation) and related them to negative emotions and perceived risk.

Study 3 (Chapter 4) and Study 4 (Chapter 5) then focussed more strongly on the causal effects of *localising* climate Change (Chapter 4 and Chapter 5) and *eliciting negative emotions* (Chapter 5) as strategies to engage the public more strongly with climate change. In order to explore the effects and processes prompted by manipulating fear and distance, it was helpful to include more extensive and specific measures of fear and psychological distance as well as additional process variables. For example, we<sup>6</sup> assessed fear by asking participants to rate how intensively they experienced six fear-related feelings when they thought about climate change. Exploring the effects of localising and fear appeals also implied adding variables that tried to capture the processes triggered by these strategies (e.g., perceived manipulateness of fearful messages).

The inclusion of additional questions also meant that the initial breadth could not be maintained. For this reasons, the social-psychological variables at the focus of our investigations narrowed progressively across studies. Similarly, while Studies 1, 2 (Chapter 3), and 3 (Chapter 4) explored people's support for mitigation and adaptation, the focus of

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<sup>6</sup> Although this thesis represents my own work, throughout when developing the rationale for specific studies I have used collective pronouns, like “we” and “our”, to acknowledge that the idea arose from a collective process of discussion between me and my supervisors.

Study 4 (Chapter 5) was limited to support for mitigation, which is the most commonly studied individual response to climate change.

Through all studies, people's engagement with climate change was assessed perceptually and in terms of their willingness to support particular response measures. More specifically, we asked people to rate the risks of local and global climate change consequences. These risk perceptions are important because individuals' perception of being threatened can be an important motivation to react to the respective risk (e.g., Floyd, Prentice-Dunn, & Rogers, 2000; Miceli et al., 2008; Zaalberg, Midden, Meijnders, & McCalley, 2009). The distinction between local and global risk perceptions was also important because it allowed us to relate different scales of perceived risk to each other and to better understand the effects of fear appeals and localising on these different scales (for more details, see Chapter 3).

In terms of the willingness to respond to climate change, we assessed people's support for different policies and their willingness to change their personal behaviour. Asking people about their support for personal and societal responses to climate change is in line with the idea that climate change needs to be tackled on all levels of society (see section "Consequences of climate change and possible responses" in Chapter 1).

In terms of the theoretical frameworks used to formulate hypotheses and to reflect on the findings, Studies 1 and 2 (Chapter 3) started from assumptions based on the dual-process perspective. However, the interpretation and discussion of the findings suggested that this perspective might be incomplete and that Construal Level Theory could be helpful to better understand them. More specifically, Studies 1 and 2 revealed a strong association between global risk perceptions and policy support on the one hand and a strong association between local risk perceptions and personal intentions on the other hand. While these results were difficult to explain from the dual-process perspective, they were in line with what could be

expected from the perspective of Construal Theory (i.e., a match between spatial distance and social distance).

Study 3 (Chapter 4) further developed the ideas that Studies 1 and 2 stimulated. Specifically, Study 3 explored the possibility that the perceived distance of climate change could moderate what people rely on when they think about climate change and possible responses (see also section “Two theoretical approaches to contextualize lack of worry and perceived distance”). Put another way, a major goal of Study 3 was to explore a possible explanation of why previous attempts to localise climate change were not as successful as might have been expected on the basis of the dual-process perspective (Shwom et al., 2008; Spence & Pidgeon, 2010). The hypotheses that people would rely more on concrete emotions (i.e., fear) when they had a proximal perspective and more on abstract beliefs (i.e., scepticism) when they had a distant perspective were partially confirmed.

Study 4 (Chapter 5) was intended to replicate and corroborate these findings in a more complex design that avoided some of the shortcomings of Study 3 (e.g., manipulating instead of measuring fear). In addition, this study explored an alternative explanation of why previous localising attempts did not reveal the expected positive effects on people’s motivation to take action on climate change. Specifically, Study 4 addressed the question of whether localising might trigger defensive processes that counteract its motivating effects. This hypothesis was mainly based on the observation that the localising approach bears significant similarities to fear appeals, which are known to trigger such antagonistic defensive processes (e.g., Witte & Allen, 2000; for more details, see Chapter 5). While the findings of Study 4 suggest that such antagonistic effects exist with regard to fear appeals and localising, the moderating role of distance found in Study 3 could not be replicated when fear was *manipulated* (but almost identical interaction effects emerged when *measured* fear was used as moderator).

Together, the four studies reported in this thesis strongly suggest that fear and psychological distance play important roles in people’s perception of climate change as a

(non-)risk and their motivation to respond to climate change by supporting mitigation and adaptation measures. Yet, the influence of fear and psychological distance seems considerably more complex than one might expect at first glance, and based on the ways in which at least one of these processes (i.e., distance) is discussed in the climate change literature. Study 3 (Chapter 4) suggested that psychological distance does not – as is often assumed – directly influence people’s motivation to take action but rather acts as a moderator of what information people preferentially take into account when they think about climate change at possibly responses. Study 4 (Chapter 5) again qualified the idea that simply localising climate change will motivate action by showing that this strategy initiates defensive processes, very similar to those known from research on fear appeals.

The main implication of these findings for researchers and practitioners is that they take into account that localising is most probably not the panacea to engage people with climate change and that a more deliberate use of this strategy seems good advice. Also, using fear appeals is a much more promising motivator of action than one might think when reading the literature on climate change communication. The implications of these findings, and their meaning for theory and practice, are elaborated in the General Discussion (Chapter 6).

## **Chapter 3 – The effectiveness of negative affect and local versus global risk perceptions as predictors of adaptation and mitigation**

### **Introduction**

Climate change has already led to changes in the natural and human environment and will continue to do so (e.g., Füssel, 2009; IPCC, 2007a). Many of these changes will be negative: loss of biodiversity, more frequent severe weather events and rising sea level, to name a few; but some changes will be positive, for example increased agricultural outputs and tourism in some places. To respond to these challenges, societies around the world are faced with two related but separate strategies. The first strategy involves reducing the magnitude of future climate change by cutting greenhouse gas emissions (e.g., reduction of energy consumption) and enhancing greenhouse gas sinks (e.g., afforestation). Measures intended to reduce greenhouse gas emissions and their concentration in the atmosphere are referred to as climate change *mitigation* (IPCC, 2007b).

However, no matter how much effort is made to mitigate against climate change, the planet is already committed to a certain level of climate change (IPCC, 2007a). As such, mitigation alone will not be enough. It is also important to prepare for and deal with the negative consequences of climate change – thereby reducing the vulnerability of people and nature against its likely effects – as well as taking advantage of the positive consequences of climate change. This second response to climate change is referred to as *adaptation* (IPCC, 2007c). While the notion of adaptation comprises both spontaneous reactions and pro-active measures for future events, the focus of our paper lies in the latter variation.

For an effective response to climate change, communities at the local, national, and global level need to adopt both strategies in conjunction (IPCC, 2007b). Implementing these response strategies, however, is challenging not least because it requires public support. To

illustrate, most mitigation and adaptation measures directly affect people's everyday lives: Policies that ban fuel-inefficient cars restrict people's choices; wind farms (to generate carbon-free electricity) alter the scenery and for some the immediate neighbourhood; new building codes (e.g., water resistant doors) to improve flood prevention require people to amend their houses, and the protection of vulnerable outdoor places (e.g., hiking trails) by closing access may force people to change the way they spend their leisure time. If public support is weak and priorities lie elsewhere, then unpopular mitigation and adaptation measures will meet resistance, those already implemented risk being revoked and the policy-makers responsible may find themselves out of office. It is, therefore, crucial to understand what makes people approve of (or oppose) mitigation and adaptation policies.

Understanding how members of the public view mitigation and adaptation is also important because of the decisions they make and the actions they take (e.g., lifestyle choices). Individuals matter because their share of greenhouse gas emissions is substantial (e.g., Committee on Climate Change, 2010; Federal Statistical Office, 2009; Gardner & Stern, 2008). More importantly though, households can cut as much as 20% of their carbon emissions without any noteworthy discomfort (Dietz et al., 2009; for an even higher estimate, see A. Druckman & Jackson, 2010). Individual motivation is also paramount in terms of adaptation: the responsibility of many adaptive responses entirely lies with individuals (e.g., behaviour during heat-waves, Wolf, Adger, Lorenzoni, Abrahamson, & Raine, 2010). In short, if mitigation and adaptation are to be successful, both as individual and collective (i.e., policy) responses, it is important to understand what motivates people to support each of these strategies (Wolf & Moser, 2011).

### **The relationship between mitigation and adaptation**

While climate change experts agree that both mitigation and adaptation are necessary, currently there is very little knowledge about the relationship between people's support for



mitigation and their support for adaptation. Conceptually, three relationships between mitigation and adaptation can be postulated: (1) A negative relationship, where the public consider mitigation and adaptation as competing alternatives – that is, people either favour mitigation or adaptation and discard the other. (2) A positive relationship, where people similarly support (or oppose) mitigation and adaptation. (3) There is no systematic relationship between support for mitigation and adaptation.

The first possibility, a *negative relationship* between the two response strategies, mirrors how the interest in mitigation and adaptation developed over time. Until recently, researchers and policy-makers almost exclusively focused on mitigation (Klein, Schipper, & Dessai, 2005; Schipper, 2006). One of the reasons was that focusing on adaptation evoked negative associations such as being “defeatist”, “fatalistic”, or not willing to act (for a more detailed discussion about why mitigation was preferred over adaptation, see Schipper, 2006). Members of the public might take a similar stance and favour mitigation over adaptation.

Next to the historical development, there are important differences between mitigation and adaptation that on their own could create a divide between support for the two response strategies. The most striking difference is probably the temporal and spatial scale at which the two strategies work (Füssel & Klein, 2006; Klein et al., 2005; Tol, 2005). Mitigation requires immediate action but – due to the inertia of the climate system – it will take decades before mitigation efforts will show their benefits. By contrast, adaptation measures typically focus on short or medium term problems and often yield immediate benefits. With regard to space, effective mitigation must be implemented globally and will also have global benefits while adaptation efforts and benefits are constrained to the regional or local level (e.g., Klein et al., 2005). There are a number of individual differences that could lead people to more strongly support early versus late action or local versus global solutions.<sup>7</sup> To illustrate, people differ

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<sup>7</sup> Note, however, that differences in scale are only likely to lead to different preferences for mitigation and adaptation when people are aware of these spatial or temporal differences.

with regard to how strongly they incorporate thoughts about the future in their decisions (Strathman, Gleicher, Boninger, & Edwards, 1994; Zimbardo & Boyd, 1999). It could be argued that the more relevant considerations about the future are for one's decisions, the more one is willing to support mitigation measures, which are costly now but bring benefits in the future. Similarly, people differ in terms of how much different places mean to them (e.g., Altman & Low, 1992). One person may, for example, have strong local roots and be extremely attached to her neighbourhood or town while being indifferent to regional, national, or international concerns. At the other extreme, another person might travel a lot and see herself as a citizen of a her country or even as a global citizen; this second person would be more likely to feel attached to several places or to the planet as a whole (cf. Devine-Wright, 2013). Thus, depending on how people relate to places at different spatial scales, climate change impacts and responses will be more or less relevant to them. A person who is predominantly attached to proximal places will be more concerned about proximal consequences and response options while a person who is attached to the whole planet might be more concerned about what happens globally rather than proximally (for an overview on the relationships between place attachment and climate change, see Devine-Wright, 2013).

Another important reason that might lead to a negative relationship between mitigation and adaptation is that some people might favour adaptation over mitigation because it provides them with an excuse to do nothing. To illustrate, some see adaptation as waiting and seeing instead of acting now (cf. Monckton, 2011). This perspective makes adaptation a much more convenient solution than mitigation, which requires substantial changes to one's lifestyle (e.g., travelling less, giving up one's car). In sum, there are major differences between the two strategies that can lead people to favour either mitigation or adaptation (for an example of the latter, see Tol, 2005).

Despite the historical development and incontestable differences between mitigation and adaptation, a positive relationship, that is, *joint support* for (or opposition to) the two

strategies, is not implausible. After all, their common goal is to avoid negative consequences for the human and natural environment. If people's support for mitigation and adaptation is guided by a broader perspective that integrates both strategies as a common response to threats associated with climate change, then people who support one strategy, for example because they value nature, should also support the second strategy. Similarly, people who do not believe in or care about such threats (i.e., climate change "sceptics") will probably see no reason to support either response strategy.

Lastly, there are at least two reasons for why the relationship between mitigation and adaptation may be *unsystematic*. First, the media typically frame climate change mitigation and adaptation independently of each other. To illustrate, in an analysis of media frames, Olausson (2009, p. 432) concluded that "The two frames [mitigation and adaptation] exist parallel to each other, in different contexts, hardly ever appearing in the same news items". This makes it difficult for laypeople to relate the two strategies to each other. Second, it is possible that the way different people relate mitigation to adaptation varies strongly (e.g., some people may support both strategies because of their common goal, others favouring one strategy because of its specific characteristics). In this case the pattern between the two strategies could look unsystematic (i.e., zero-relationship) when individual levels of support are aggregated. In sum, good reasons can be advanced for a negative, positive, or unsystematic relationship between mitigation and adaptation. However, without empirical data, arguing which of these possible relationships is more plausible comes close to mere guessing.

Accordingly, this research will explore the relationship between support for mitigation and adaptation in a direct and in an indirect way. Directly, we will examine the correlations between different forms of mitigation and adaptation (i.e., personal actions and support for broader societal responses). Indirectly, we will investigate people's motives to mitigate and to adapt to see if these reflect common or different bases of support. To this end, we draw on

social psychological variables that are widely used in the context of climate change and have the potential to identify specific motives to mitigate and to adapt.

## **Individual's motivation to support mitigation and adaptation**

### **Climate change scepticism**

*Support for mitigation.* One factor that is crucial for people's motivation to mitigate climate change is the extent to which people believe or doubt that climate change is happening, that it is caused by human behaviour, and that it will have serious effects. Scepticism – sometimes also referred to as its antipode “belief in” or “knowledge about” climate change – is an important factor because if people do not believe that climate change is a real and human-made phenomenon, it is unlikely that they will be concerned about it, and even less likely that they will act upon it (Poortinga et al., 2011).

In line with this reasoning, some studies showed that higher levels of scepticism are associated with lower levels of support for mitigation (Joireman et al., 2010; Leiserowitz, 2006). Others, however, have found no relationship between scepticism and mitigation support (Brody, Grover, & Vedlitz, 2012; Tobler, Visschers, & Siegrist, 2012a). It is unclear to what this inconsistency is due. To some extent this may be due to methodology, for example the specific questions used to assess scepticism (e.g., the inclusion of general natural science questions, Brody et al., 2012) or the way the scales were calculated (e.g., arithmetic mean in Joireman et al., 2010 vs. principal component analysis in Tobler et al., 2012a) might have caused differences.

*Support for adaptation.* There is some evidence that people low in scepticism are more likely to take actions to mitigate and adapt to climate change than those high in scepticism (Blennow & Persson, 2009; Morton et al., 2011). However, it is also plausible that *high* levels of scepticism could be associated with *more* support for adaptation, especially if adaptation is understood as waiting and seeing instead of acting now (cf. Monckton, 2011). Some sceptics

support adaptation because they think of it as a natural reaction to changing climates that has happened since the beginning of time (e.g., Driessen, 2009). Hence, it is possible to imagine that research could reveal that high levels of scepticism coincide with support for adaptation depending on what that scepticism is based (i.e., the concept of climate change in general, or more specifically anthropogenic climate change) and how adaptive measures relate to this.

### **Attitudes**

There are at least three related sets of attitudes that are relevant in understanding people's motivation to respond to climate change: Attitude towards nature, attitude towards environmental protection, and attitude towards addressing climate change. All three attitudes refer in some way to the environment but have slightly different foci. While attitude towards nature captures people's evaluation of nature in general, attitude towards environmental protection focuses on people's views of conserving the environment, and attitude towards addressing climate change is concerned with people's evaluation of the idea and necessity to respond to climate change.

One important reason why *attitudes referring to nature* and *environmental protection* are considered relevant in the present context is that climate change has until recently almost exclusively been framed as an environmental problem (cf. Barnett, 2010). Correspondingly, the general population is well aware that climate change will harm the environment (cf. Whitmarsh, 2009b) and their attitude towards nature and towards environmental protection should play some role in accounting for individual differences in mitigating climate change.

*Support for mitigation.* Previous research confirms that people with strong pro-environmental attitudes are more likely to mitigate climate change (Dietz et al., 2007; O'Connor et al., 1999; Shwom et al., 2010). Given that people who positively evaluate environmental protection usually also hold positive attitudes towards nature in general (e.g., Brügger, Kaiser, & Roczen, 2011), we expect the relationship between attitude towards nature and support for mitigation to be positive too.

*Support for adaptation.* Adaptation has multiple foci – for example maintaining human safety – so the protection of the environment is less prominent than in mitigation (IPCC, 2007a). We therefore assume that attitude towards nature and attitude towards environmental protection will be positively related to support for adaptation, but not as strongly as these attitudes are related to support for mitigation.

### **Risk perceptions**

Without a sense of risk, action is likely to seem unnecessary even if the individual has positive attitudes about those actions in principle. Accordingly, the extent to which people feel at risk from climate change could be one additional factor that is necessary for getting people to act on their positive attitudes.

Risks can be processed in two different ways: Analytically and affectively (for an overview, see Evans, 2008). The *analytical* processing mode is thought to be slow, deliberative, and conscious. It deals with abstract symbols, numbers and is used to think about the future or hypothetical events. The *affective* processing mode, on the other hand, is fast and does not need any conscious effort. It relies on intuition, experiences, images, and associations (Epstein & Pacini, 1999; Slovic et al., 2004).

Within analytical risk perception another differentiation should be made when dealing with climate change: that of generalised risks (e.g., to other people) and the risks that are seen to be self-relevant to the individual contemplating action. Typically, people estimate the risks to others to be greater than those to themselves (i.e., they exhibit relative optimism: Weinstein, 1980) something that can interfere with taking action because it deflects personal relevance and responsibility. This type of thinking has also been highlighted in relation to the risks of climate change: People generally perceive climate change as a distant threat, as something that affects strangers, happens in remote times and places, rather than here and now (e.g., Leiserowitz, 2006; Lorenzoni et al., 2007; O'Neill & Nicholson-Cole, 2009). The perception of climate change as a distant threat could thus lead to the perspective that climate

change risks are irrelevant to the individual and that there is no need for personal action. Put the other way round, when climate change is perceived as a phenomenon with local consequences, then people should also have a greater sense of urgency, responsibility, and should ultimately be more motivated to respond to climate change (CRED, 2009; Moser & Dilling, 2007; O'Neill & Nicholson-Cole, 2009; Spence et al., 2011).

*Support for mitigation.* When used to explain people's willingness to engage in mitigation behaviours or to support policies aimed at preventing further climate change, both analytic and affective appraisals of risks have been found to be reliable predictors: The more people considered climate change as a risk and the more negative feelings they had about it, the more they were willing to mitigate (Brody et al., 2012; Dietz et al., 2007; Leiserowitz, 2006; O'Connor et al., 1999; O'Connor, Bord, Yarnal, & Wiefek, 2002).

To our knowledge, no research is available on the assumed superiority of local risk perceptions over global risk perceptions as a predictor of mitigation support. Although the common assumption that an increased sense of local risks motivates people to mitigate (CRED, 2009; Moser & Dilling, 2007; O'Neill & Nicholson-Cole, 2009; Spence et al., 2011) makes intuitive sense, the global scale at which mitigation works (e.g., Klein et al., 2005) suggests that global risk perceptions could also be positively linked to support for mitigation. A fact that supports this idea is that people may not only have strong bonds with proximal places such as their neighbourhood or town but also with their country or even with the whole planet (cf. Devine-Wright, 2013). More importantly, some people are actually *more* concerned about "places" at a more distant or abstract level (e.g., country, planet) than they are about proximal places (e.g., their towns; see Devine-Wright, 2013). Hence, there are theoretical reasons for and against the superiority of local risk perceptions over global risk perceptions as a predictor of mitigation support.

*Support for adaptation.* The relevance of risk perceptions for adaptation support is less clear. Most studies that investigated climate change risk perceptions found no relevant (or

only a negligible) link with people's level of adaptation support (Esham & Garforth, 2013; Grothmann & Reusswig, 2006; Hoffmann, Sprengel, Ziegler, Kolb, & Abegg, 2009; Tucker, Eakin, & Castellanos, 2010). This is unexpected, as it conflicts with theoretical work that considers risk perceptions as a crucial factor for people's motivation to act in response to climate change (e.g., Grothmann & Patt, 2005; Stewart, 2009) and is inconsistent with more general research on hazard preparedness, which typically finds that risk perceptions are strongly related to people's willingness to take preventive measures (e.g., Lindell & Perry, 2000; Neuwirth et al., 2000).

The distinction between local and global risk perceptions also warrants some comments with regard to adaptation. As outlined before, adaptation is often considered to be a predominantly local issue (Adger, 2001; Füssel & Klein, 2006; Tol, 2005). Combined with the notion that high levels of local risk perception are associated with more willingness to respond to climate change, this leads to the expectation that local risk perceptions will be more important for people's motivation to adapt to climate change than global risk perceptions.

### **Summary and research aims**

An effective response to climate change requires the public to jointly support mitigation and adaptation measures. A key problem with this requirement is that, to our knowledge, no research is available on how the public relates these two strategies to each other. Are mitigation and adaptation considered as a common response strategy to address climate change, as mutually exclusive alternatives, or are preferences for these strategies so heterogeneous that no systematic overall pattern is discernible?

The main goal of this research was to assess the general public's support for different forms of mitigation and adaptation and to relate the levels of support for these measures with each other. To this end we conducted online surveys in two European countries in which we



(1) investigated correlations between different forms of support for mitigation and adaptation and (2) compared how well social psychological predictor variables accounted for individual differences in support for mitigation and adaptation. This second, more indirect approach of using social psychological variables as predictors of mitigation and adaptation enabled us to learn more about how (dis-)similar the reasons for supporting the two response strategies were. Specifically we investigated attitudes with different foci, scepticism, affective risk perception, and analytical risk perceptions. The selection of variables we used to predict support for mitigation and adaptation, although not exhaustive, covers the psychological variables most widely used to explain people's motivation to respond to climate change and have the potential to reveal different motivations to support mitigation and adaptation.

## **Methods**

### **Design and Participants**

We conducted two online surveys in Spring 2010, the first in the UK, the second in Switzerland. Even though comparisons between the two surveys are made in this chapter, the two studies were not originally planned and carried out with the intention of comparing them. Note also that the Swiss survey was part of a larger survey where certain questions were already predetermined. This is also the reason why some questions and measures differ between the Swiss survey and the UK survey.

In the UK sample, we recruited participants primarily through adverts that were displayed on the websites of two newspapers with an assumed different readership (i.e., “The Daily Mirror”, approx. 30%; “The Independent”, approx. 55%). The rest of the participants were recruited from the Internet (e.g., using Facebook ads). Participants were told that the survey was about their attitudes towards current affairs and how they used different media. Participants were first asked to indicate which current newspaper headlines they recognised. The survey then asked respondents about how they used various media (the results from the

recognition task and on the use of media are not reported here). Participants were then assigned an alleged random topic of current interest – which always was “climate change” (ethical approval for this deception was granted by the department’s ethics committee). We asked them about their views on climate change and their willingness to support mitigation and adaptation strategies. The survey concluded with socio-demographic questions and preferences regarding a potential win in the prize draw. The survey took about 25 to 30 minutes to complete. Out of 1293 people who started the survey, 641 (49.6%) completed at least 80% of all questions, which we used as minimal inclusion criterion to achieve good data quality. In addition, we excluded those participants not living in the United Kingdom. The proportion of females among the remaining 616 participants was 41.6%, the proportion of males was 45.6% (12.8% did not report their sex). On average, people were 39.1 years old ( $SD = 13.4$ ; range: 13 to 83; 74 persons did not report their age).

In the Swiss survey, we sent an email to people who had participated in a previous research project on environmental attitudes and pro-environmental behaviour (Brügger et al., 2011) and asked them to take our online survey. The survey was framed as a follow-up to examine how attitudes and behaviours develop over time. Out of 586 people we contacted, 341 (58.2%) completed the questionnaire online. The first part of the questionnaire asked participants about their attitudes towards nature and environmental protection. The survey then gave participants a description of climate change (59 words) plus a deliberately short definition of mitigation (efforts to reduce climate change, 25 words) and adaptation (support human and natural systems to deal with climate change impacts, 22 words). Next, we asked participants to what extent they were willing to support mitigation and adaptation policies, how likely they considered specific climate change risks, and how sceptical they were about climate change. The survey concluded with basic demographic questions and people’s preferences in case they would win a prize. We only included participants who answered at least 80% of all questions and were resident in Switzerland. Of these 316 participants, 154

were females (48.7%) and 160 (50.6%) were males; the sample's mean age was 36.4 years (SD = 15.1; range: 19 to 81; 1 person did not indicate gender and age).

## Measures

### *Predictor variables*

*Scepticism.* To assess the degree to which people doubt the existence of human-made climate change and the severity of its consequences, we adopted six previously used items (e.g., “There’s no such thing as climate change”; (Whitmarsh & O’Neill, 2010; Whitmarsh, 2009b) and added the following item that referred to the previous unusually cold winter: “The cold and snowy winter was a proof that climate change is not happening” (Appendix A lists all items used in this thesis). Participants were asked to indicate how much they agreed with these statements (1 = *strongly disagree*, 5 = *strongly agree*; see Table 2 for reliability information about all measures we used in the present research).

*Behaviour-based attitudes.* In the Swiss survey, we included two behaviour-based attitude measures: Attitude towards nature in general and attitude towards environmental protection. Because the use of behaviour-based attitudes is not very common, we will first briefly explain the rationale of this approach and then turn to the two measures we used.

According to Kaiser and colleagues (Kaiser, Byrka, & Hartig, 2010), individual behaviour can be regarded as a function of a person’s attitude level and of the “difficulty” or “costs” of the specific behaviour. “Costs” can be understood literally as monetary expenses. However, the meaning of “costs” also includes figurative costs such as investments in time, physical effort, sacrifices in comfort, or social disapproval (e.g., in light of unpopular actions). Because people tend to avoid doing things that are costly, the extent to which people *do* engage in behaviours that are demanding and that are relevant to the attitude is very informative in terms of what goals people have. For example, if someone spends money on home insulation, uses public transport to get to work even though it takes much longer than driving by car, chooses an unattractive emission-free electric car over a more stylish car

running on fuel, then it can be assumed that this person has a good reason to impose these costs on herself. Put differently, a person who consistently carries out costly actions that benefit the environment is very likely to do this because she has a positive attitude towards environmental protection. By contrast, if someone fails to engage in even the easiest conservation actions, then it is likely that this person has a weak environmental attitude. Thus, the knowledge about how many relevant behaviours people do (not) perform can be used to gauge their attitude level.

The more general *attitude towards nature* consisted of 40 items, of which 26 were presented as behavioural self-reports (e.g., “I spend time in a park”). The remaining 14 items were evaluative statements (e.g., “My favourite place is in nature”). Seventeen behavioural items were presented with a 5-point frequency scale (1 = *never*, 5 = *always*); for the remaining 23 items a yes/no format was used (Brügger et al., 2011). To assess *attitude towards environmental protection*, we used a behaviour-based measure (Kaiser & Wilson, 2004). This instrument included 18 items with a yes/no format (e.g., “I reuse my shopping bags”) and 32 items with a frequency scale (e.g., “I read about environmental issues”, 1 = *never*, 5 = *always*).

*Traditional attitude measure.* In the UK survey we used four items to assess people’s *attitude towards addressing climate change* (e.g., ‘Radical changes to society are needed to tackle climate change’; 1 = strongly disagree, 5 = strongly agree; items taken from Whitmarsh, 2009b).

*Local and global risk perception.* We asked people to judge the likelihood that seven (identical) risks (e.g., food shortages and starvation, standard of living; Dietz et al., 2007; Leiserowitz, 2006; O’Connor, et al., 1999) would occur due to climate change on the local (“where I live” and “in the UK / Switzerland”) and global level (“worldwide”, “in the world”). Answer options ranged from 1 (*very unlikely*) to 5 (*very likely*).

*Affective risk perception.* In the Swiss survey, we assessed affective risk perception with the following question: “Which description best describes your emotional reaction when you think about ‘climate change’?”. Participants answered on a seven-point scale (1 = *very positive*, 7 = *very negative*; (see also N. Smith & Leiserowitz, 2012). In the UK survey, participants were first asked if they had any negative feelings about climate change (1 = *none*). If they replied with “yes”, they were also asked to rate the degree of their negative feelings (2 = *slightly*, 5 = *extremely*).

### **Dependent measures**

*Support for mitigation policies.* Respondents were presented with a selection of steps to decrease the amount of greenhouse gases “as a society” and then asked how they would vote on them in a national referendum (O’Connor et al., 1999). The suggested measures included prohibitions (e.g., “Ban the driving of cars in certain areas”), taxes (e.g., “Increased fuel and diesel taxes”), subsidies (e.g., “Subsidies for the household production of green energy”), and the provision of information and educative measures (e.g., “Introducing labels stating carbon content”). We adapted eight questions – some with slightly different wordings – from the literature (Nilsson, von Borgstede, & Biel, 2004; Prillwitz & Barr, 2011) and created six new questions (e.g., “Tax for the protection of tropical rain forests”). Answer options ranged from 1 (*definitely no*) to 5 (*definitely yes*).

*Support for adaptation policies.* Participants were presented with a brief introduction (see Appendix E) explaining the need and the rationale underlying the idea of adaptation. To assess support for pro-active adaptation policies, we developed a catalogue of 16 adaptation measures that were guided by adaptation research (IPCC, 2007a; UKCIP, 2010) and by strategies from large cities (e.g., City of London Corporation, 2007) that were appropriate for the two countries where we conducted our surveys. The proposed adaptation measures focused on conservation of species, protection against water scarcity, heat, and floods. We presented participants with a selection of prohibitions and regulations (e.g., “Introduce

building codes to make houses more thermally comfortable with longer and hotter summers”), taxes (e.g., “Increase prices for water consumption”), the opportunity to provide information (e.g., “Train Health Services staff to identify and advise on heat stress risks”), and infrastructural investments (e.g., “Upgrade all flood defences to a higher standard”). Support was measured on a scale ranging from 1 (*definitely no*) to 5 (*definitely yes*).<sup>8</sup>

*Personal mitigation intentions.* We used ten items to assess people’s future intentions to engage in actions to mitigate climate change. The topics revolved around mobility (e.g., “Car sharing”), energy saving (e.g., “Install more insulation at home”), consumption (e.g., “Reduce the number of new things you buy”), and political behaviours (e.g., “Join an environmental group”). The response format to the ten questions ranged from 1 (*very unlikely*) to 5 (*very likely*). We did not include this measure in the Swiss survey.

*Personal adaptation intentions.* We presented UK participants with eight actions they could individually take to reduce the vulnerability of themselves, other people, or nature from negative climate change impacts. The contents of these actions again included flood and environmental protection, water scarcity, risk from heat stress, and donating money to developing countries so they can more easily adapt to climate change (1 = *very unlikely*, 5 = *very likely*).

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<sup>8</sup> Some of the suggested measures can contribute to mitigating climate change *and* adapting to its consequences. However, the present research was mainly interested in how laypeople respond to the general ideas of mitigation and adaptation. To this end, capturing people’s responses to measures presented as either steps to mitigate climate change or to adapt to it seems an adequate procedure that should not be adversely affected by the possibility that some measures could have simultaneous mitigative and adaptive real-world effects.

## Results

The relationship between people's support for mitigation and adaptation is presented in two parts. We first explore the direct relationship between mitigation and adaptation by looking at their bivariate correlation coefficients. We then take a more indirect approach to study their relationship and use multiple linear regression analyses to examine how well different socio-psychological predictors (i.e., attitudes, scepticism, affective and analytical risk perceptions) can explain differences in individuals' support for mitigation and adaptation. This indirect approach allowed us to learn more about how (dis-)similar the reasons for supporting the two response strategies were.

### Direct relationships between mitigation and adaptation

The Pearson correlations in Table 2 provide direct information for how support for mitigation and adaptation are related. Most importantly, all correlation coefficients between mitigation and adaptation are positively related with medium to large effect sizes ( $.44 \leq r_s \leq .66$ ). The strongest relationships were found between variables that were on the same level of implementation (either personal or societal): The correlation between support for mitigation and adaptation policies was  $r = .66$  in the UK and  $r = .61$  in Switzerland. People's intentions to take personal actions to mitigate climate change and adapt to its consequences were also strongly correlated  $r = .60$  (personal intentions were only assessed in the UK survey). While the relationship between mitigating climate change through policies and on a personal level (i.e., intentions) was equally strong ( $r = .60$ ), answers that referred to different levels of adaptation were less strongly related to each other ( $r = .42$ ). Importantly, while some of these correlations are large, none of them suggests singularity between the measures of adaptation and mitigation.

Table 2

*Descriptive statistics and bivariate correlations between predictor variables and dependent variables*

	N <sub>UK</sub> / N <sub>CH</sub>	M <sub>UK</sub> / M <sub>CH</sub>	SD <sub>UK</sub> / SD <sub>CH</sub>	1	2	3	4	5	6	7	8	9	10
1 Attitude towards nature	- / 309	- / 3.39	- / 0.58	-.84	.47***	-.11	.07	.30***	.26***	.33***	.27***	-	-
2 Attitude towards addressing climate change (UK) / environmental protection (Switzerland)	539 / 309	3.26 / 3.62	0.70 / 0.50	-	.59/.86	-.36***	.19**	.25***	.36***	.60***	.35***	-	-
3 Scepticism	614 / 307	2.45 / 2.04	0.82 / 0.75	-	-.66***	.85/.87	-.41***	-.32***	-.58***	-.61***	-.41***	-	-
4 Affective risk perception	548 / 215	2.50 / 5.49	1.42 / 1.08	-	.49***	-.52***	-/-	.18**	.41***	.31***	.22***	-	-
5 Local risk perception	607 / 309	3.10 / 2.85	0.72 / 0.63	-	.44***	-.41***	.39***	.83/.77	.61***	.43***	.36***	-	-
6 Global risk perception	608 / 309	3.87 / 3.97	0.73 / 0.62	-	.53***	-.56***	.44***	.68***	.90/.83	.61***	.54***	-	-
7 Mitigation policy support	575 / 309	3.35 / 3.66	0.77 / 0.74	-	.55***	-.56***	.43***	.45***	.53***	.90/.89	.61***	-	-
8 Adaptation policy support	546 / 309	3.69 / 3.48	0.62 / 0.54	-	.42***	-.44***	.35***	.36***	.48***	.66***	.88/.83	-	-
9 Mitigation personal intentions	563 / -	3.44 / -	0.67 / -	-	.42***	-.40***	.35***	.40***	.43***	.60***	.46***	.78/-	-
10 Adaptation personal intentions	553 / -	2.88 / -	0.78 / -	-	.35***	-.33***	.29***	.38***	.30***	.44***	.42***	.60***	.81/-

*Note.* To the right of the sample size information (*N*), the figures in the diagonal cells indicate internal consistency reliabilities (UK / Switzerland).

Off-diagonal figures represent Pearson correlations. The figures below the diagonal refer to the UK survey, those above to the Swiss survey. As we did not assess personal intentions in the Swiss survey, these cells do not contain any figures. M = Mean, SD = Standard deviation \*\*\* Stands for  $p < .001$ , \*\* stands for  $p < .01$ , \* stands for  $p < .05$ .



Thus while these are related, they do seem to be distinct responses.<sup>9</sup>

Taken together, the correlation coefficients show that when a person supports any form of mitigation – for example introducing new taxes – she is likely to also support any other way of mitigating climate change – for example by using public transport more often – and to support measures to adapt to impacts of climate change (i.e., positive relationship). Of course, this also means that support for any adaptation measure also entails support for mitigation measures. This speaks against the idea that people think of mitigation and adaptation as alternative or mutually exclusive strategies to respond to climate change.

### **Indirect information about the relationship of mitigation and adaptation support**

We built hierarchical regression equations with three different blocks to predict policy support and behavioural intentions in multiple regressions. The first block included the level of individual scepticism about climate change and either an attitude that specifically related to addressing climate change (UK) or two more general attitudes that concerned people's evaluation of nature and their evaluation of environmental protection (Switzerland). The second block consisted of the affective risk perception and the third block included analytical

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<sup>9</sup> We conducted exploratory principal component analyses to further support the suggestion that people's answers with regard to mitigation and adaptation are distinguishable. We first carried out a principal components analysis that included all mitigation and adaptation intentions (UK data) and found two separate factors for mitigation and adaptation (see Appendix B). We then carried out two additional factor analyses (one with the UK data and one with the Swiss data) that included all mitigation and adaptation policies. These analyses revealed less clear solutions. It seems that the factor analyses clustered the policy items mainly according to how severely they would affect individuals' everyday lives (see Appendix C). Because these "difficulty" factors (cf. Garson, 2013; Kubinger, 2003) were not useful in understanding the relationship between mitigation and adaptation, we decided to retain the theoretically more meaningful anticipated solution with mitigation and adaptation as separate constructs.

risk perceptions, which were divided into local and global risks. To account for a potential overlap between the predictor variables, we also ran models in which we included all predictors simultaneously. This allowed us to assess the predictive power of each variable while all other predictors were held constant.

### **Policy support**

*Mitigation.* In both countries, attitudes and sceptical beliefs (Model 1) did the best job of explaining people's support for mitigation policies ( $R^2_{adjusted} = .37 / .54$ , Table 3): The more positive people's attitude towards nature and the stronger their attitude to protect the environment (Switzerland) or to address climate change (UK) and the less they were sceptical about climate change, the more they were willing to support mitigation policies. (Analytical) risk perceptions (local and global risks) represented the second most powerful predictor of mitigation support – as can be seen in the amount of variance explained as separate predictor block ( $R^2_{adjusted} = .29 / .37$ , Model 3, Table 3) and the size of their Beta-weights in the Full Models.

When the potential overlap between the predictors was taken into account in the Full Models, scepticism and attitude towards addressing climate change (UK survey) and attitude towards environmental protection (Swiss survey) independently explained the largest proportion of variance, followed by global risk perceptions. Particularly interesting is the predictive power of people's attitude towards environmental protection, which independently explained 13% (Beta square) of the variance in mitigation policy support. This suggests that for many people protecting the environment in general – that is, also including behaviours such as refusing to take plastic bags in shops or pointing out un-ecological behaviour to others – and supporting mitigation policies go hand in hand.

Table 3

*Results of multiple regression analyses predicting policy support in the surveys conducted in the UK and in Switzerland*

Predictors	Mitigation policy support																Adaptation policy support																								
	1				2				3				Full				1				2				3				Full												
	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>													
<i>UK survey</i>																																									
Attitude towards addressing climate change	.35	.05	.32	***					.24	.05	.22	***	.20	.05	.23	***					.11	.05	.13	*																	
Scepticism	-.33	.04	-.35	***					-.23	.05	-.24	***	-.22	.04	-.29	***					-.12	.04	-.16	**																	
Affective risk					.23	.02	.43	***	.04	.02	.08						.15	.02	.35	***	.03	.02	.07																		
Local risk								.18	.05	.17	***	.12	.05	.11	*					.05	.04	.06		.02	.05	.02															
Global risk								.43	.05	.41	***	.17	.06	.16	**					.37	.04	.44	***	.24	.05	.28	***														
Adjusted $R^2/N$			.37	534		.18	515			.29	570			.42	483			.22	525		.12	493			.23	542			.28	483											
<i>Swiss survey</i>																																									
Attitude towards nature	.12	.06	.10	*					.05	.07	.04		.15	.05	.17	**					.10	.06	.10																		
Attitude towards environmental protection	.57	.07	.39	***					.53	.08	.36	***	.16	.07	.15	*					.12	.08	.11																		
Scepticism	-.45	.04	-.46	***					-.31	.06	-.31	***	-.25	.04	-.34	***					-.10	.06	-.14																		
Affective risk					.21	.04	.31	***	-.00	.03	-.00						.11	.03	.22	***	-.01	.03	-.03																		
Local risk								.10	.07	.09		.08	.07	.07						.04	.05	.05		.02	.06	.02															
Global risk								.66	.07	.56	***	.29	.08	.25	***					.44	.05	.51	***	.34	.08	.39	***														
Adjusted $R^2/N$			.54	307		.09	215			.37	309			.59	213			.23	307		.05	215			.28	309			.32	213											

*Note.* *B* = Unstandardized regression coefficient, *SE* = Standard Error,  $\beta$  = Standardized regression coefficient, *Sig.* = level of statistical significance, \*\*\*

stands for  $p < .001$ , \*\* stands for  $p < .01$ , \* stands for  $p < .05$ .

*Adaptation.* With regard to support for adaptation, the attitude and sceptical beliefs block ( $R^2_{adjusted} = .22 / .23$ , Model 1, Table 3) explained slightly less of the variance than the block containing risk perceptions ( $R^2_{adjusted} = .23 / .28$ , Model 3). Once the overlap – or shared variance – of all predictors is taken into account in the Full Model, the single most powerful predictor of adaptation support is *global* risk perception: The more likely people judge climate risks to affect the world in general (as opposed to local effects), the more they are willing to support adaptation policies. The role of local risk perceptions as a predictor of policy support, however, was negligible.

This is surprising for several reasons: First, it is often assumed that the extent to which people perceive climate change as a local problem is a key factor to motivate action (e.g., CRED, 2009). Second, adaptation is often thought as being more locally bounded than mitigation (e.g., Klein et al., 2005), which should further enhance the predictive power of local risk perceptions over global risk perceptions. Third, the typical local focus of adaptation was also reflected in the selection of adaptation support items (only one item referred to measures outside participants' own country). This local-to-local match further lead us to expect the opposite pattern, namely that local risk perceptions would better predict support for adaptation policies than global risk perceptions. One possible explanation for the strong association between global risk perceptions and policy support is that they have a similar level in abstractness or psychological distance: Both refer to events or actions that are removed from individuals' immediate environment and area of influence. We will return to this issue in the discussion section.

*Summary.* The patterns of support were similar for mitigation and adaptation in that attitudes and sceptical beliefs as well as analytical risk perceptions were relevant predictors. The main difference was that support for mitigation was most closely linked to attitudes and beliefs whereas support for adaptation was best predicted by the extent to which people judged climate change to be a likely (global) risk.

**Personal intentions to mitigate and to adapt**

*Mitigation.* The model containing attitudes and sceptical beliefs (Model 1, Table 4) and the one featuring analytical risk perceptions (Model 3, Table 4) both explained 20% of the variance in people's mitigation intentions. In direct comparison, attitude towards addressing climate change and sceptical beliefs were equally strong predictors of mitigation intentions (Model 1, Table 4). In the Full Model, however, the contribution of scepticism to explaining personal intentions was no longer statistically significant. At first glance, this non-significance in the Full Model stands in contrast to the important role the same variable played as a predictor of mitigation policy support. Yet the inferiority of the attitude measure with regard to the statistically significant predictors is small in terms of the size of the Beta-weights ( $\Delta\beta \leq .06$ ). The non-significance of scepticism has probably mainly to do with the smaller amount of overall explained variance: While the predictors conjointly explained 42% (UK) and 59% (Switzerland) of the variance in mitigation policy support, the proportion of explained variance dropped to 26% with regard to personal intentions. It would therefore be wrong to conclude that people's level of scepticism is irrelevant for their personal mitigation intentions. Rather these figures do suggest that, based on our data, it is generally more difficult to account for individuals' behaviour intentions than for their policy preferences.

In contrast to support for mitigation policy, where global risk perceptions explained more variance than local risk perceptions, the superiority of global risk perceptions as a predictor of personal intentions to mitigate shrunk in direct comparison to local risk perceptions (Model 3, Table 4) and completely disappeared when the remaining predictors were added (Full Model, Table 4). In this Full model, all predictors – with the exception of scepticism – made a statistically significant and – in contrast to policy support – a similarly large contribution to explain people's intention to take personal actions. This also applies to affective risk perceptions, which made no statistically significant contribution in any other of the Full Models.

Table 4

*Results of multiple regression analyses predicting personal intentions in the survey conducted in the UK*

Predictors	Mitigation intentions												Adaptation intentions																			
	1				2				3				Full				1				2				3				Full			
	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>Sig.</i>
Attitude towards addressing climate change	.25	.05	.27	***					.15	.05	.16	**	.26	.06	.23	***					.16	.06	.15	*								
Scepticism	-.18	.04	-.23	***					-.09	.05	-.11		-.17	.05	-.18	**					-.11	.06	-.12	*								
Affective risk					.17	.02	.35	***					.05	.02	.10	*				.16	.02	.29	***					.04	.03	.07		
Local risk									.18	.05	.19	***	.14	.05	.15	**					.36	.06	.33	***	.32	.06	.29	***				
Global risk								.27	.05	.30	***	.13	.05	.14	*					.08	.06	.08		-.08	.07	-.07						
Adjusted $R^2/N$			.20	501			.12	504			.20	556			.26	483			.14	497			.08	498			.15	549			.19	483

*Note.* *B* = Unstandardized regression coefficient, *SE* = Standard Error,  $\beta$  = Standardized regression coefficient, *Sig.* = level of statistical significance

\*\*\* stands for  $p < .001$ , \*\* stands for  $p < .01$ , \* stands for  $p < .05$ .

*Adaptation.* When combined in Model 1, attitude towards addressing climate change and scepticism ( $R^2_{adjusted} = .14$ , Table 4) equally well predicted personal intentions to adapt as analytical risk perceptions ( $R^2_{adjusted} = .15$ , Model 3, Table 4). In the Full Model, local risk perceptions outperformed the other predictors: The perception of (more) *local* risks was by far the best predictor of people's willingness to take personal adaptation actions; local risk perception independently explained 8% (Beta square) of the variance in adaptation intentions. It is unclear why the expected supremacy of local risk perceptions over global risk perception was only observed in the case of personal adaptation – rather than with regard to *all* forms of climate change responses, as should be expected based on the prevailing reasoning in the literature. We will discuss a match of psychological distance on a spatial (local vs. global) and social dimension (personal actions vs. measures implemented as a society) as a possible explanation in the discussion section.

The other variables that achieved statistical significance as predictors of adaptation intentions in the Full Model were the degree of people's scepticism and their attitudes towards addressing climate change. The less sceptical people were about climate change and the more positively their attitudes towards addressing climate change, the more they were ready to take personal actions.

## **Discussion, limitations, and conclusions**

### **Discussion**

To our knowledge, this study is the first that examined the relationship between support for mitigation and support for adaptation among the public. It provides consistent evidence from two countries that public support for mitigation and adaptation are strongly linked to each other and that the two response strategies are endorsed for similar reasons. People who were willing to mitigate climate change – be it on a personal level by changing

their behaviour or on a societal level by supporting policies – also supported personal and societal steps to adapt to negative consequences from climate change, and vice versa.

It also seems that the psychological processes involved in peoples' motivation to respond to climate change are very similar for these two strategies: People who believe that climate change is real and dangerous, who have positive attitudes about protecting the environment and about addressing climate change, and who perceive climate change as a risk, are willing to support both mitigative and adaptive responses to the challenges associated with climate change. This finding speaks against the concern that people might trade off mitigation against adaptation (Klein et al., 2005; Schipper, 2006). The finding is also promising because it suggests that efforts from campaigners or policy-makers aimed at strengthening people's motivation to adapt to climate change will not damage efforts to enhance support for mitigation (cf. Schipper, 2006) and vice-versa. On the contrary, the positive relationship points to the possibility that fostering support for one response strategy could benefit the second strategy at the same time. Future studies using an experimental setting or a longitudinal design could be helpful to learn more about how attempts to change support for mitigation affect support for adaptation and vice versa. For example, researchers could provide people with arguments in favour of adaptation and explore how these arguments affect the way they think about mitigation. It is possible that thinking about adaptation creates the impression that climate change is a problem that can be dealt with and that mitigation might not be so important after all. However, it is also plausible to assume that highlighting adaptation could make the magnitude of climate change impacts more salient. People might realize that climate change can have a substantial impact on their everyday life. To the extent that people disapprove of this alternative reality, this outlook might motivate people to support mitigation measures. Another possibility for future research would be to change the order in which people think about climate change. Because mitigation and adaptation elicit different associations – for example with regard to justice (Klinsky, Dowlatabadi, &



McDaniels, 2012) – the order in which people think about these strategies might give the different arguments relatively more (or less) weight. Thus, depending on whether people think first about adaptation or mitigation could lead to different perceptions and decisions.

Despite the broad commonality of the picture, some of our findings were unexpected and warrant further discussion. The finding that surprised us most and opens new avenues for future research concerns the relationship between risk perceptions and the level at which response strategies are implemented. A common idea is that people are not willing to address climate change because they perceive it as a distant threat and that their motivation could be increased by making local consequences more salient (e.g., Moser & Dilling, 2007; Spence et al., 2011). If “localising” is an effective means to increase individual engagement with climate change, as is often expected, then local risk perceptions should outperform global risk perceptions as a predictor for every dependent variable. However, it was *global* risk perceptions that better predicted people’s willingness to support mitigation and adaptation policies rather than *local* risk perceptions. Neither was local risk perception superior in terms of personal mitigation intentions; both local and global risk perceptions uniquely contributed to the prediction of personal intentions. It was only with regard to personal adaptation intentions that we found the expected superiority of local risk perceptions as a predictor.

Some parts of these findings could be explained by the different scales on which mitigation and adaptation work. Because successful mitigation involves worldwide efforts and has widespread benefits, it can be regarded as a geographically more extended phenomenon than adaptation, which requires local efforts and has local benefits (Adger, 2001; Fussler & Klein, 2006). This perspective is consistent with the findings that *global* risk perceptions better predicted mitigation policy support (as compared to local risk perceptions) and that *local* risk perceptions better predicted adaptation intentions (as compared to global risk perceptions). However, referring to the different scope of mitigation and adaptation as an explanation for the observed patterns would be at odds with the finding that support for

adaptation, which clearly has a local focus, is also best predicted by *global* risk perceptions: Our analyses revealed a strong association between global risk perceptions and policy support (regardless of whether these policies referred to mitigation or adaptation), and a strong association between local risk perceptions and personal intentions (more so when these actions referred to adaptation than to mitigation).<sup>10</sup>

Construal Level Theory (e.g., Trope & Liberman, 2010), a dominant theory in the current psychological literature, provides an alternative explanation for the unexpected associations between local risks and personal intentions as well as between global risks and policy support. Construal Level Theory posits that human perceptions of the world and the way we make judgments depend on the psychological distance between ourselves and the events or objects we are dealing with. Low psychological distance means that we are focused on ourselves, our current geographic location, the present time, and that we are certain of what is happening around us right now. Conversely, when psychological distance is high, then we focus on other people, faraway places, the distant future or past, and we are less certain about what did or could happen.

The variables we used to assess analytical risks and willingness to respond to climate change neatly map onto two dimensions of psychological distance: Local and global risk perceptions can be mapped onto the dimension of spatial distance; personal behaviour and policy support can be mapped onto the social dimension of psychological distance (*I* do something vs. *we* do something). Perhaps the unexpected strong relationships we found between local risk perceptions and personal intentions on the one hand and between global risk perceptions and policy support on the other hand are due to spontaneous matches with

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<sup>10</sup> The relationship between global risk perceptions and policy support was additionally analysed on the level of individual policy items. To some extent this analysis mirrored the trend that distant policies (e.g., “Tax for the protection of tropical rain forests”) are more strongly related to global risk perceptions than proximal policies (e.g., “Ban the driving of cars in certain areas”; see Appendix D).

regard to psychological distance: Local risk perceptions are psychologically *proximal on the spatial dimension* and personal intentions can be regarded as *proximal on the social dimension* (it is the individual who forms the intentions). Likewise, the *spatially remote* global risk perceptions can be matched to support for policies, which can be regarded as *distant on the social dimension* (policies involve strangers and collective action). Importantly, the proposed spontaneous matches would be consistent with the empirically corroborated proposition of Construal Level Theory saying that different dimensions of psychological distance (e.g., social and spatial distance) are related to each other (Trope and Liberman, 2010). It is therefore plausible that the observed links between the risk perspective (local and global) and level of implementation (personal and societal) are due to a similar level of psychological distance from the individual and, therefore, due to a corresponding level of mental construal.

There is a counter-intuitive corollary to this interpretation that is highly relevant to people who are involved in climate change communication. The relationships we observed between spatially varying risk perspectives and the two levels of implementation imply that appeals to change personal behaviour and to increase support for policies are most effective when they are combined with spatial information that is consistent with their respective construal level (i.e., local versus global, respectively). This logic is consistent with the reasoning of Construal Level Theory and empirical findings on the effectiveness of matching construal levels (e.g., Kim, Rao, & Lee, 2009; White, MacDonnell, & Dahl, 2011). The importance of matching levels could also explain why previous attempts to increase people's engagement with climate change by portraying local impacts (i.e., low-level construal) were not successful in (or even detrimental to) increasing support for policies and strengthening attitudes towards climate change mitigation (both high-level construals; Shwom et al., 2008; Spence & Pidgeon, 2010). In short, on the basis of our results and current theory, we suggest that a local focus does not per se lead to more involvement and stronger motivation to act on

climate change. Rather, climate change communication could be much more effective if different levels of construals are intentionally matched: Focussing people's attention to local climate change seems well suited to enhance their willingness to take personal actions. However, with regard to support for policies it seems more effective to address the issue of climate change on a bigger scale and therefore remove climate change spatially from people rather than bring it closer to them (cf. Spence and Pidgeon, 2010). We strongly encourage future studies to look more systematically at how psychological distance and support for responses at different implementation levels (i.e., personal intentions and policy support) are related. One way of exploring this further could be, for example, to test whether proximal versus distant descriptions of climate change effects indeed has different effects on personal intentions versus policy support.

### **Limitations**

Three limitations might have affected the findings of this research. The first issue we would like to discuss is the apparently negligible role of affective risk perception. The amount of variance affective risk perception could explain with regard to the dependent variables was small, particularly in relation to the effects of attitudes and analytic risk perceptions. However, we believe that the weak predictive power of affective risk does *not* indicate that this variable is irrelevant as a motivation to address climate change. Instead, we believe that this weakness reflects the potential for methodical improvement. We suggest that discriminating between and measuring more specific emotions (as against a more general measure of “negative” affect) could improve the predictive power of affect and be helpful to distinguish between different motives to address climate change. For example, fear seems to motivate action if certain conditions, such as the belief that one can effectively deal with the threat, are met (e.g., Maloney et al., 2011). The possible role of fear as motivator has also been highlighted in the context of climate change (e.g., Moser, 2007), although its use is not uncontroversial (e.g., O'Neill & Nicholson-Cole, 2009). Another negative emotion that could

help to understand individuals' willingness to fight climate change is guilt (Ferguson & Branscombe, 2010). Distinguishing between different negative emotions would also provide a new approach to engage people affectively. We therefore recommend that future studies should continue to include affective aspects of risk perception and extend the scope to other, more specific emotional processes.

Second, our samples were not representative of either the UK or Switzerland. However, given the large sample sizes and considering that survey contexts were markedly different (survey framed as looking at “current affairs” vs. “environmental attitudes”) we are confident that our samples are large and diverse enough to study relationships between different social-psychological variables.

The third shortcoming of this research has to do with the selection of predictor variables. We included a variety of psychological processes to study similarities and differences between support for mitigation and adaptation. Of course, our selection is not the only possible one. There are other variables that are helpful to explain people's motivation to mitigate and to adapt. In particular, we think of the extent to which people believe that the proposed measures will be effective (i.e., efficacy beliefs; Esham & Garforth, 2013; Grothmann & Patt, 2005; Zaalberg et al., 2009) and that people see themselves as personally capable of responding to climate change (i.e., self-efficacy beliefs; Grothmann & Patt, 2005; Spence et al., 2011). Other relevant processes might include people's levels of trust in involved stakeholders (i.e., local and national government, environmental agencies, policy-makers; Dietz et al., 2007; Kellstedt, Zahran, & Vedlitz, 2008), experience with the effects of climate change (Spence et al., 2011; Zaalberg et al., 2009), or beliefs and opinion of relevant others (Esham & Garforth, 2013; Wolf et al., 2010). Studying these alternative predictors of support for mitigation and adaptation could reveal that the motives to mitigate and to adapt vary more strongly than suggested by our findings.

## Conclusions

Although additional predictors may be relevant for understanding support for particular response strategies, we do not believe that such patterns would challenge our finding that people's motivation to mitigate and to adapt are strongly linked to each other. This is not to say that we assume that the strong relationship between mitigation and adaptation support is set in stone; situations that force people to make trade-offs or different framings could shift people's preferences in favour of one strategy or the other. We are certain that studies that look at additional predictors and varying contexts can make important contributions to our understanding of how mitigation and adaptation are related in people's minds and how climate change communicators can effectively engage their audiences.

A related issue that offers great opportunities for future research concerns the causal relationships between the variables we used as predictors. There are some intuitive expectations about how certain variables cause changes in other variables (e.g., scepticism inhibits risk perceptions) but without empirical testing we cannot exclude less intuitive causal pathways (e.g., changes in risk perceptions lead to changes in scepticism). Longitudinal studies that follow changes across variables, and experiments that manipulate key predictors, can deepen our understanding of such causal relationships.

In responding to climate change, mitigation and adaptation go hand in hand – not just in pleas from the scientific community but also in people's minds. Yet, sometimes one hand is needed more than the other. The better the understanding of how to mobilise each hand to do specific things, for example by focussing on local risk perceptions to foster the willingness to take personal adaptation actions and by appealing to existing attitudes to increase support for mitigation policies, the more effective will responses to the challenges of climate change be.

## Summary

There is now considerable consensus that people around the world need to act to reduce the negative impacts of climate change. This research investigated how individual support for two different forms of action, mitigation and adaptation, relate to each other, and how well each of these can be accounted for by relevant social psychological factors (attitudes, risk perceptions, scepticism). Based on survey data from two European convenience samples (N = 616 / 316, UK / Switzerland) we found that public support for mitigation and adaptation is strongly associated: Someone who is willing to reduce greenhouse gas emissions (mitigation) is also willing to prepare for climate change impacts (adaptation). Moreover, people endorsed the two response strategies for similar reasons: People who believe that climate change is real and dangerous, who have positive attitudes about protecting the environment and the climate, and who perceive climate change as a risk, are willing to respond to climate change. Furthermore, distinguishing between local and global risk perceptions suggested that the idea of portraying climate change as a local threat might indeed be effective in promoting personal actions. However, to gain support for broader societal initiatives such as policy support, it seems advisable to turn to the global risks of climate change. We discuss the implications of our findings for climate change communication. The notion that “localising” climate change might not be the panacea for engaging people in this domain is discussed with regard to previous theory and research.

## **Chapter 4 – The effects of localising climate change from the perspective of Construal Level Theory**

### **Introduction**

There is little doubt that human-made climate change is leading to significant changes in the natural and human environment (e.g., IPCC, 2007a; Rosenzweig et al., 2008). It also seems clear that people all over the world need to react to these changes by limiting the amount of greenhouse gases in the atmosphere (i.e., mitigation; IPCC, 2007c) and by reducing the vulnerability of people and nature to the unavoidable impacts of climate change (i.e., adaptation; IPCC, 2007c). One of the most important ingredients for a successful response to climate change is public support. Mitigation and adaptation strategies can only be implemented at an individual (e.g., lifestyle choices) and societal level (e.g., policies) if members of the public support them directly or vote for politicians who advocate such measures. However, judging from a recent international opinion poll, only a minority of the public is willing to spend money to address climate change (PEW research center, 2010) and the proportion of Europeans who say they have taken action to fight climate change seems to be declining rather than increasing (European Commission, 2011).

A common explanation for insufficient public support to address climate change is that people perceive climate change as a distant threat: something that affects strangers, and that happens in remote times and places rather than in the here and now (Fleury-Bahi, 2008; Leiserowitz, 2006; Lorenzoni et al., 2007; O'Neill & Nicholson-Cole, 2009). The distance at which people perceive climate change could lead to the perspective that climate change risks are irrelevant to one's self and that there is no need for personal action. To remedy this, it has repeatedly been suggested that highlighting the local consequences of climate change is an important strategy to engage and mobilize publics around this issue (CRED, 2009; Moser &



Dilling, 2007; O’Neill & Nicholson-Cole, 2009; Spence et al., 2011; Weber, 2010). The rationale behind “localising” climate change is that this narrows the psychological distance to this issue, creating a greater sense of urgency and personal responsibility, and ultimately increasing people’s motivation to act. However, studies that have experimentally tested the localising-approach have not revealed the expected positive effects on individual support for addressing climate change (Shwom et al., 2008; Spence & Pidgeon, 2010).

The missing positive effect of such “localising” is counter-intuitive and may, at first glance, seem disappointing. However, it is not unexpected when considered from the perspective of dominant theoretical models of psychological distance. Construal Level Theory (Trope & Liberman, 2003, 2010) argues that varying levels of psychological distance (e.g., here vs. far away, now vs. in ten years) influence how people represent objects mentally and what information they consider when making judgments and decisions. More specifically, psychologically proximal objects and events are construed concretely whereas distant objects are represented in more abstract terms.

Chapter 3 has already provided some evidence for the idea that psychological distance influences how people think about climate change and possible responses. The two surveys revealed a strong association between local risk perceptions and personal intentions, and a strong association between global risk perceptions and policy support. It is possible that these associations are due to spontaneous matches with regard to psychological distance: Local risk perceptions are psychologically proximal on the spatial dimension and personal intentions can be regarded as proximal on the social dimension. Likewise, the spatially remote global risk perceptions can be matched to support for policies, which can be regarded as distant on the social dimension. Importantly, these proposed spontaneous matches would be consistent with the empirically corroborated proposition of Construal Level Theory that different dimensions of psychological distance (e.g., social and spatial distance) are related to each other (Trope and Liberman, 2010). In sum, this pattern of findings gave rise to the idea that the extent to

which people perceive climate change as a proximal or distant risk may be related to how people think about climate change and different options to respond to it.

Following this, the main goal of this chapter was to learn more about the causal influence of psychological distance on how people think about climate change and possible response measures. In line with Construal Level Theory and stimulated by the finding that psychological distance seems to influence the way people process information about climate change (Chapter 3), it was expected that zooming in on local climate change consequences should activate a concrete way of thinking about this issue and increase the relative importance of concrete (rather than abstract) sources of information that people consider when making judgments and decisions. Conversely, zooming out to global climate change consequences should activate an abstract way of thinking about this issue and increase the relative importance of abstract (rather than concrete) sources of information that people consider when making judgments and decisions. Thus, according to Construal Level Theory, “localising” climate change should affect how climate change is mentally represented, and through this what people act on, not whether or not people act *per se*.

Following the above reasoning, the aim of the present research was to reconsider the widely held belief that focusing on local (vs. global) impacts of climate change should straightforwardly increase people’s motivation to support mitigation and adaptation strategies. Before presenting a study that tested this, we elaborate further on why considering psychological distance is crucial in the context of climate change and what kinds of information we expect people to rely on when they zoom in on local, or zoom out to global, climate change consequences.

### **Climate change as a distant threat**

Climate change and distance are two strongly entangled topics: Wherever greenhouse gasses are emitted, they spread throughout the atmosphere and will contribute to *global*

climate change. Similarly, the consequences of climate related actions are often felt by people other than those who carry these actions out both in space and time. The entanglement of distance and climate change is also obvious in the fact that many consequences of climate change, due to the inertia of the climate system, will only be manifest several decades from now. This is, from the perspective of an individual, a long time span and far away from one's present situation. Finally, although it is certain that the climate is changing and will continue to do so, the exact magnitude and quality of future climate change impacts can never be absolutely known. Analogously to spatial, social, and temporal distance, uncertainty represents another dimension of distance (hypotheticality) that matters in the context of climate change: On the proximal side of the continuum, there is what people see and know, whereas on the distal end there lies everything that might be.

Research on public perception of climate change also indicates that distance is an important factor. When people are asked about how they think about climate change, the result is very consistent, at least in Western countries. People perceive climate change as a threat to strangers remote in time and space rather than as a risk to oneself, the people one knows, or close places; in addition, climate change is perceived as a greater danger to the natural world than it is to humans (Bord et al., 1998; Fleury-Bahi, 2008; Leiserowitz, 2006; Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Milfont, 2010; O'Neill & Nicholson-Cole, 2009; Safi et al., 2012). The finding that people typically see climate change as a distant threat is problematic because individuals' perception of being personally at risk can be an important motivation to react to the respective risk (e.g., Floyd et al., 2000; Miceli et al., 2008; Zaalberg et al., 2009), and the link between perceived personal risk and willingness to act on climate change has been observed in several studies (Brody et al., 2012; Dietz et al., 2007; O'Connor et al., 1999, 2002; Terpstra, 2011; Zaalberg et al., 2009; however, note that there are a number of studies regarding adaptation where the links with risk perception were weak or absent, e.g., Esham & Garforth, 2013)

## **Climate change and “localising” climate change from the perspective of Construal Level Theory**

Against the above backdrop, the idea that emphasising local consequences of climate change should increase people’s motivation to act is intuitively appealing. However, previous attempts to implement this idea raise doubt about the effectiveness of “localising” climate change. To our knowledge, only three studies have examined the impact of “localising” on people’s motivation to act on climate change, and neither reveals supportive evidence. Shwom and colleagues (2008) provided their participants with information about climate change trends either on a regional or a national scale. Contrary to the common advice, the extent to which participants endorsed climate change policies did not differ across conditions. In a similar vein, Spence and Pidgeon (2010) framed climate change in local versus distant terms. The local frame included a text on national consequences, a local map illustrating potential flooding caused by sea-level rise, and three photographs of urban flooding that were recognisable as places in the UK (where the study was conducted). The distant frame included similar stimuli but with reference to continental Europe. Again, localising climate change had no effect on attitudes towards climate change mitigation.

The third study we are aware of was by Scannell and Gifford (2013), which provided members of the general public with information posters describing either one broad global impact of climate change (sea levels rising) or a local impact specific to the area they lived in (either of the following three: forest fires, beetle infestation, rising sea levels). Relative to a third condition, where no information was provided, the locally framed information poster increased participants’ engagement with climate change (including affective, cognitive, and behavioural aspects of engagement). In contrast, people’s engagement with climate change did not differ between the globally framed poster and the control condition. Thus, this study suggests that providing information about local climate change may be helpful to increase people’s engagement with climate change. However, two aspects of this study make it

impossible to draw any conclusions about specific advantages of zooming in on local climate change relative to a more global approach. First, Scannell and Gifford (2013) did not directly compare the local and the global frame. Second, they did not only vary the psychological distance of impact but also the type of impact (sea level rising vs. forest fires, beetle infestation, rising sea levels); this conflation makes it difficult to determine what the effects are due to. Thus, while localising climate change impacts is a “common sense” strategy to increasing engagement, to date there is little evidence that this strategy works.

As mentioned above, this finding may not be so surprising when considered from the perspective of Construal Level Theory (Trope & Liberman, 2003, 2010). Construal Level Theory (CLT) starts from the assumption that humans can only directly experience the present situation. Everything that is removed from the current situation, be it on a spatial (here vs. far away), temporal (now vs. future/past), social (me vs. others), or hypothetical (certain vs. uncertain) dimension, needs to be mentally construed. The further away an object is from the present situation of a person, the more effort she has to make to construe it, and the more abstractly and generalised the resulting mental representation will be (high-level construal). Conversely, the present situation offers a lot of context-specific information and is rich in details; it involves no or only little mental construal (low-level construal). In simpler terms, this means that when we think of an object as close versus distant, we form different mental representations of it. These representations then guide subsequent judgments and decisions: “We make choices and set preferences with respect to our construals of objects rather than the objects themselves” (Trope & Liberman, 2010, p. 451). Thus, psychological distance – the perception of when, where, to whom, and whether an event occurs (Trope & Liberman, 2010) – affects *what* evaluations and even behavioural intentions are based on.

Illustrative of this, Ledgerwood et al. (2010) found that participants with a proximal and concrete perspective considered primarily low-level incidental circumstantial information (e.g., other people’s opinion) when they evaluated a policy. Conversely, when participants

with a more distant (abstract) mind-set evaluated the same policy, they were guided by their broader values, which are commonly regarded as overarching orientations that are relatively stable across time and different situations (i.e., high-level construal). Eyal and colleagues (2009) found the same pattern with regard to behavioural intentions: When intentions were represented in the distant future, (high-level construal) values better predicted intentions, whereas (low-level construal) feasibility considerations were better at predicting intentions in the near future (see also Rabinovich et al., 2010).

Considering that distance influences what evaluations and intentions are based on – rather than directly affecting people’s motivation to act – it is not surprising that Spence and Pidgeon (2010) and Shwom et al. (2008) did not find any impact of distance framing on the level of policy support and attitudes towards climate change mitigation. According to construal level theory, personalising, localising, and bringing climate change closer in time would not be expected to have a direct effect on people’s overall willingness to respond to the challenges arising from climate change. Instead, when people have a proximal perspective, they should preferentially consider concrete low-level information (e.g., other people’s opinions, feasibility considerations) for representing climate change, its consequences, and potential response strategies, while those with a distant focus are expected to rely more on abstract high-level information (e.g., their own values). Thus CLT would predict that variations in distance framing should interact with other things – things that represent low- or high-level construals – to determine individual responses.

### **Fear and scepticism as low-level and high-level information**

Two factors that are relevant for how people think and decide in the context of climate change and that differ with regard to their level of construal are fear and scepticism. The role of *fear* as a driver of personal action is well documented in general, for example with regard to health-related behaviours (e.g., Maloney et al., 2011). In terms of climate change, fear is

also regarded as a motivator for taking action (Maibach et al., 2008; Moser, 2007; Weber, 2006) and there is some evidence showing that when people are afraid of climate change (or have similar other negative feelings), they perceive climate change more as a risk, have more favourable attitudes towards mitigation, and are more willing to mitigate (Leiserowitz, 2006; Meijnders et al., 2001b; N. Smith & Leiserowitz, 2012; van Zomeren et al., 2010; for a more critical perspective on fear appeals, see for example O'Neill & Nicholson-Cole, 2009).

We assume that the experience of *fear* represents a *lower-level construal* relative to more abstract beliefs about climate change (see below). This assumption is grounded in the distinction of emotions into low-level and high-level construal emotions. Low-level construal emotions are spontaneous reactions to the immediate situation that do not involve mental construal. Examples of low-level construal emotions are pain, hunger, sadness, anger, and fear (cf. Liberman et al., 2007). High-level construal emotions, on the other hand, are those emotions that require distancing on at least one dimension of psychological distance. For example, guilt and shame require considering the perspective of other people, that is, these emotions involve distancing on the social dimension of psychological distance (Agerström & Björklund, 2009). Although the distinction of low-level and high-level construal emotions resembles the distinction of primary and secondary emotions (Ekman, 1992, 1999), the two ways to distinguish emotions are based on different theoretical arguments. While the primary-secondary distinction is based on whether emotions have innate characteristics or not (Ekman, 1992, 1999), the distinction into low-level and high-level construal emotions is based on whether emotions are directly experienced or mentally construed (see Liberman et al., 2007). Because people rely more strongly on information that is consistent with their current mind-set, we assume that people who adopt a local perspective on climate change will rely more on the immediate experience of fear (a low-level construal) as a source of information about whether they should act than people who adopt a more (spatially) distant perspective (for

initial empirical support for the idea that affect is more relevant for psychologically proximal judgments and decisions, see Chang & Pham, 2013; Midden & Huijts, 2009).

In contrast to the hypothesized role of fear as low-level construal, when people adopt a global perspective on climate change, their subsequent decisions should be guided by abstract construals. Previous research suggests that when people are engaged with abstract construals (e.g., when they plan for events that are temporally distant; Rabinovich et al., 2010) their actions are more strongly guided by their broad beliefs and values. In relation to this, the second factor we considered as a potential source of decision-making about climate change was *scepticism*. Scepticism refers to the degree to which people believe in the reality of human-made climate change and its present and future consequences. Scepticism is relevant because it undermines people's motivation to address climate change (cf. Lorenzoni et al., 2007); why should anyone be concerned about climate change and motivated to act – especially to mitigate – if they do not believe that climate change is real, potentially dangerous, and caused by humans? On the other hand, if a person's level of scepticism is low, then he or she is more likely to support mitigation (Joireman et al., 2010; Leiserowitz, 2006) and adaptation (Blennow & Persson, 2009; Morton et al., 2011). From the perspective of CLT, scepticism – as a collection of abstract beliefs about climate change, its causes, and possible consequences – can be considered as a higher-level construal relative to the more concrete experience of fear. Because high-level construals are more informative for representations of distant objects, we expected that people with a distant perspective on climate change would rely more on sceptical beliefs than on fear to represent risks and make decisions about supporting climate change responses.

### **The present research**

Although there is scientific consensus that climate change is happening (e.g., IPCC, 2007b) and that it needs to be addressed now (Stocker, 2012), the public is not yet prepared to



take the necessary steps. Partly, this has been explained by the fact that people perceive climate change as something that will mainly affect strangers, distant places and times (e.g., Leiserowitz, 2006). In accordance with this logic, it is routinely suggested that to overcome this barrier and to enhance people's willingness to respond to climate change, the *local* and *personal* impacts of climate change need to be made more salient (e.g., CRED, 2009; Lorenzoni et al., 2007; Moser & Dilling, 2007). Although this strategy has common sense appeal, there is actually little evidence that localising climate change impacts translates into increased readiness to act (e.g., Shwom et al., 2008; Spence & Pidgeon, 2010).

Like previous studies, the present research is interested in the role distance plays in the context of climate change action. However, we approach this issue via the perspective of Construal Level Theory (CLT; Trope & Liberman, 2003, 2010). In accordance with this perspective, we do not expect that localising climate change will automatically increase individual motivations to act. Rather, based on CLT we expect that varying psychological distance (i.e., a local vs. distant focus on climate change) should influence people's mental construals of climate change and consequently the kind of information they act on (i.e., information that reflects low- versus high- level construals; Trope & Liberman, 2010).

We further assumed that the experience of fear represents a lower level construal relative to more abstract sceptical beliefs. Accordingly, we predicted that participants with a local perspective (low-level construal mind-set) would rely more on fear (low-level construal information) to represent risks and make decisions about supporting climate change responses. Furthermore, we expected that the influence of fear would be positive (i.e., that more fear would lead to more risk perceptions and more willingness to respond to climate change). Conversely, people with a global perspective (high-level construal mind-set) should rely more on scepticism (high-level construal information) when representing risks and deciding how to act. This relationship was expected to be negative, that is, the more sceptical people are, the less they should consider climate change as a risk and the less they should be

motivated to act. To test these predictions we conducted an experiment with two conditions: We provided participants with either local or global information about climate change and then asked them about their risk perceptions and their willingness to respond to climate change by supporting mitigation and adaptation measures. We also measured their emotional responses to climate change and their beliefs (i.e., scepticism), risk perceptions and intentions in each of these conditions. We predicted interactions involving psychological distance and both reported fear and reported scepticism on risk perceptions and intentions.

## **Material and methods**

### **Participants and procedure**

Participants were 80 Psychology students from a University in the UK who participated in exchange for course credit. The average age was 20.6 years ( $SD = .63$ ; range: 18 to 50). The proportion of females was 82%. Upon arrival in the classroom, students received a questionnaire that introduced climate change with either a local or global focus (randomly assigned). They answered the remainder of the questionnaire and then were debriefed.

### **Manipulation and manipulation checks**

*Manipulation.* The manipulation consisted of two parts. Participants first read an introductory text about climate change. In the local (proximal) condition the text (184 words, see Appendix F) referred three times to the “UK” whereas the in the global (distant) condition, the text (185 words, see Appendix F) referred to “all over the world”, “across the globe”, or to “the planet” in the same places. In the second part of the manipulation, participants were asked to judge the likelihood of different potential climate change impacts that were framed either locally (e.g., “where I live”) or globally (e.g., “in much of the world”). Thus the manipulation aimed to get participants thinking about climate change in ways that were local versus global (i.e., proximal versus distant).

To check whether focusing on local (vs. global) impacts of climate change elicited concrete (vs. abstract) thinking styles, participants carried out two tasks. In the first task, participants were asked to describe what six potential climate change impacts (e.g., heat waves, sea-level rise) could look like on a local versus global scale. To analyse the extent to which participants were thinking concretely or abstractly, participants' answers were coded according to the linguistic category model (LCM; Coenen, Hedebouw, & Semin, 2006; Semin & Fiedler, 1988; for application in the context of CLT, see Leach & Plaks, 2009; Trope & Liberman, 2010). Looking at participants' descriptions of consequences associated with heat, sea-level rise, and storms no differences could be found between the abstractness mean score in the local and global condition ( $p$ -values  $< .05$ ). In other words, the way participants formally described the potential impacts of heat and sea-level rise did not differ as a function of whether they had a local or global mind-set. Given that no differences in terms of abstractness were found and considering the extensive effort needed to code the answers, we decided not to analyse the remaining three impact descriptions.

The second manipulation check asked participants to group 30 different climate change impacts (e.g., "famine", "population migration"). It was expected that participants with an abstract mind-set (global condition) would think broadly and consequently use relatively few categories to classify the objects. Conversely, individuals who were primed with a concrete (local) mind-set were expected to refer to more categories to classify the same objects (cf. Liberman et al., 2002). When the number of categories was compared, no statistically significant difference was found between the local ( $M = 4.29$ ,  $SE = .26$ ) and global condition ( $M = 4.42$ ,  $SE = .26$ ;  $t(66) = -.37$ ,  $p = .71$ ).

Taken together, the two approaches to check whether the manipulation was successful in eliciting a concrete versus abstract mind-set indicate that there were no differences between the local and global condition. Accordingly, we cannot be certain that the manipulation

effectively induced a concrete versus abstract mind-set in the proximal versus distant condition respectively. This issue will be covered in more detail in the discussion section.

### Measures

*Perceived risk.* To measure the extent of perceived risk, we asked participants to judge the likelihood of seven possible consequences from climate change (1 = *very unlikely*, 5 = *very likely*). To maintain the integrity of the manipulation, in the local condition we used questions relating to spatially proximal impacts (e.g., “Water shortages will occur where I live”) whereas in the global condition questions referring to global impacts (e.g., “Water shortages will occur in much of the world”). All items were taken from previous research (Dietz et al., 2007; Leiserowitz, 2006; O’Connor et al., 1999 as well as from Chapter 3 of this thesis, see Appendix A). The local and global items formed two reliable scales ( $\alpha_{\text{local}} = .76$ ,  $\alpha_{\text{global}} = .82$ ).

*Low-construal level fear of climate change.* Participants indicated the extent to which they experienced 14 different emotions when thinking about (local vs. global) climate change. Out of these 14 adjectives (e.g., bored, guilty, reassured), four were used to capture participants’ levels of fear (anxious, nervous, tense, fearful; Spence & Pidgeon, 2010;  $\alpha = .87$ ).

*High-construal level scepticism.* We used six items to assess participants’ level of scepticism (Whitmarsh & O’Neill, 2010; e.g., ‘The evidence for climate change is unreliable’, ‘There’s no such thing as climate change’; Whitmarsh, 2009b). Participants were asked to indicate how much they agreed with these statements (1 = *strongly disagree*, 5 = *strongly agree*;  $\alpha = .79$ ).

*Support for mitigation policies.* Participants indicated their support (1 = *definitely oppose*, 5 = *definitely support*) for 11 policies that we presented as steps to decrease the amount of greenhouse gases “as a society” (e.g., “Ban the driving of cars in certain areas”).

The 11 items (Nilsson et al., 2004; Prillwitz & Barr, 2011, see Appendix A for all items used in this Study), formed a reliable scale ( $\alpha = .73$ ).

*Personal intentions to mitigate.* We used 10 items (Lowe et al., 2006; O'Connor et al., 1999) to assess people's future intentions to engage in actions to mitigate climate change. The topics covered were mobility (e.g., "Car sharing"), energy-saving (e.g., "Install more insulation at home"), consumption (e.g., "Reduce the number of new things you buy"), and political behaviours (e.g., "Join an environmental group"). On a 5-point Likert scale, participants indicated how likely they were to take each action in the future to combat climate change (1 = *very unlikely*, 5 = *very likely*). The proposed actions formed a reliable scale ( $\alpha = .79$ ).

*Support for adaptation policies.* The 12 items (see Chapter 3 and Appendix A) listed a range of policies that represented adaption in response to climate change, including different ways of reducing the vulnerability of species, preventing water scarcity, heat-related problems, and floods. Participants were asked to indicate the degree of their support for each of these policies (1 = *definitely oppose*, 5 = *definitely support*,  $\alpha = .75$ ).

*Personal intentions to adapt.* Participants rated the likelihood of nine steps they could take individually to adapt to climate change (see Chapter 3 and Appendix A). These actions were aimed to reduce the vulnerability of themselves (e.g., "Read about how to avoid heat stress during heat waves"), other people (e.g., "Persuade relatives or friends to move away from flood plains"), or nature (e.g., "Donate money to preserve species at risk from climate change") from negative climate change impacts. Participants answered the question of which actions they were likely to take in the future on a five-point Likert scale (1 = *very unlikely*, 5 = *very likely*). The items formed a reliable scale ( $\alpha = .77$ ).

*Personal involvement and systematic processing.* In some previous research, psychological distance has also been used to manipulate the level of "issue involvement" or "personal relevance" (see Petty & Cacioppo, 1986). Although, according to Construal Level

Theory, distance can have an effect on mental processes without affecting personal involvement (Ledgerwood, Trope, et al., 2010; Ledgerwood, Wakslak, et al., 2010), we included a measure of personal involvement to check for possible effects of the distance manipulation. Participants indicated their agreement (1 = *strongly disagree*, 5 = *strongly agree*) to three involvement questions (“Climate change is important to me”, “Climate change is personally relevant me”, “I am interested in the issue of climate change”; see Ledgerwood, Trope, & Chaiken, 2010). The three items formed a reliable involvement scale ( $\alpha = .85$ ). The more people are involved with an issue, the more they are motivated to process the available information (see Petty & Cacioppo, 1986). To exclude the possibility that the distance manipulations lead to different levels of systematic processing, participants’ descriptions of the six potential climate change impacts were compared. More specifically, the descriptions were compared with regard to their length. On average, participants in the local condition produced the same amount of characters as participants in the global condition (Table 5). Hence, there is no evidence that the distance manipulation increased either the level of personal involvement or the motivation to process information.

Table 5

*Number of characters used to describe six potential climate change impacts in the local and global condition*

	$M_{loc}$	$SE_{loc}$	$M_{glob}$	$SE_{glob}$	$t$	df	$p$
Heat waves	126.56	8.80	135.72	10.29	-.68	78	.50
Sea-level rise	97.87	10.10	119.92	9.72	-1.57	75	.12
More frequent and intense storms	97.76	12.34	106.24	10.09	-.53	74	.60
Hotter and drier summers	94.24	10.31	109.46	10.01	-1.06	78	.29
Wetter winters	78.80	9.76	71.68	8.16	.56	74	.58
Impacts on tourism	98.43	9.43	126.03	11.30	-1.89	75	.06
Mean characters across all impacts	98.95	8.16	111.15	7.70	-1.09	78	.28

*Note.* loc = local framing of climate change, glob = global framing of climate change.

## Results

*Main effects.* We used multiple linear regression analyses with distance as single predictor to test for main effects on people’s willingness to respond to climate change and their levels of personal involvement. As anticipated, focusing on either local or global impacts of climate change had no effect on people’s motivation to mitigate climate change (p-values for policy support and personal intentions  $\geq .74$ , Table 6) or adapt to possible consequences (p-values for policy support and personal intentions  $\geq .88$ ). The distance manipulation did not have an effect on personal involvement ( $p = .33$ ), which underlines the idea that varying distance does not necessarily translate into different levels of issue involvement (Ledgerwood, Trope, et al., 2010; Ledgerwood, Wakslak, et al., 2010). The only variable that differed as a function of the distance manipulation was risk perception: risks were perceived to be higher in the global condition than the local condition. However, comparing these risk perceptions directly would be inappropriate because the object of risk judgments differed across conditions (see method section).

Table 6

*Main effects of condition*

	$M_{loc}$	$SD_{loc}$	$M_{glob}$	$SD_{glob}$	$R^2$	$\beta$	df	$p$
Mitigation policy support	3.58	.52	3.54	.52	.00	-.04	78	.74
Mitigation intention	3.43	.57	3.43	.66	.00	-.00	78	.99
Adaptation policy support	3.69	.49	3.67	.51	.00	-.02	77	.90
Adaptation intentions	3.31	.68	3.34	.63	.00	.02	77	.88
Involvement	3.46	.88	3.26	.98	.01	-.11	78	.33
Risk perceptions	3.19	.64	3.62	.64	.10	.32	78	.003

*Note.* loc = local framing of climate change, glob = global framing of climate change.

*Interaction effects.* To address the question of whether varying foci on climate change influenced the extent to which participants relied more on low-level construal fear or high-level construal scepticism to represent climate change risks and to decide about responses, we explored potential interaction effects using a series of regression analyses (Table 7). In each model, the distance manipulation, fear, and scepticism were entered in the first step. We also included gender and age as covariates to ensure that the effects found were independent of these demographic variables. In the second step, the focal interaction terms (Distance x Fear and Distance x Scepticism) were added to the model. If adding the interaction terms resulted in a statistically significant improvement of the model, simple slope analyses were carried out to better understand and visualize the interactions (for details, see Cohen, Cohen, West, & Aiken, 2003).

When risk perceptions were used as the dependent variables, it was found that people were differently influenced by fear depending on whether they thought in terms of local or global climate change ( $\beta = -.30, t = -2.33, p = .02$ ; Table 7 and Figure 1): For participants with a local perspective (low-level construal) fear was positively associated with risk perceptions ( $\beta = .33, t = 2.41, p = .02$ ), that is, the more people were afraid of climate change, the more they perceived it as a risk. Conversely, reported fear and risk perceptions were not systematically related to each other among participants with a global mind-set ( $\beta = -.12, t = -.84, p = .41$ ). This pattern is consistent with our prediction that low-level construal fear was more informative for participants with a local perspective.



Table 7

*Main and interactive effects of distance, scepticism and fear on risk perceptions and response measures, holding constant the influence of age and gender*

	Step 1				Step 2					
	<i>B</i>	<i>SEB</i>	$\beta$	$R^2$	<i>B</i>	<i>SEB</i>	$\beta$	$R^2$	$\Delta R^2$	$\Delta F$
Risk perception ( <i>N</i> = 77)										
Age	.00	.01	-.03	.26	-.01	.01	-.06	.39	.13	7.45**
Gender <sup>1</sup>	-.35	.18	-.20 <sup>+</sup>		-.36	.17	-.21*			
Distance <sup>2</sup>	.41	.14	.30**		.42	.13	.31**			
Fear	.07	.09	.08		.28	.12	.33*			
Scepticism	-.26	.10	-.29**		.09	.13	.10			
Distance X Fear					-.40	.17	-.30*			
Distance X Scepticism					-.63	.18	-.50***			
Mitigation intentions ( <i>N</i> = 77)										
Age	.02	.01	.20 <sup>+</sup>	.30	.02	.01	.20(*)	.30	.00	.02
Gender <sup>1</sup>	-.32	.16	-.20*		-.32	.16	-.20(*)			
Distance <sup>2</sup>	-.07	.12	-.05		-.07	.12	-.05			
Fear	.14	.08	.18 <sup>+</sup>		.13	.11	.17			
Scepticism	-.32	.09	-.39***		-.34	.13	-.41**			
Distance X Fear					.02	.17	.02			
Distance X Scepticism					.03	.17	.03			
Adaptation intentions ( <i>N</i> = 76 )										
Age	.02	.01	.20 <sup>+</sup>	.30	.02	.01	.19 <sup>+</sup>	.32	.02	.97
Gender <sup>1</sup>	-.21	.17	-.12		-.21	.17	-.12			
Distance <sup>2</sup>	-.05	.13	-.04		-.05	.13	-.04			
Fear	.18	.09	.22*		.28	.12	.33*			
Scepticism	-.36	.09	-.41***		-.24	.14	-.28 <sup>+</sup>			
Distance X Fear					-.19	.18	-.15			
Distance X Scepticism					-.21	.18	-.17			
Mitigation policies ( <i>N</i> = 77)										
Age	.00	.01	.01	.20	.00	.01	-.01	.26	.06	2.75 <sup>+</sup>
Gender <sup>1</sup>	-.15	.15	-.12		-.15	.14	-.11			
Distance <sup>2</sup>	-.07	.11	-.07		-.07	.11	-.07			
Fear	-.04	.07	-.06		.12	.10	.18			
Scepticism	-.30	.08	-.43***		-.21	.11	-.30 <sup>+</sup>			
Distance X Fear					-.33	.15	-.33*			
Distance X Scepticism					-.14	.15	-.15			
Adaptation policies ( <i>N</i> = 76)										
Age	.00	.01	-.05	.23	-.01	.01	-.07	.28	.05	2.38 <sup>+</sup>
Gender <sup>1</sup>	-.25	.14	-.19 <sup>+</sup>		-.25	.14	-.20 <sup>+</sup>			
Distance <sup>2</sup>	-.04	.11	-.04		-.04	.10	-.04			
Fear	.04	.07	.05		.11	.10	.18			
Scepticism	-.28	.07	-.41***		-.11	.11	-.16			
Distance X Fear					-.13	.14	-.14			
Distance X Scepticism					-.31	.15	-.33*			

Note. <sup>1</sup> female = 1, male = 2; <sup>2</sup> local = 0, global = 1; \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$ , <sup>+</sup>  $p < .10$ .

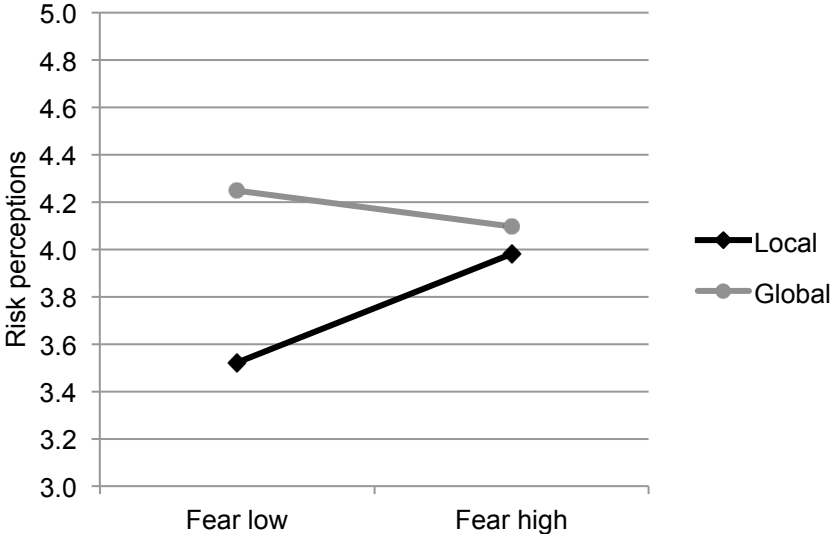


Figure 1. Simple slopes of condition predicting risk perceptions for 1 SD below the mean of low-level construal fear and 1 SD above the mean of fear.

Conversely, and again in line with our predictions, (high-level construal) scepticism was more informative for participants with a global perspective ( $\beta = -.59, t = -4.41, p < .001$ ) than for those who were primed with local climate change ( $\beta = .10, t = .71, p = .48$ ). More specifically, the more sceptical participants were, the less likely they judged climate change risks (this second interaction effect is illustrated in Figure 2;  $\beta = -.50, t = -3.52, p < .001$ ).

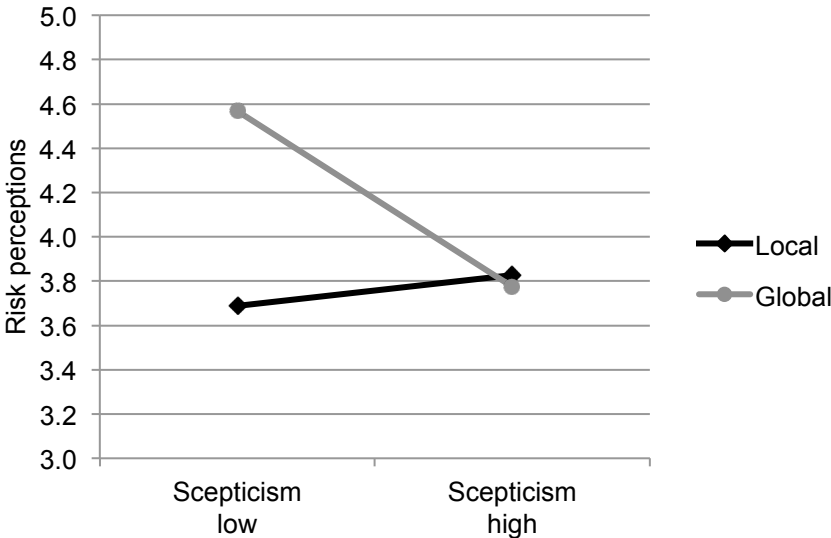


Figure 2. Simple slopes of condition predicting risk perceptions for 1 SD below the mean of high-level construal scepticism and 1 SD above the mean of scepticism.

With respect to *personal intentions*, none of the predicted interactions were found. In contrast to our prediction, when people made decisions about acting personally on climate change, (high-level construal) scepticism was not only more informative for participants with a psychologically distant perspective but also for those with a proximal perspective (scepticism explained about 17% ( $\beta^2$ ) of the variance in mitigation and adaptation intentions). More specifically, the less sceptical people were about the reality of climate change, the more willing they were to take personal action. The absence of the predicted interaction and the main effect of scepticism suggest that participants *generally* relied more on their abstract beliefs than on fear when making decisions about personal intentions.

In terms of policy support, two interaction effects emerged: When examining participants decision about *support for mitigation policies*, the interaction between distance and fear on willingness to support policies ( $\beta = -.33$ ,  $t = -2.30$ ,  $p = .02$ , Figure 3) looked similar to the one observed for risk perceptions (see Figure 1): The more people reported fear in the local condition, the more they were willing to support mitigation policies, however this effect was not itself significant,  $\beta = .18$ ,  $t = 1.18$ ,  $p = .24$ . Unexpectedly, in the global condition, fear was significantly negatively related to support for mitigation policies,  $\beta = -.32$ ,  $t = -1.99$ ,  $p = .05$ . One explanation for this negative association is that fear and the global mind-set are represented at different construal levels. Because of this mismatch participants with a global mind-set could have found it more difficult to process and integrate their feelings and the psychological distance information than participants with a local mind-set. As a result, participants in the global condition probably had an experience that was less fluent and therefore less persuasive (see Kim et al., 2009) than participants in the local condition, where fear and mind-set were represented at the same construal level. We will discuss the issue of “fit” in more detail in the discussion section.

Looking at this interaction differently, however, it can be seen that distance framing *did* have an effect for people who reported higher levels of fear. Specifically, at high levels of

fear local framing resulted in more support for mitigation policies ( $M = 3.86, SE = .09$ ) than global framing ( $M = 3.56, SE = .09, t(77) = 1.95, p = .06$ ). At low levels of fear, there was no effect of the framing manipulation on mitigation policy support ( $t(77) = 1.39, p = .17$ ). As such, there is some support for the hypothesis in the pattern on this variable.

With regard to support for *adaptation policies*, another interaction emerged ( $\beta = -.33, t = -2.12, p = .04$ ) that was in line with the prediction that (high-level construal) scepticism should be more informative for participants with a global mind-set than for those with a local mind-set. Specifically, scepticism was negatively associated with support for adaptation policies in the global condition ( $\beta = -.61, t = -4.23, p < .000$ ; Figure 4). By contrast, for participants who had a local mind-set scepticism was not a relevant source of information ( $\beta = -.16, t = -1.02, p = .31$ ).

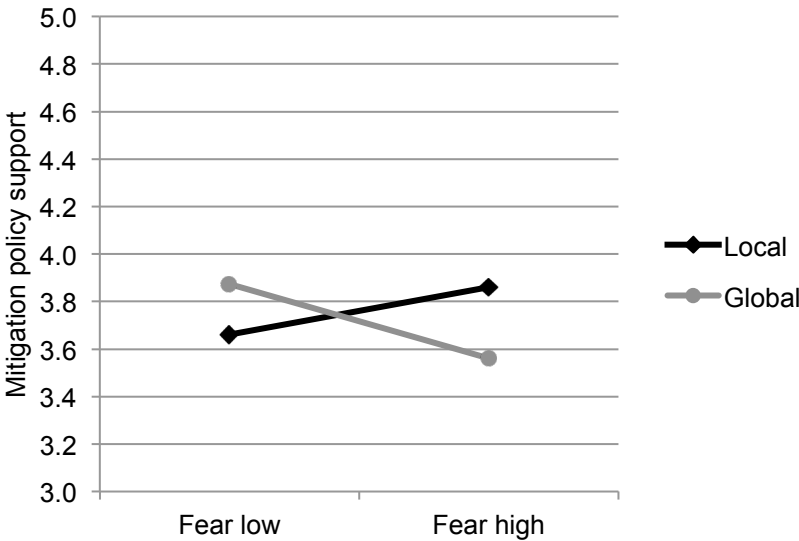
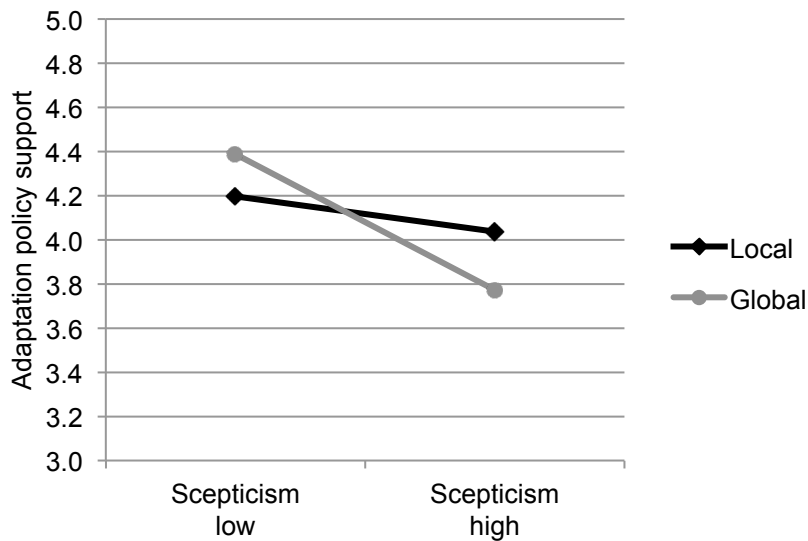


Figure 3. Simple slopes of condition predicting mitigation policy support for 1 SD below the mean of low-level construal fear and 1 SD above the mean of fear.



*Figure 4.* Simple slopes of condition predicting adaptation policy support for 1 SD below the mean of high-level construal scepticism and 1 SD above the mean of scepticism.

In sum, the overall pattern of interactions suggests that people with a local mind-set often rely more on low-level construal fear to make climate-related judgments and decisions, at least with respect to risk perceptions and certain kinds of policy support, than people with a global mind-set. By contrast, people with a global mind-set are more strongly influenced by high-level construal scepticism when thinking about climate change and possible response than people with a local mind-set, again at least with respect to risk perceptions and certain kinds of policy support. Unexpectedly, when it came to making decisions about personal actions, the predicted effects were replaced by more straightforward effects of fear (increasing action) and scepticism (reducing action) and there were no main or interactive effects of distance framing.

## Discussion

Moving people's attention from global to local is often suggested as a strategy to increase their sense of urgency and their motivation to respond to climate change (e.g., CRED, 2009; Lorenzoni & Pidgeon, 2006). However, from the perspective of construal level theory (CLT; Trope & Liberman, 2003, 2010) – an approach that is concerned with how the

psychological distance that lies between a person and what she or he is thinking about affects mental processes such as making judgments and decisions – it seems unlikely that zooming in on local climate change will have a direct effect on people’s motivation to respond to climate change. Instead, CLT suggests that psychological distance determines what kinds of information people rely on to make judgments and decisions.

In line with the predictions derived from CLT, the results of the present study showed that focusing on local climate change (vs. thinking about worldwide climate change) did not straightforwardly increase participants’ perceptions of risk and their mean-level support for response strategies. The absence of a direct effect of the distance manipulation on climate-related responses parallels the findings of other studies that have also failed to find this (see Shwom et al., 2008; Spence & Pidgeon, 2010). Instead, we found that distance interacted with other things to determine individual responses. Participants with a local perspective relied more on low-level construal fear when they made risk judgments whereas those with a global focus were more influenced by high-level construal scepticism. Partially this pattern was also found when people decided whether they wanted to support policies intended to mitigate climate change and to facilitate adaptation. Importantly, the directions of these relationships were consistent with previous research: More fear in the local condition was associated with greater perception of risk and more willingness to respond to climate change (Leiserowitz, 2006; Meijnders et al., 2001b; N. Smith & Leiserowitz, 2012; van Zomeren et al., 2010) and more scepticism in the global condition was associated with lower perception of risk and less willingness to respond (Blennow & Persson, 2009; Joireman et al., 2010; Leiserowitz, 2006; Morton et al., 2011). In other words, these patterns replicate insights on the impact of psychological distance on mental processes (e.g., Eyal et al., 2009; Ledgerwood, Trope, et al., 2010) within the context of climate change. Our findings also challenge the idea that simply localising climate change increases individuals’ motivation to act. Rather, making climate change more local changes what people *act on*.

These findings suggest that climate change communication could benefit from a more comprehensive approach that not only acknowledges the importance of psychological distance but also considers the opportunities that come with different mental perspectives. One crucial opportunity is to create messages with either consistently concrete or consistently abstract information. When messages elicit a certain processing mode among people (i.e., a concrete vs. an abstract mind-set) and then provide information that fits people's current perspective (e.g., low-level construal fear vs. high-level construal scepticism), people will perceive the message as more fluent, easier to process, and more persuasive. Such "fitting" messages are therefore more effective at influencing how people act than messages that do not create fit (Kim et al., 2009; White et al., 2011).

Besides combining the "right" bits of information into effective messages, a second way to benefit from the persuasiveness of fitting construal levels is to tailor messages to characteristics of people. For example, imagine a campaign that wanted to motivate people who do not believe that climate change poses a real threat to take action against climate change. In this situation, there are essentially two ways to account for the persons' characteristics and to reduce the negative effects of such abstract beliefs on the motivation to act on climate change. First, avoid discussions about climate change on an abstract level; thereby these abstract beliefs will be less salient and their effect is less detrimental to climate change action. The impact of high-level construal sceptical beliefs could probably be reduced further if communicators reframed the issue of climate change in more concrete terms (e.g., by focusing on local impacts and appealing to social norms, which seem to be low-level construals and would therefore fit the local perspective; see Ledgerwood, Trope, et al., 2010). However, there are situations where communicating in abstract terms cannot be avoided, for example when discussing future building projects or consequences for the whole world. Then a second way to tailor a message to the same hypothetical sceptical person could be to reframe climate friendly actions in other abstract concepts that are more likely to be supported

by people who hold sceptical beliefs (e.g., act environmentally friendly to foster the welfare of their society, see Bain, Hornsey, Bongiorno, & Jeffries, 2012). Alternatively, responding to climate change could also be framed as a necessary step to protect economic growth and beneficial to business (e.g., CRED, 2009; Defra, 2013; however, recent research indicates that focussing on economic benefits may also backfire, Bolderdijk, Steg, Geller, Lehman, & Postmes, 2013).

In addition, a more comprehensive approach should also consider some counter-intuitive propositions that follow from the present findings and reasoning. For example, there is reason to believe that in some circumstances an abstract and distant framing of climate change is superior to a concrete and proximal framing. Generally speaking, when people have a psychologically distant perspective, they are more likely to act in a way that is consistent with their central values and attitudes (e.g., Eyal et al., 2009; Ledgerwood, Trope, et al., 2010). This pattern has also been observed in the context of environmentally friendly behaviour (Rabinovich et al., 2010). One explanation for the higher consistency between attitudes and behaviour in situations where psychological distance and mental construal level are high, is that higher construal level facilitates self-control (e.g., Fujita & Carnevale, 2012). Considering that many climate-friendly behaviours require people to make sacrifices (e.g., spend extra money on house insulation, spend extra time for walking instead of driving a car), framing climate change as a distant issue could foster self-control and thereby help people with climate-friendly attitudes to act in accordance with their long-term goals.

A question that remains open is why the predicted interaction effects occurred on risk perceptions and (partially) on policy support but *not* on personal intentions. A possible explanation for these differences is that personal intentions are generally more difficult to change. At least two reasons support this explanation. First, people's everyday behaviours are often very stable (Neal, Wood, & Quinn, 2006). Assuming that people base their decisions about future behaviour – at least to some extent – on their current (and past) behavioural



patterns, it is likely that the stability of their daily routine carries over to their intentions, meaning that their intentions are unlikely to change. Second, the “costs” of changing personal intentions are higher than the costs of changing risk perceptions and policy support. A person can change her perception of climate change risks from *likely* to *very likely* without any direct implications for herself. Of course, the changed perception could later translate into behaviour changes but there are no direct effects or costs associated with a revised view on risks.

Likewise, it is easy to increase one’s verbal support for policies without facing any personal consequences. Even if regulations or taxes indeed change in the future, these changes are far away and hypothetical. By contrast, committing to change one’s behaviour is more costly, especially behaviour that helps mitigate climate change and adapt to its consequences. These changes typically affect one’s lifestyle (e.g., using public transport rather than your own car, becoming a vegetarian), something that requires a lot of conviction and motivation to change. In sum, it is possible that the manipulation was sufficient to influence the more malleable variables (risk perceptions and policy support) too weak to change people’s more stable behavioural intentions. Future studies could attempt stronger manipulations (e.g., with visual stimuli) in order to explore the possibility of also changing people’s intentions.

### **Limitations**

Limitations of this research should be noted. First, the participants of this study were all students and many of them were female (82%). This means that the present sample is not representative of the general population. Representativeness is indeed an important issue, especially when one wants to make claims about the prevalence of specific beliefs and attitudes in the population. However, the purpose of this research was to study psychological processes. Although these processes could – at least in principle – differ between the student population and the general population, student samples are typically unproblematic in terms of external validity (J. N. Druckman & Kam, 2011). Therefore, the limited representativeness

of our sample is unlikely to represent a significant threat to the findings of this study. It should, nonetheless, be noted and considered an important limitation.

Second, the manipulation checks did not show any differences in thinking styles (i.e., concretely vs. abstractly) in the two conditions. Hence, although the conditions produced different tendencies in terms of what kind of information participants were influenced by, we cannot be certain that this is due solely to a difference in the extent of concrete versus abstract thinking. It is unclear why the manipulation checks did not reveal an effect. One possibility is that the manipulation checks were not appropriate. For example, participants' descriptions of climate change impacts, which were analysed with regard to their abstractness, did not contain many words; often they were just fragments of a sentence. These descriptions might have been too short for the abstractness analysis. In future studies, it might therefore be advisable to ask respondents to produce at least one or two full sentences. Although the formal aspects of the second manipulation check (grouping climate change impacts) was very similar to manipulation checks that were successfully used in previous studies (cf. Liberman et al., 2002), the task might have been too demanding in terms of the elements participants had to group. Previous sorting tasks used objects that people are familiar with, such as things to pack for a weekend trip. In relation to this, grouping different potential future climate change impacts is a much more hypothetical and difficult task. We therefore think that this manipulation check was also not ideal.

Another possible reason for why no manipulation effect was detected could be that participants indeed did not differ with regard to how concretely or abstractly they were thinking after reading the two text versions. However, evidence from a pilot test that was conducted within the context of Study 4 (Chapter 5, see Appendix E) suggests that the present manipulation indeed affects how concretely or abstractly people think. More specifically, this pilot test showed that people were better at finding missing details in pictures (Picture Completion Test, taken from Petermann & Petermann, 2007) after reading a text about local

climate change as compared to when they had read a text about global climate change. The better performance after reading the local text is in line with the prediction that people in the local condition adopt a more concrete and detailed thinking style and should accordingly detect more missing elements in the pictures than people with a more distant perspective (see also Wakslak, Trope, Liberman, & Alony, 2006). Although the manipulations used in the present research and in the pilot test were not identical, we believe that the overlap was large enough to assume that the manipulation used in the present research would have led to similar performance differences in the picture completion test.

A third potential shortcoming is that the differential reliance on either fear or scepticism could have resulted from different levels of involvement and systematic processing. However, a comparison of mean values on involvement and the amount of text produced in the descriptions of potential climate change impacts (a typical measure of systematic processing) did not differ across conditions. Together with additional counter-evidence for a systematic link between psychological distance and involvement from the literature (Ledgerwood, Trope, et al., 2010; Ledgerwood, Wakslak, et al., 2010) it is, therefore, unlikely that the observed patterns are due to differences in involvement or degree of systematic processing.

Another issue with the present research is that the interaction effects could not be observed with regard to all response measures and those that were statistically significant had relatively small effect sizes. Partly, these issues may have a methodological explanation. The variance and skew of some variables were problematic. In particular, the variance of fear was narrow and there was a clear tendency for generally low-levels of experienced fear. The inclusion of items that have the potential to capture low levels of fear (e.g., feeling “uncomfortable”) could alleviate these problems. Another explanation for the weak effects (and the absence of the interaction with regard to some variables) is that the manipulation was subtle: Participants read one of two texts that described climate change. The difference

between the texts was that it referred three times to the “UK” in the local version and three times to “all over the world” and similar expressions implying distant impacts in the distant version. These differences were not emphasized in any way (e.g., by putting the crucial word in italics or in bold letter). Even though the manipulation was strengthened by a second part – estimating the likelihood of either local or global climate change risks – it is overall a subtle way of activating a local or global perspective on climate change. In light of this subtle manipulation it would be unrealistic to expect large effects.

Future studies should try to replicate and extend the present findings. The present study only manipulated psychological distance and then used observed spontaneous individual differences in low-construal level fear and high-construal level scepticism as second predictors. It would be instructive to move a step forward and also experimentally vary the second part of the interactions (i.e., fear and/or scepticism). Thereby more control over the central variables would be achieved and clearer conclusions about the causality of the involved variables could be drawn. An experimental induction of fear and scepticism would also be helpful to reduce the plausibility of alternative explanations (e.g., a conflation with environmental attitudes). Note, however, that using fear to communicate risks – despite the success of this strategy in areas such as health-promotion (Maloney et al., 2011) and its potential for climate change communication (Maibach et al., 2008; Meijnders et al., 2001b; Weber, 2006) – is not uncontroversial and should be attempted with caution (for a more detailed discussion, see CRED, 2009; Moser, 2007; O’Neill & Nicholson-Cole, 2009; Roeser, 2012).

## **Conclusion**

The findings of this study suggest some interesting ideas about the relationship between psychological distance and people’s perceptions and decisions in the context of climate change. Specifically, our findings challenge the idea that simply localising climate change increases individuals’ motivation to act. Instead, consistent with Construal Level Theory, our

results suggest that psychological distance does not straightforwardly translate into different levels of engagement with climate change. Rather, variation in psychological distance seems to influence what perceptions and decisions are based on (low- vs. high-level construal information). Consistent with this idea we show that fear (a low level emotion) is a stronger predictor of risk perceptions and certain forms of policy support when people are in a local mind-set, whereas more abstract beliefs associated with scepticism are stronger predictors of these things when people are in a global mind-set. On this basis, we suggest that future research and practice should adopt a more differentiated perspective on the effects of psychological distance in the context of climate change.

## **Summary**

Despite consensus for the need to act in order to reduce the negative impacts of climate change, individual readiness to do this is still limited. One prominent explanation for individual inaction is that climate change is perceived as something distant from people's lives, affecting only strangers in other places and times. Accordingly, reducing the psychological distance of climate change has repeatedly been proposed as one strategy to increase individuals' (affective) engagement and their motivation to respond to climate change. The present research considers this idea from the perspective of Construal Level Theory (CLT). From this perspective, decreasing psychological distance should not itself influence people's engagement and willingness to act. Instead, variations in psychological distance should change the processes that underlie individual decision-making. In particular, when objects, ideas or events are psychologically proximal, they are construed concretely and decision-making is guided by these concrete construals. Conversely, when objects, ideas or events are psychologically distant, they are represented in more abstract terms and decision-making is guided by these abstract construals. To test the assumptions of CLT in the context of climate change, we conducted an experiment in which we described climate change with

either a local or global focus. Drawing on CLT, we predicted and found that participants with a local perspective relied more on fear (i.e., a concrete emotional response) to represent risks and make decisions about supporting climate change, whereas participants with a global focus relied more on scepticism (i.e., their generalized beliefs) when making such judgements. Our results challenge the idea that simply localising climate change will increase individuals' motivation to act and suggest that future research should adopt a more differentiated perspective on the effects of psychological distance in the context of climate change.

## **Chapter 5 – Antagonistic processes of fear appeals and localising**

### **Introduction**

Despite the urgency to act effectively on climate change (e.g., Stocker 2012), the general public does not consistently recognize climate change as major issue (European Commission, 2013; Jowitz, 2010; PEW research center, 2013; Weber & Stern, 2011) and average individual willingness to support measures to tackle climate change is low (e.g., European Commission, 2011; PEW research center, 2010). A prominent explanation for the ambivalence about climate change is that the public perceives this issue to be distant from their everyday lives, and consequently climate change does not elicit the necessary level of concern to motivate action (e.g., CRED, 2009; Lorenzoni et al., 2007; Weber, 2006). Given this analysis, the strategies that have been suggested to overcome public inaction have involved reducing the perceived psychological distance of climate change by zooming in on local consequences (CRED, 2009; Moser & Dilling, 2007; Nicholson-Cole, 2005; Spence et al., 2011; Weber, 2010) and activating concern through playing on people's emotions (Weber, 2006).

Although the two strategies have been proposed frequently, their effectiveness has rarely been tested in the context of climate change. Of more concern, the few studies that applied the approach of "localising and personalising" climate change have not revealed the anticipated positive effects of this strategy (Shwom et al., 2008; Spence & Pidgeon, 2010), although other studies have shown that fear appeals can be successful for motivating action on climate change (van Zomeren et al., 2010). The successful application of fear appeals to this domain might, at least in part, stem from the extensive prior work that has been conducted on fear appeals more generally. More specifically, this work has identified conditions that increase the success of this persuasive strategy and help to avoid possible

pitfalls. Moreover, this line of research has elaborated the processes through which these effects occur. Similar insights into the processes governing localising as a persuasive tactic are comparatively lacking.

The major goal of the present research was to study the effectiveness of *fear appeals* and of *localising* climate change to increase public perception of climate change as a risk and to motivate action on climate change. In doing so, we were not just interested in the net effects of these approaches. It was an important goal of this research to explore the *processes* that are initiated when people are confronted with fear appeals and localised information about climate change. Better understanding the processes guiding individual responses to these different persuasive strategies enables better implementation of such techniques in future climate change communications.

A secondary goal of this research was to follow up on the findings of the previous Chapter. The focus of Chapter 4 was on how psychological distance influenced the way people think about climate change and possible response measures. Based on Construal Level Theory (Trope & Liberman, 2003, 2010), it was expected that psychological distance would influence what type of information (i.e., the concrete emotion of fear vs. abstract sceptical beliefs) people predominantly rely on when thinking about climate change and possible responses. As predicted, it was found that participants with a local perspective relied more on low-level construal fear when they made risk judgments whereas those with a global focus were more influenced by high-level construal scepticism. To some extent this pattern was also found when people decided whether they wanted to support policies intended to mitigate climate change and to facilitate adaptation. In the present Chapter, we wanted to replicate and extend the findings of the Chapter 4. In order to replicate the findings, we kept the study designs very similar. The main difference was that we used *spontaneously occurring* fear as moderator in Chapter 4 and *manipulated* fear in the present Chapter. Manipulating fear has



several advantages: It gives us more control over the variable fear, it helps us to reduce the plausibility of alternative explanations, and it enables us to draw clearer conclusions about the causal role of fear.

Before introducing the experiment we conducted to achieve this goal, we briefly outline fear and localising as persuasive techniques, and the various processes that might determine their effectiveness or otherwise.

### **Using fear-arousing messages to engage the public**

A frequently used explanation for why people do not act on climate change is that they cannot directly experience climate change and that they therefore are not worried enough to take action (Weber, 2010). By definition, “climate” is the average weather over a long period of time, typically 30 years. As such, climate is an abstract statistical concept that cannot be experienced directly (Weber 2010). Because of this lack of direct experience, people do not experience visceral emotions when they think about climate change (Weber 2006). This lack of emotional involvement is problematic because emotions such as worry or fear can be important drivers to respond to threats (E. Peters & Slovic, 2000). In other words, when people do experience emotions like fear, this feeling can overcome the paralysis that abstract threats often bring about. The role of fear as a driver of personal action is well documented in general, for example with regard to health-related behaviours (e.g., Maloney et al., 2011; Witte & Allen, 2000) and disaster prevention (e.g., Neuwirth et al., 2000; Terpstra, 2011).

Fear is also regarded as a promising motivator for taking action on climate change (Maibach et al., 2008; Moser, 2007; Weber, 2006). Some research based on correlational data support this view: When people are afraid of climate change (or have similar other negative feelings) they perceive climate change more as a risk, have more favourable attitudes towards mitigation, and are more willing to mitigate (Leiserowitz, 2006; N. Smith & Leiserowitz, 2012). Yet, the correlational basis of these studies does not permit stronger, causal

conclusions about the assumed role of fear in motivating action. Findings from experiments, where only levels of fear are varied and everything else is held constant, are more helpful in determining causality. However, the experimental evidence on the effectiveness of fear appeals is less conclusive. On the one hand, van Zomeren and colleagues (2010) found that fear arousing messages increased participants' *intentions* to act in environmentally friendly ways. However, another study found that fear appeals lead to more favourable attitudes towards using light bulbs (i.e., save energy to mitigate climate change) but had no effect on behavioural intentions or actual behaviour (Meijnders et al., 2001a). Similarly mixed evidence comes from a study by Spence and Pidgeon (2010). They framed climate change either in terms of what can be gained when people mitigate or what can be lost when climate change is not mitigated. The loss frame increased fear relative to the gain frame and more fear in turn increased the levels of perceived severity of climate change impacts. However, attitudes towards climate change mitigation were more favourable in the gain frame than in the loss frame. Thus, while the association between spontaneously occurring fear and support for climate change mitigation seems to be unanimously positive, purposefully elicited fear produced mixed and more complex effects.

One explanation for why fear appeals might produce mixed results is that they initiate multiple psychological processes, some of which have opposing effects. To illustrate, the Extended Parallel Process Model (EPPM; Witte & Allen, 2000; Witte, 1998), a prominent model of fear appeals often applied in the health literature, uses the terms *danger control processes* and *fear control processes* to account for these antagonistic mechanisms. When people perceive a threat as serious and personally relevant, they become scared and motivated to reduce their fear. One way of reducing fear is to tackle the threat itself (i.e., removing or lessening the threat; Witte & Allen, 2000). This danger control behaviour is considered *adaptive* because it motivates people to protect themselves from the threat. By contrast, when

people engage in fear control processes, they ignore the threat and any recommended responses. Instead, they engage in coping strategies that reduce their fear rather than addressing the threat itself. Behaviour resulting from fear control, such as defensive avoidance, downplaying or denying the threat, reactance, or dismissing the message as manipulative, are usually seen as *maladaptive* because they fail to protect the individual from harm (Witte & Allen, 2000; Witte, 1998).

In sum, there is compelling evidence from cognate fields that fear appeals can motivate harm-reducing behaviour. Fear has also been positively related to people's engagement with climate change, though this relationship, particularly the causal role of fear, is not sufficiently well understood. To understand how fear appeals work, when they are effective, and when they are not, it is crucial to not only study and assess their intended effects (i.e., promoting behaviour that reduces the threat) but also the processes that can simultaneously increase (i.e., accepting one's fear and trying to control the danger) and decrease (i.e., focusing on controlling the feeling of fear) the intended effect (cf. Roskos-Ewoldsen, Yu, & Rhodes, 2004).

### **Localising climate change to engage the public**

The general public typically perceive climate change as a distant threat: People see climate change as something that happens in remote times and places rather than in the here and now, and as something that is more likely to affect strangers than people one knows (Bord et al., 1998; Fleury-Bahi, 2008; Leiserowitz, 2006; Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Milfont, 2010; O'Neill & Nicholson-Cole, 2009; Safi et al., 2012). This perceived distance could lead to the view that climate change risks are irrelevant to one's self and that there is no need for personal actions to address climate change. To counteract this inertia, it has repeatedly been suggested that highlighting the local consequences of climate change is an important part of strategies to engage and mobilize publics around this issue

(CRED, 2009; Moser & Dilling, 2007; Nicholson-Cole, 2005; O'Neill & Nicholson-Cole, 2009; Spence et al., 2011; Weber, 2010). The rationale behind “localising” climate change seems to be that this approach decreases the psychological distance, makes the consequences of climate change easier to imagine, creates a greater sense of urgency, personal responsibility, and ultimately enhances people’s motivation to act. Although researchers seem to unanimously promote localising as a strategy to motivate action against climate change, empirical evidence is actually scarce and inconclusive. To our knowledge, only three studies have directly tested this approach, and the findings of these do not reveal a consistent picture. First, Shwom and colleagues (2008) investigated the effect of two messages about climate change that described climate change trends either on a regional or on a national scale. Contrary to the common advice, the extent to which participants endorsed climate change policies did not differ across these conditions. Second, and in a similar vein, Spence and Pidgeon (2010) framed climate change in local and distant terms. The manipulation was successful in that the locally framed information was rated as *more personally relevant* than the distantly framed information. However, localising climate change had no effect on attitudes towards climate change mitigation. Put differently, the “localising” approach seems to have stirred something in their participants but it did not carry over to their attitudes. The final study we are aware of was by Scannell and Gifford (2013), which provided members of the general public with information posters describing either one broad global impact of climate change (sea levels rising) or a local impact specific to the area they lived in (either of the following three: forest fires, beetle infestation, rising sea levels). Relative to a third condition, where no information was provided, the locally framed information poster increased participants’ engagement with climate change (including affective, cognitive, and behavioural aspects of engagement). In contrast, people’s engagement with climate change did not differ between the globally framed poster and the control condition. Thus, in this

study at least, providing information about local climate change seems to effectively increase people's engagement in comparison to providing no information. However, Scannell and Gifford (2013) did not directly compare the local and the global frame and it is therefore not possible to draw any conclusions about specific advantages of zooming in on local climate change relative to a more global approach.

In sum, despite accepted wisdom, available research does not consistently reveal the assumed supremacy of localised climate change communication over communication with a more distal (e.g., national or global) focus. One explanation for why local frames might sometimes fail to successfully motivate climate change action is that localising, like fear appeals, might trigger parallel, and possibly contradictory, processes. This assumption is mainly based on the structural similarity of localising climate change and fear appeals: The two aspects of fear appeals that trigger danger or fear control processes are the *severity* of the threat and the perception that it is *personally relevant* (e.g., Witte & Allen, 2000; Witte, 1998). Proponents of the localising approach explicitly argue that increasing personal relevance is one of the main goals – if not *the* main goal – of this strategy (Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Marx et al., 2007; Nicholson-Cole, 2005; O'Neill & Nicholson-Cole, 2009; Scannell & Gifford, 2013).

Moreover, evidence from existing attempts to implement the localising strategy suggests that it indeed increases personal relevance (Scannell & Gifford, 2013; Spence & Pidgeon, 2010; see also O'Neill & Hulme, 2009). The second prerequisite for engaging in danger or fear control processes, the notion that the threat is severe, is also integral to the localising approach. For one thing, scientific reports (e.g., IPCC, 2007c) and news coverage of climate change (Doulton & Brown, 2009; Ereaut & Segnit, 2006; Hulme, 2008) often emphasise the severity of climate change and the urgency to act. Actually, it is questionable whether any convincing message about *local* climate change can be crafted without stressing

the importance of this issue (cf. Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Maibach et al., 2008).

An additional argument that supports the view that localising can trigger negative reactions is that people generally do not like “bad news”. This is, however, how climate change is typically portrayed in the media – an impending catastrophe (Boykoff, 2008; Ereaut & Segnit, 2006; Hulme, 2008). So defensive reactions would not be surprising when people learn that this severe and scary issue will affect their local environment, their friends, families, and ultimately themselves – rather than distant places and strangers.

Importantly, some studies suggest that defensive reactions to the localising approach may be occurring naturally, that is, without any special intervention: When people compare local and global environmental problems, they consistently perceive distant environmental problems as more severe than local problems (Gifford et al., 2009; Schultz et al., in press; Uzzell, 2000). Importantly, this perception seems independent from where people live, for it has been observed in many different countries and not just in those where the environment is actually better off (Gifford et al., 2009; Schultz et al., in press). The predominant explanation for this “spatial optimism” is that people tend to maintain a positive place identity and a positive self-image (cf. Gifford et al., 2009; Schultz et al., in press). When climate change is framed in local terms, the outlook of (mainly) negative consequences is a potential threat to people’s self-image and the place(s) they identify with. As a reaction, people may discount the local consequences of climate change (cf. Schultz et al., in press). Note that spatial optimism, and the reaction of discounting possible threats, is consistent with the more general tendency to estimate the risks to oneself to be smaller than the risks to others (i.e., to exhibit relative optimism: Weinstein, 1980).

Because of the structural similarity between fear appeals and the localising approach and because climate change is almost always “bad news” and potentially threatening one’s

self-image as well as places people identify with, it is very likely that localising this issue initiates similar parallel processes as fear-arousing messages. Thus, in addition to the processes that might facilitate the effects of locally framed messages, there are processes that might increase the chances of these being rejected. Indeed, the previous finding that zooming in on local climate change consequences *decreased* people's judgments of the *severity* of climate change (relative to the global frame, Spence and Pidgeon, 2010) can be interpreted as a possible manifestation of such undesired side-effects (i.e., dismissal as unrealistic). On this basis, we suggest that the activation of antagonistic parallel processes might account for why previous attempts to demonstrate the positive effects of localising were not always successful (Shwom et al., 2008; Spence & Pidgeon, 2010).

To summarise, in the absence of consistent, direct and positive effects of localising climate change on individual attitudes and behaviour, we argue that it becomes important to consider the various processes that might be triggered by such messages, and how these processes might complement or cancel each other out. Without this kind of deeper investigation, the absence of direct effects of localising on relevant outcomes should not be interpreted as localising having no effects at all. Moreover, a better understanding of the facilitative and antagonistic processes triggered by localising messages could improve the future use of this strategy if there are ways to maximise positive processes and minimise the negatives.

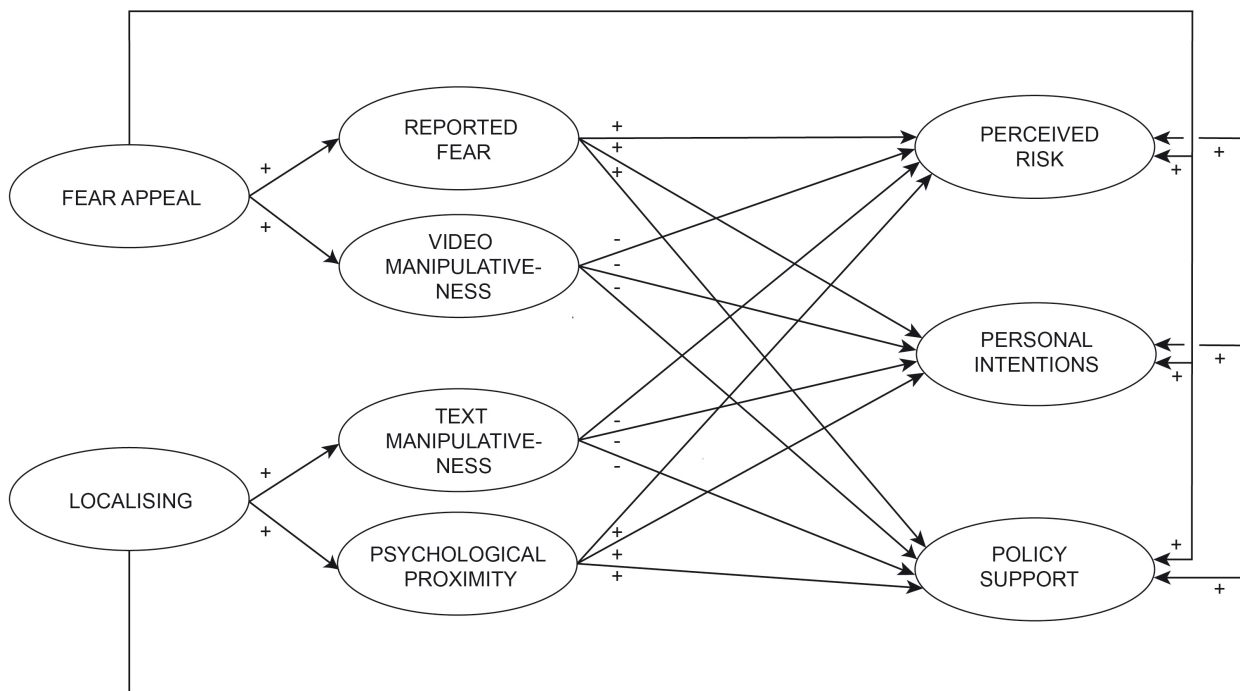
### **Aims and expectations**

The main goal of this research was to test the effectiveness of two strategies that might be used to increase public perception of climate change as a risk and to motivate action on climate change: fear appeals and zooming in on the local (versus global) consequences of climate change. Given the ambiguity of past findings, especially in relation to the latter strategy, further explorations of their influence on individual climate change relevant

orientations would seem important. In addition, to better understand how these strategies work, and to possibly explain previously inconsistent findings, we also considered more closely the inhibiting and motivating processes these might set in motion (the expected relations are depicted in Figure 5).

Specifically, we expected that both fear appeals and localising climate have the potential to increase risk perceptions and support for mitigation. More importantly though, we also predicted that fear appeals would increase participants' motivation by eliciting the experience of fear but also increase defensiveness in the face of fear (e.g., by dismissing fear arousing messages as “manipulative”). Both these responses should have indirect consequences for risk perceptions and mitigation support, but in opposing directions with fear increasing and defensiveness decreasing these outcomes. In terms of the localising approach, we similarly investigated the processes that might be triggered by such messages and that might indirectly influence message outcomes. Specifically, we expected that local (versus global) framing should reduce psychological distance to climate change, something that should increase positive orientations in terms of risk and mitigation support. However, there are at least two reasons for why localising, similar to fear, could increase defensiveness, which should in turn decrease positive orientations: First, localising is structurally similar to fear (it portrays climate change as a *threatening* and *personally relevant* issue). Second, people do not like “bad news”, which is exactly how climate change is typically portrayed in the media. Third, research on spatial optimism suggests that people may spontaneously and habitually employ defensive strategies, even in the absence any special intervention.





*Figure 5.* Conceptual model of fear appeals and the localising approach predicting risk perceptions and the willingness to mitigate climate change. + / - refer to paths that are expected to be positive / negative.

A secondary goal of this research was to test the combined effect of fear appeals and the localising approach. Based on theoretical considerations and previous research it can be argued that each strategy can make an important yet different contribution to motivating people to act on climate change: Fear appeals should elicit emotions that increase the willingness to act (e.g., Witte, 1998) while localising should decrease the tendency to see climate change as distant and personally irrelevant threat (e.g., CRED, 2009; Lorenzoni et al., 2007). This is also in line with Lorenzoni and colleagues (2006, p. 277) who argued that “if climate change communicators were to associate negative affect with specific localised impacts and with enabling personal solutions linked to those effects, these together could exert a significant positive influence on behavioural intentions.” Thus, we predicted that the

perception of climate change as a locally and personally relevant risk and the willingness to address climate change would be highest when fear appeals (i.e., high level of fear) were combined with local information about climate change (rather than global information; see also Chapter 4 of this thesis).

## **Method**

### **Sample**

Participants were recruited through E-mail lists (current and former students from a University in the UK), online ads (Craigslist, Facebook, online newspaper), and through different forums. As incentive we announced a prize draw with different prize options (e.g., iPods, vouchers).

In total, 344 participants completed the survey. To ensure good data quality we used three criteria to include or exclude participants. First, we asked participants whether they wanted to participate seriously or only look at the survey (Reips, 2007). We only included participants who had confirmed that they were participating seriously. Second, with regard to the manipulations (described below), we only included participants who watched at least 75% of the video (fear manipulation) and had a maximal reading speed of 800 words per minute (proximity manipulation). Third, only residents of the UK were considered for analysis. When these three criteria were applied, the sample included 335 participants. Of these, five participants were excluded because they had more than ten missing values. The mean age of the 330 participants was 32.0 years (range: 17 to 81). The proportion of females was 56.4%.

### **Study design and procedure**

As a cover story, participants were asked to evaluate two alternative forms of communicating climate change in order to help us refining materials for a future study. Each participant watched a video that either induced low or high levels of fear and read a text that

either focused on local or global climate change. After each manipulation, relevant processes were evaluated. After both manipulations individual orientations to climate change were assessed.

Fear manipulation. Participants watched a video (approx. 3 min) that – by means of overlaid text, stills, video scenes, and a graph – described the causes and consequences of climate change. The video first explained that climate change was the average weather over thirty years, what and how much had already changed, and that humans were responsible for it to a large extent. The high-fear version then showed a selection of expected consequences of higher temperatures, using dramatic music, an emotional font (Impact), vivid and drastic visual information about climate change such as dark sky with lightning, underlined with the sound of thunder and howling wind (more severe weather events), a car carried away fast by a stream of water (floods), and cow carcasses on dry land (drought). The low-fear version showed the same consequences but had emotionally neutral music, used a more neutral font (Arial and Arial Black), and showed less drastic visual information such as a satellite image of a storm, a parked car with water up to its' lights, and sheep on dry land without any grass to graze on. In addition, the two versions differed in terms of how the expected temperature increase was framed: In the high-fear version, the upper limit of the possible temperature increase was indicated (6.5°C by 2100; IPCC, 2007d), whereas the lower boundary was indicated in the low-fear version (2.4°C by 2100; IPCC, 2007d). Both videos finished with the request to “Act now to prevent this from happening ... before it is too late” (to see the low fear video, go to: <http://www.youtube.com/watch?v=I3n6B8e1g5U>; high fear video: <http://www.youtube.com/watch?v=kjsuCpbBYyY>). This request was intended to increase participants' sense of self-efficacy, a factor that is an important pre-condition for fear appeals to work (e.g., van Zomeren et al., 2010; Witte, 1998). Finally, the videos tried to avoid geographical cues that would bias the videos towards proximal or distant places.

Proximity manipulation. Distance was manipulated by two different texts that either focused on the impacts of climate change in the UK or in the world. The local version referred several times to how things have already changed or were expected to change “in the UK” and described impacts for cities such as “London, Birmingham, or Manchester” or regions such as “the south of Britain, North England, and Scotland”. In the global version, causes and consequences were described for “the whole world”, cities such as “New York, Delhi, or Tokyo” and regions such as “Central America, Southern Africa, and Southeast Asia” (see Appendix E). Thus, the texts described the identical consequences and were equally specific so as to avoid confounding distance with type of consequences or with specificity (vs. vagueness). To enhance the local versus global priming, we additionally included three questions framed as “reading checks” that repeated some of the condition-specific information.

Study design and procedure. To ensure that the presentation of either manipulation did not consistently influence the other, we counter-balanced the sequence in which participants watched the fear video and read the distance text. The study therefore had a 2 (order: fear video first vs. distance text first) x 2 (fear: low vs. high) x 2 (distance: local vs. global) design. Participants were randomly assigned to each of the resulting eight conditions. Participants watched the video and evaluated it in terms of how much they liked it, how useful they found it to understand climate change, how much it elicited different emotions, and how manipulative they found the video. After reading the text, participants answered the three questions about it, and evaluated the text in terms of how much they liked it, how useful it was to understand climate change, how manipulative they found it, and how close or distant they perceived climate change. After the two manipulations participants answered questions about how likely they perceived different climate risks, their beliefs about how effectively they could respond to climate change and how effective measures to mitigate climate change

were in general. Participants were then again told that it was not too late to act and that there were “different things we can do”; this statement was intended to further strengthen participants’ feeling of self- and group-efficacy. We then presented them with steps they could take personally or as a member of society to fight climate change and asked them to indicate their support for these steps. Finally, participants answered some demographic questions and were debriefed.

### Measures

*Reported fear* was used to measure danger control processes. We assumed that the extent to which people accepted the negative feelings elicited by the fear videos would reflect their readiness to address the external danger. Participants were asked to make a fast and spontaneous assessment of how much the video made them feel 15 emotions, six of which were used to create a fear scale (tense, nervous, anxious, fearful, frightened, threatened). The other nine emotions (e.g., interested, optimistic, calm, compassionate) were used to prevent awareness of the study’s focus. Answer options ranged from *not at all* (=1) to *extremely* (=5). The six items formed a highly reliable scale, Cronbach’s  $\alpha = .93$ .

*Reported distance*. Participants were presented with five semantic differential-type scales on which they were asked to indicate how climate change felt to them. The endpoints on the seven-point scales read as: *very close* versus *very distant*; *like here* versus *like at the other end of the world*; *like tomorrow* versus *like thousands of years away*; *like affecting me* versus *like affecting distant strangers*; *very real* versus *very hypothetical* ( $\alpha = .90$ ).

*Manipulativeness*. To account for possible negative responses to our manipulations, we assessed the extent to which participants rated the video and the text as manipulative, which is one possible form of fear control (cf. Good & Abraham, 2007; Witte & Allen, 2000; see also Brehm, 1966; Miller, Lane, Deatrck, Young, & Potts, 2007). Participants indicated their agreement (1 = *strongly disagree*, 5 = *strongly agree*) to three statements made about the

video and text: “This video (text) was manipulative”, “This video (text) tried to influence my opinion”, “This video (text) tried to change my thoughts”. The three items formed a reliable scale for both the video ( $\alpha = .81$ ) and the text ( $\alpha = .82$ ).

*Stimulus likeability.* As an additional global measure of participants’ favourability towards the two manipulations, we asked them to indicate how much they liked the video and text they had read (1 = *liked it very much*, 5 = *disliked it very much*).

*Perceived risk.* To assess the extent to which participants considered climate change as a personally relevant risk, we asked them to judge the likelihood that four personal risks (e.g., “Certain effects of climate change will impair my health”) and five local risks (e.g., ‘Water shortages will occur where I live’; Dietz et al., 2007; Leiserowitz, 2006, see Appendix A for all items used in this Study) would occur due to climate change. To make the purpose of the study less obvious to participants, these five local consequences were additionally presented on the global level (e.g., “Worldwide water shortages will occur”). All risk items were presented in a randomized order to make the three risk dimensions (i.e., personal, local, global) less obvious and to reduce the tendency to give the same answer to all questions. The answer options for these 14 risk items ranged from *very unlikely* (= 1) *very likely* (= 5). Because of their conceptual similarity and based on inter-item correlations we combined the local and personal risk items into a single personal and local risk scale. The nine items formed a reliable scale ( $\alpha = .88$ ).

*Support for mitigation policies.* Participants indicated their support (1 = *definitely oppose*, 5 = *definitely support*) for 11 policies that we presented as steps to decrease the amount of greenhouse gases “as a society” (e.g., ‘Increased household electricity taxes’; Nilsson et al., 2004; Prillwitz & Barr, 2011; see Chapter 3 and Appendix A). The 11 items formed a reliable scale ( $\alpha = .85$ ).

*Personal intentions to mitigate.* We used 11 items (Lowe et al., 2006; O'Connor et al., 1999; see Chapter 3 and Appendix A) to assess people's future intentions to engage in actions to mitigate climate change (e.g., "Using public transport more often"). Participants were offered a five-point Likert scale (1 = *very unlikely*, 5 = *very likely*) to indicate which actions they were likely to take. The proposed actions formed a reliable scale ( $\alpha = .79$ ).

*Personal efficacy.* The extent to which participants believed that they were able to contribute to mitigate climate change was measured with four items, for example "I am able to act effectively on climate change" or "Making a contribution to reduce climate change is easy for me" ( $\alpha = .80$ ).

*Beliefs about the efficacy of mitigation actions.* The extent to which participants believed that it is possible to reduce climate change was measured with three items, for example "Introducing new carbon regulations will significantly decrease greenhouse gas emissions" ( $\alpha = .80$ ).

### **Analytic strategy**

To test the direct and indirect effects of fear appeals and the localising approach we used structural equation modelling (SEM; Amos 20, Arbuckle, 2011). SEM has several advantages. First, it can simultaneously test direct and indirect effects on more than one outcome variable. Second, it distinguishes between the measurement model and the path model and therefore provides parameters that are corrected for measurement error.

After checking the data for normality, we used the maximum likelihood approach to estimate the parameters. The model was tested confirmatorily, that is, we did not consider any model modification suggestions provided by the statistical software. The conceptual proximity between the dependent variables (risk perception, personal intentions, policy support, see Table 8) was taken into account by allowing their residual error terms to correlate. No other disturbance or error terms were correlated.

To assess the quality of the model, we present the  $\chi^2$ -statistic, the relative  $\chi^2$ -statistic ( $\chi^2/\text{df}$ ) and four commonly used fit indices: The Comparative-Fit-Index (CFI), the Tucker-Lewis-index (TLI), the Root-Mean-Square-Error-of-Approximation (RMSEA) with its 90% confidence interval (90% CI), and the Standardized-Root-Mean-Squared-Residual (SRMR). The  $\chi^2$ -statistic compares observed and model-implied figures. Ideally, models produce small and non-significant  $\chi^2$ -statistics, indicating no discrepancies between estimated and observed figures. However, because the  $\chi^2$ -statistic increases with sample size and with the number of observed variables in the model (Hair, Black, Babin, & Anderson, 2010; Loehlin, 2004), the  $\chi^2$ -statistic does often not meet this ideal condition. The relative  $\chi^2$ -statistic accounts for the number of parameters in the model. Values smaller than 3.0 are regarded as acceptable (Hair et al., 2010). To further evaluate model fit, additional indices are used that take into account sample size and model complexity. The CFI and the TLI are two such indicators that assess the model's goodness-of-fit; values larger than .90 are usually interpreted as reasonable fit between model-implied and observed correlations (e.g., McDonald & Ho, 2002). The RMSEA and SRMR are badness-of-fit indicators. RMSEA should be .06 or lower and the SRMR should be close to .08 (Hu & Bentler, 1999). Note also that the CFI and SRMR represent sample-based fit statistics; they estimate how well the model fits the present sample. The TLI and RMSEA, on the other hand, are population-based fit statistics; they speak of how well the model is generalizable to the population at large (Loehlin, 2004).

Because the present model includes seven constructs with up to eleven items (e.g., policy support) it is likely that there are too many items relative to the sample size. To prevent problems that could occur due to the item to sample size ratio when estimating the different parameters, we combined items into aggregate indicators by calculating their mean (without replacing missing values). This was done for those constructs with more than six items (i.e., risk perception, personal intentions, and policy support). To create three balanced indicators



Table 8

*Descriptive statistics and bivariate correlations*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12
1 Fear manipulation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Reported fear	2.28	0.95	.29***	.93	.08	-	-.10	-.05	-	.27	.33	.23	.31	.15
3 Fear manipulativeness	3.77	0.92	.38***	.07	.81	-	.25	.63	-	-.23	-.21	-.25	-.24	-.18
4 Localising	-	-	.06	-.06	.09	-	-	-	-	-	-	-	-	-
5 Reported distance	3.46	1.36	.04	-.09	.21***	-.10*	.90	.22	-	-.62	-.56	-.52	-.40	-.34
6 Distance manipulativeness	3.15	0.92	.10*	-.04	.51***	.06	.19***	.82	-	-.21	-.32	-.37	-.29	-.24
7 Dislike text	2.65	0.80	.05	-.13*	.16**	.12*	.18***	.29***	-	-	-	-	-	-
Personal and local risk														
8 perception	3.40	0.73	.02	.24***	-.19***	.12*	-.55***	-.18***	-.18***	.88	.50	.51	.40	.31
9 Personal intentions	3.43	0.69	.04	.28***	-.17**	-.04	-.47***	-.26***	-.32***	.42***	.79	.81	.64	.62
10 Policy support	3.36	0.75	.04	.20***	-.21***	.01	-.46***	-.31***	-.30***	.44***	.67***	.85	.61	.54
11 General efficacy beliefs	3.58	0.93	.07	.27***	-.19***	.02	-.34***	-.23***	-.33***	.34***	.51***	.51***	.80	.65
12 Self-efficacy beliefs	3.16	0.79	-.04	.13*	-.15**	-.03	-.29***	-.20***	-.20***	.26***	.50***	.44***	.52***	.80

*Note.* To the right of the standard deviation information (*SD*), the *figures in the diagonal cells* indicate internal consistency reliabilities

(Cronbach's  $\alpha$ ). For single-item measures, estimating the reliability was not possible with our data. Off-diagonal figures represent the Pearson correlations: uncorrected (below the diagonal) and corrected for measurement error attenuation (above the diagonal). A generic correction adjusts correlations for the unreliabilities of the two measures involved. The standard procedure entails taking the ratio between an observed correlation and the square root of the product of the two reliabilities (cf. Charles, 2005). \*\*\*\* stands for  $p < .001$ , \*\* stands for  $p < .01$ , \* stands for  $p < .05$ ; widely accepted significance tests are only available for uncorrected correlation coefficients.

for each construct, the items were allocated to the parcels according to their item-to-construct loadings (Little, Cunningham, Shahar, & Widaman, 2002). Note that for situations like the present one, when the primary goal is exploring relationships among latent constructs, parcelling is a methodologically acceptable strategy (Little et al., 2002).

*Missing data.* Of all possible answers, less than 0.80% of the data were missing.

Where manifest variables were used as direct indicators for the latent constructs (i.e., video / text manipulateness, psychological distance, reported fear) missing values were replaced by the mean of the entire series (the maximal number of missing values per item that were replaced this way was six). Where parcels were used as indicators of the latent constructs (i.e., risk perception, intentions, policy support), we simply used the mean of the available items without replacing missing values.

## Results

### Effects of order

To test whether the order in which the fear appeals and the local versus global information were presented had an effect on the dependent variables (local and personal risk, personal intentions, and support for policies), we carried out a three-way analysis of variance (ANOVA) with fear (low vs. high), distance (local vs. global), and order of manipulations (fear first vs. distance first) as main effects.

The analyses of the order manipulation revealed one marginally significant three-way interaction when risk perceptions were used as dependent variable,  $F(1, 322) = 3.73, p = .05, \eta^2 = .01$ . The general pattern indicated that providing the emotional information first (low and high fear videos) resulted in higher risk perceptions than presenting a text about either local or global impacts first (Figure 6). There was, however, one exception: The combination of low fear and the global frame resulted in lower personal and local risk perceptions when

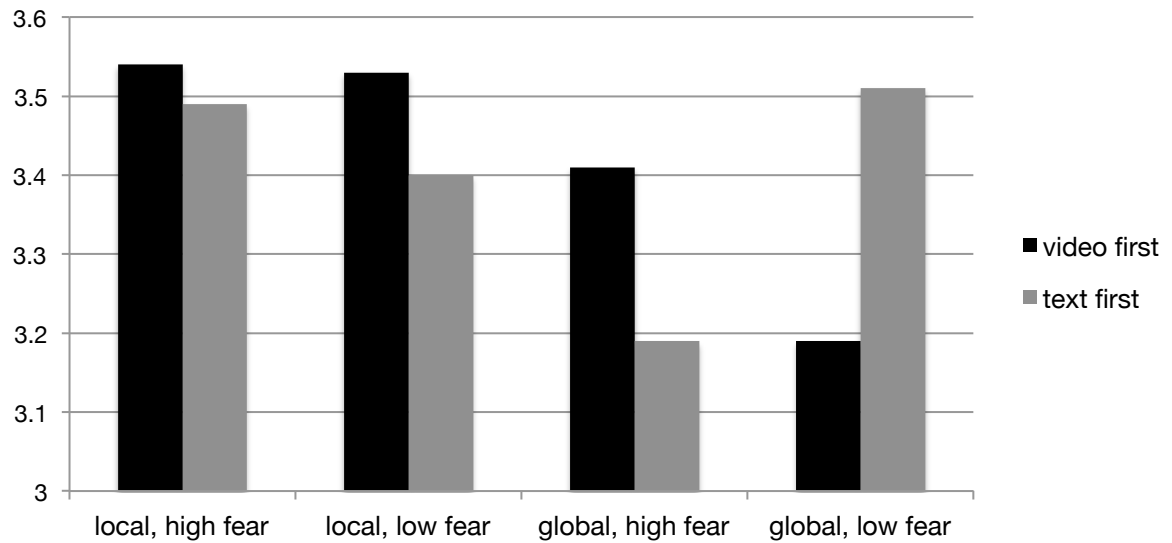


Figure 6. Three-way interaction between order of manipulation, level of fear, and proximity manipulation.

participants first watched the low fear video and then read the globally framed text ( $M = 3.19$ ,  $SD = 0.75$ ) as compared to when they first read about global impacts and then watched the low fear video ( $M = 3.51$ ,  $SD = 0.61$ ;  $t(89) = 2.21$ ,  $p = .03$ ). Neither the general pattern nor the reversal of it on one condition was expected. Moreover, it was not possible to replicate this three-way interaction when different dependent variables were used (i.e., personal intentions and policy support,  $ps \geq .37$ ).

In line with these non-significant effects, of all six possible two-way interactions (between order and either fear or distance) on risk perceptions, personal intentions, and policy support only one two-way interaction was marginally significant ( $F(1, 326) = 3.61$ ,  $p = .06$ ,  $\eta^2 = .01$ ): When the video was presented first, the high fear video resulted in stronger personal intention to mitigate climate change ( $M = 3.53$ ,  $SD = 0.69$ ) than the low fear video ( $M = 3.34$ ,  $SD = 0.78$ ;  $t(172) = 1.70$ ,  $p = .09$ ). However, when the psychological proximity manipulation was first presented, no differences resulted between the high fear video ( $M = 3.37$ ,  $SD = 0.69$ ) and the low fear video ( $M = 3.47$ ,  $SD = 0.59$ ;  $t(154) = 0.98$ ,  $p = .33$ ).

The *p-values* of the remaining two-way interactions were all larger than  $p = .16$ . Because of the inconsistency of the order effects and because order was only manipulated to avoid any consistent effect of one manipulation on the other – rather than out of theoretical interest – we did not further inspect order effects and excluded them from further analyses. We will, however, return to this issue in the discussion section.

### **Effects on efficacy beliefs**

To test whether localising and fear had any effect on participants' beliefs about the efficacy of mitigation measures in general or on their self-efficacy beliefs, analyses of variance (ANOVAs) were carried out. However, no main effects from either fear appeals or localising or an interaction between these were found ( $p\text{-values} \geq .24$ ). We therefore were confident that we met our goal to create messages that maintained similar levels of perceived efficacy, a variable shown to be important in research on fear appeals particularly (Witte, 1998). Given that perceived efficacy did not differ as a function of the manipulations, we excluded the efficacy variables from the structural equation model.

### **Combining the localising approach and fear appeals**

To test our hypothesis that fear would be most effective in increasing risk perceptions and people's willingness to address climate change when combined with the local (vs. global) framing of climate change, we conducted a two-way Analysis of Variance (ANOVA) with fear (low vs. high) and distance (local vs. global) as factors. Contrary to our predictions, out of three interaction terms, none was statistically significant ( $p$ -values  $\geq .28$ ). That is, the effects of fear and distance were additive and not multiplicative with regard to all dependent variables. In sum, there were no interactions that qualify the structural equation models that follow.

### **Structural equation model**

*Measurement model.* To evaluate the ability of the manifest items to serve as indicators of the latent constructs, we first examined the measurement model, where all latent constructs (but no error variances) were allowed to correlate with all other constructs. The measurement model revealed acceptable discrepancies between the observed and model-implied values:  $\chi^2 = 653.78$ ,  $df = 316$ ,  $p = .000$ ,  $\chi^2/df = 2.07$ . The model fit indicators, which are relatively independent of sample size, suggested a good fit to the observed covariances: CFI = .94, TLI = .93, RMSEA = .06 [90% CI: .05–.06], and SRMR = .06. All factor loadings between the indicators and the latent constructs were .64 and higher, which suggests accurate measurement of the underlying concept.

*Path model with the two postulated antagonistic processes.* We first fitted the proposed model in which fear influences the outcome variables via reported fear (positively) and video manipulateness (negatively) and in which localising influences the outcome variables via psychological proximity (positively) and perceived text manipulateness (negatively, Figure 5). The overall fit of this model to the data was acceptable,  $\chi^2 = 777.52$ ,  $df = 327$ ,  $p = .000$ ,  $\chi^2/df = 2.38$ . The model fit indicators also suggested a good fit to the

observed covariances: CFI = .92, TLI = .90, RMSEA = .07 [CI: .06–.07], SRMR = .10.

However, contrary to our expectations, describing climate change in local versus global terms did not influence the extent to which people perceived the message as manipulative ( $\beta = .07$ ,  $p = .28$ ). Including a construct that does not have a meaningful relationship with the experimental condition inserts noise into the model and dilutes it. To avoid this, we excluded the perceived manipulateness of the local versus global text.

*Reduced path model.* The reduced model with only one parallel process again fitted the data well ( $\chi^2 = 495.86$ ,  $df = 256$ ,  $p = .000$ ,  $\chi^2/df = 1.94$ ). The model fit indicators also suggested a good fit to the observed covariances: CFI = .95, TLI = .94, RMSEA = .05. [CI: .05–.06], SRMR = .06). This reduced model revealed the hypothesized indirect causal influence from fear appeals to perceived risk, personal intentions, and policy support via experienced fear. The high fear video produced higher levels of reported fear ( $\beta = .30$ ,  $p < .001$ ). Reported fear then increased risk perceptions ( $\beta = .23$ ,  $p < .001$ ) and the willingness to respond to climate change by acting personally ( $\beta = .26$ ,  $p < .001$ ) and by supporting policies ( $\beta = .19$ ,  $p < .001$ ). As predicted, the high fear video was also perceived as being more manipulative ( $\beta = .41$ ,  $p < .001$ ), which in turn decreased the level of perceived risk ( $\beta = -.13$ ,  $p = .03$ ), the willingness to support policies ( $\beta = -.20$ ,  $p < .01$ ) and to take personal actions ( $\beta = -.12$ ,  $p = .07$ ). Thus, the model revealed the predicted antagonistic impact of fear appeals.

With regard to localising, this reduced model revealed a marginally significant influence of the local versus global texts in the expected direction: Climate change was perceived as more proximal in the local condition than in the global condition ( $\beta = .11$ ,  $p = .06$ ). The increased psychological proximity in turn resulted in higher risk perception ( $\beta = .57$ ,  $p < .001$ ), stronger intention to take personal action ( $\beta = .52$ ,  $p < .001$ ) and support policies ( $\beta = .48$ ,  $p < .001$ ). Thus, the model revealed the expected positive effect of localising

on the outcome variables via increased psychological proximity of climate change while it failed to show the predicted negative influence of localising via perceived manipulateness.

With regard to the *direct* influence of fear and localising on the outcome variables, the model revealed only one statistically significant effect: When people read the locally framed text, they judged personal and local climate change impacts as more likely ( $\beta = .10, p = .04$ ). (We resume this issue when we describe the alternative antagonistic model).

In short, this simplified model supports the idea that fear appeals elicit parallel processes (i.e., perceived manipulateness and reported fear) that can cancel each other out (no direct influence detectable), while localising climate change seems to only have beneficial effects (i.e., no effect on message manipulateness). To further probe the possible existence of negative effects of localising, we fitted another model in which we replaced the perceived manipulateness of the local versus global framing by a more general evaluation. Specifically, we tested whether the local (vs. global) text influenced the extent to which participants liked or disliked the text and whether the degree of liking or disliking in turn influenced the outcome variables.<sup>11</sup>

*Alternative path model with two antagonistic processes.* Before testing the new structural model, it was ensured that it was based on a satisfactory measurement model ( $\chi^2 = 503.30, df = 266, p = .000, \chi^2/df = 1.89, CFI = .95, TLI = .94, RMSEA = .05$  [90% CI: .05–.06], and SRMR = .05). When the covariance structure of the measurement model was replaced by the structural paths, this alternative structural equation model with two antagonistic processes fitted the data well:  $\chi^2 = 546.23, df = 277, p = .000, \chi^2/df = 1.97, CFI = .95, TLI = .94, RMSEA = .05$  [90% CI: .05–.06], and SRMR = .08. All factor loadings between the indicators and the latent constructs were .72 and higher, which indicates accurate measurement of the underlying concept (Figure 7).

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<sup>11</sup> Because of the relatively small correlation between perceived text manipulateness and text dislike ( $r = .29, p < .001$ ), we treated these variables as separate responses to the stimuli.

The parameters remained virtually the same with regard to the fear paths ( $\Delta\beta \leq .03$ ). With regard to localising, this alternative model did reveal the expected antagonistic pattern: Climate change was again perceived as slightly more proximal in the local condition than in the global condition ( $\beta = .11, p = .06$ , Figure 7). The increased psychological proximity in turn resulted in higher risk perception ( $\beta = .56, p < .001$ ), stronger intentions to take personal action ( $\beta = .50, p < .001$ ) and more support for policies ( $\beta = .45, p < .001$ ). Analogously to applying fear, localising climate change instigated a parallel process that inhibited the intended positive effects: When climate change was framed as a local issue, people disliked the text more than when it was framed as a global issue ( $\beta = .12, p = .03$ ). And the more people disliked the text, the less they perceived climate change as a risk ( $\beta = -.10, p = .03$ ) and the less they were willing to act personally on climate change ( $\beta = -.26, p < .001$ ) or to support mitigation policies ( $\beta = -.25, p < .001$ ). Thus, both strategies, applying fear and focussing on local climate change, elicited processes that simultaneously increased and decreased the level of perceived risk and the willingness to support climate change mitigation by means of personal actions and policies.

As in the previous models, only one direct causal link from the independent variables to the outcome variables was detectable in this model: The locally framed text increased local and personal risk judgments relative to the globally framed text ( $\beta = .11, p = .02$ ). When the standardized coefficients that originate from the antagonistic pairs are directly contrasted, the paths running from dislike to perceived risk ( $\beta = -.10$ ) and from psychological proximity to perceived risk ( $\beta = .56$ ) results in the largest net difference between two antagonistic pairs ( $\Delta\beta = .46$ ). This further points to the possibility that a direct effect of fear appeals and localising is only likely when either the motivating or inhibiting indirect pathway dominates. By contrast, when the two antagonistic pairs are in balance, it is more likely that no direct influence is detectable – despite processes being at work in between.



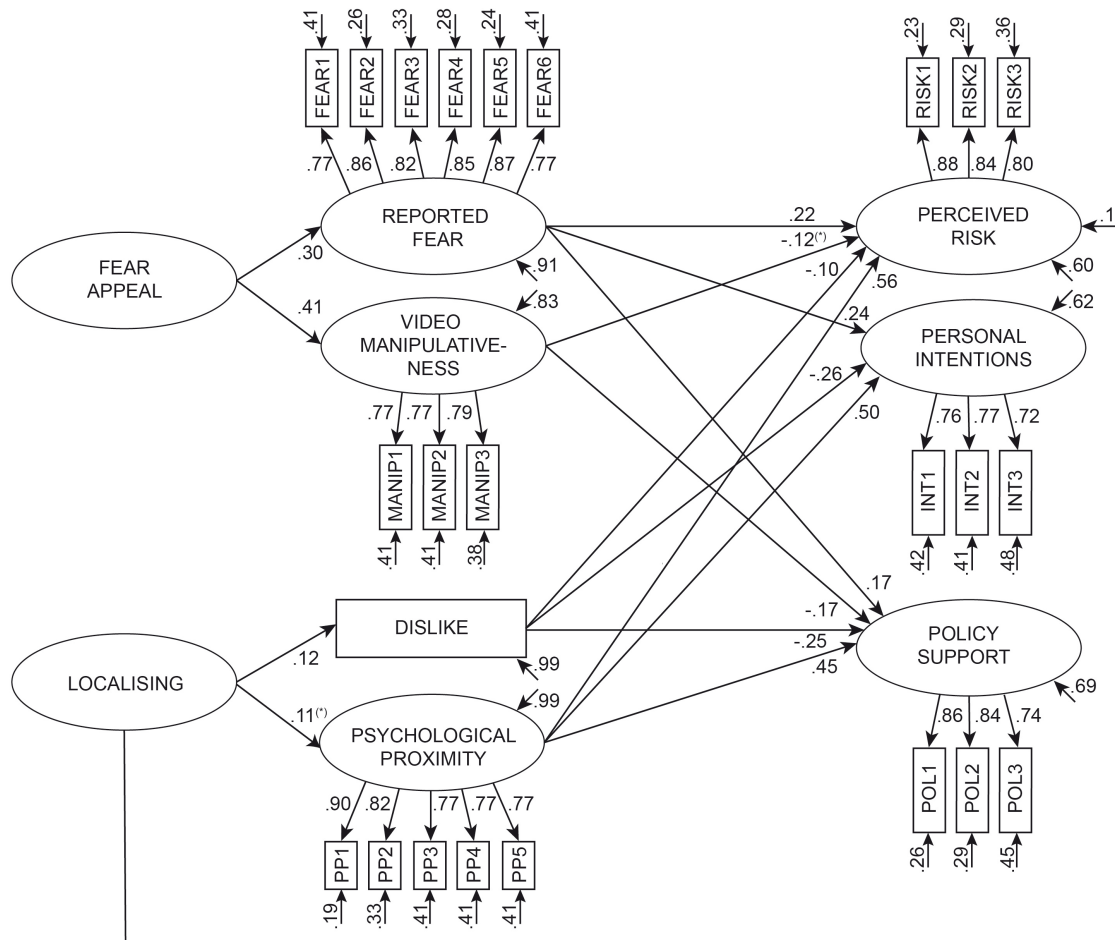


Figure 7. Structural equation model of fear appeals and the localising approach.

Arrows between constructs indicate directed (i.e., assumed causal) relations, the corresponding  $\beta$ -coefficients (standardized multiple regression coefficients) represent their strengths. Non-significant paths are not displayed. Arrows without origin indicate proportions of error and unexplained variance. FEAR1-6 = manifest fear items, MANIP1-3 = manifest manipulateness items, PP1-5 = manifest psychological proximity items, RISK1-3 = parcels representing the mean value of three manifest risk items, INT1-3 = parcels representing the mean value of 3-4 manifest personal intention items, POL1-3 = parcels representing the mean value of 3-4 manifest policy support items. Explained variance for each variable is as follows:  $R^2$  reported fear = .09,  $R^2$  video manipulateness = .17,  $R^2$  psychological proximity = .01,  $R^2$  text dislike = .01,  $R^2$  perceived risk = .40,  $R^2$  personal intentions = .38,  $R^2$  policy support = .31.

*Summary.* While the reported models unanimously support the idea that fear appeals initiates antagonistic processes that can cancel each other out, the results are mixed with regard to the effects of the localising approach. The model we originally postulated revealed that people did not – as predicted – perceive the locally framed text as more manipulative than the globally framed text. However, additional analyses revealed that when the extent to which people disliked the local versus global text was instead used as an intermediate variable, the model did reveal an antagonistic influence of localising on the outcome variables via participants' disliking of the text and via the increased psychological proximity of climate change. Hence, the localising approach also seems to initiate defensive processes – or at least to trigger more negative evaluations of the message – and should not be regarded as straightforward panacea for motivating action on climate change.

## **Discussion**

In this study, we tested two strategies to motivate action on climate change. The first strategy, fear appeals, aims to increase risk perceptions and the motivation to respond to climate change via emotions. The second strategy, localising climate change, aims for the same goal, but by means of increasing the sense that climate change was a locally and personally relevant phenomenon. We predicted and found that both strategies, applying fear and focussing on local climate change, elicited processes that simultaneously *increased* and *decreased* the level of perceived risk and the willingness to support climate change mitigation by means of personal actions and policies.

The most important insight of our study is that localising climate change is not, as one might conclude when reading recommendations of how to communicate climate change (e.g., CRED, 2009; Spence et al., 2011), a straightforward means for motivating people to act. Although it seems correct that localising has the expected effects of decreasing the psychological distance of climate change and increasing people's perception of risk and their

motivation to act, localising also initiates processes that inhibit these desired effects.

Specifically, locally framed messages were perceived more negatively than globally framed messages, and negative evaluations of the message in turn predicted significantly reduced risk, reduced motivation to act on climate change and reduced support for policies addressing climate change.

Another strength of our study was that it relativized a point of view in climate change communication that has almost become a truism, namely not to use fear to motivate people. Despite the successful application of fear appeals in other contexts, particularly with regard to health-related behaviours (e.g., Maloney et al., 2011; Witte & Allen, 2000), researchers concerned with climate change communication warn or even advise against using fear appeals to motivate action on climate change (e.g., Hulme, 2008; Moser, 2007; O'Neill & Nicholson-Cole, 2009; Wolf & Moser, 2011). The present research indicates that fear appeals can be perceived as manipulative and should not be used without caution. However, the results also suggest that fear appeals have the potential to motivate people to act on climate change, at least to the extent that they are not perceived as manipulative.

### **Limitations and directions for future research**

A limitation of this research was that the effect sizes of the manipulations were small: Relatively large proportions of the variance in the process variables could not be explained by the fear manipulation (reported fear: 91%; reported video manipulateness: 83%) and proximity manipulation (dislike: 99%; psychological proximity: 99%). A possible solution to obtain stronger effects could be to use more extreme manipulations that differentiate the experimental conditions more strongly. For example, the high fear version of the video could be supplemented with more fear-arousing material and more vivid imagery while the low fear video could be designed less scary. Yet, caution in strengthening fear manipulations is recommended as this could also amplify the extent to which people perceive it as manipulative.

Given that the effects of the localising manipulation on perceived proximity and the extent to which participants disliked the text were particularly small, strengthening the localising manipulation seems essential. Applying the same logic of more extreme messages would mean to further zooming in on local climate change, that is, describing it on a regional or even on a town level rather than on a nation level. However, even though this reasoning seems compelling, people often identify more strongly with their nation than with the region or town they live in (for an overview, see Devine-Wright, 2013). People who identify more strongly with their country than with their local environment might react with indifference to messages that describe climate change on the level of regions or towns. Messages with a focus on national impacts of climate change – thus, with a more distant perspective – would be more effective for people with such views. In other words, further localising climate change by zooming in to a regional or urban level could backfire.

Another means to strengthen the manipulation might be to draw on different formats. In the present study, the effects of the vivid fear manipulation were more pronounced than the effects of the textual distance manipulation. The localising manipulation might be more effective if it was made more vivid like the fear video (e.g., by employing video, computer animations, or by featuring recognisable acoustic information such as local vs. exotic accents).

A different way of interpreting the small effect sizes, aside from the methodological considerations outlined above, is that there are *other factors* that influence the process variables in addition to manipulated fear and distance. From this perspective identifying and including additional relevant factors seems to be a good strategy to arrive at a model with more explained variance. For example, if a place means a lot to someone (e.g., Altman & Low, 1992), then she or he will already be motivated to protect it (cf. Devine-Wright & Howes, 2010; Devine-Wright, 2009; Scannell & Gifford, 2010; Uzzell, Pol, & Badenas, 2002). In addition, it could be argued that the more people are attached to the geographical

area that is mentioned in the localised (or distant) message, the more personally relevant – but also the more threatening – will people perceive the message. Messages that are in line with what people feel attached to are therefore likely to increase the motivation to respond to climate change – but also the tendency to react with defensiveness.

Another personal factor that could be useful to consider is the extent to which people believe that climate change is real, relevant and caused by humans. The less sceptical people are about climate change, the more they see it as a risk (e.g., Joireman et al., 2010; Leiserowitz, 2006; O'Connor et al., 1999). Existing (non-)sceptical views are also likely to predispose people to process relevant information in an attitude-consistent manner (Corner et al., 2012; Ditto, Munro, Apanovitch, Scepanisky, & Lockhart, 2003; Whitmarsh, 2011). Thus people's own positions on climate change are likely to influence how they respond to fear arousing and localising messages and whether they see these as manipulative or motivating. In short, including additional relevant factors as control variables and potential moderators of the influence of fear and localising could improve the explanatory power of the presented process model.

An unexpected finding of the present study was that fear appeals and localising initiated two *different* negative processes. Based on literature on fear appeals (e.g., Good & Abraham, 2007; Witte & Allen, 2000) we argued that negative effects of fear appeals and localising should both be traceable in the extent to which people perceive the video and text as manipulative. While our data supported this process with regard to the fear videos, the proximity manipulation was not similarly related to perceived text manipulateness. Instead, proximity increased the extent to which participants disliked the message, although to a lesser extent than fear influenced manipulateness.

One crucial question that arises from this is why manipulateness was the process for fear (the video) and disliking was the process for distance (the text). Again, the different format of these manipulations (text vs. video) may be one explanation. First, the videos were

vivid while the texts were plain and factual (cf. Marx et al., 2007; Nisbett & Ross, 1980). Accordingly, videos may elicit more affectively-tinged evaluations (i.e., manipulateness) whereas texts may elicit more affectively neutral evaluations (i.e., liking). Second, and relatedly, it could be argued that perceiving a message as manipulative is probably a stronger response than disliking it. Thus, the stronger response to the video and the weaker response to the text seem consistent with the differences in vividness of the two formats. As already suggested, future research could test this explanation by employing a more vivid manipulation of psychological proximity and exploring its effects on perceived manipulateness and dislike of the message.

Aside from the differences between responses to fear arousing and localising messages, one might also wonder why a locally framed message is disliked more than a globally framed message. One explanation, which we already outlined in the introduction, is that people generally do not like bad news. An alternative explanation for why people might have disliked the local message more than the global because it was less familiar. People tend to like familiar information more than unfamiliar information (Zajonc, 1968). And because climate change is mostly referred to as a global and distant issue (e.g., O'Neill, 2013; Olausson, 2009) rather than as a regional or local one (cf. Whitmarsh et al., 2011), zooming in on local impacts might simply have put this new framing at an evaluative disadvantage with the more familiar global framing. Specifically, processing this new frame was probably more effortful, a quality that people interpret as a hint to how correct and likeable a message is (for an overview, see Alter & Oppenheimer, 2009).

Even though disliking worked well to model negative effects of localising, there are some critical aspects about this variable. First, due to the general wording of the question, it is not clear what theoretical concept disliking represents. Dislike could be a spontaneous cognitive evaluation of the message (i.e., disapproval or rejection); it could also reflect an unpleasant feeling or even a mild form of fear. To better understand people's negative

response to localised messages, future research could test alternative defensive reactions as process variables. Specifically, research on health promotion has identified other relevant defensive reactions (e.g., denial, rejection of the message as implausible, and avoidance; Good & Abraham, 2007; Sweeny, Melnyk, Miller, & Shepperd, 2010; Witte & Allen, 2000). Also, single-item measures are sometimes less reliable and valid, especially when they assess abstract concepts such as dislike (cf. DeVellis, 2003). Additional items would therefore be recommendable for future studies.

Another unexpected finding were the effects of order. A pattern that followed from varying the sequence of the localising and fear manipulations was that presenting the more emotional fear videos before the texts about local (vs. global) climate change was more effective in eliciting personal and local risk perceptions. Also, when the video was presented first, the high fear video was more effective in spurring personal mitigation intentions than the low fear video. However, when the psychological proximity manipulation was presented first, no differences resulted between the two versions of the video. These patterns suggest that presenting the fear-arousing video (especially the high fear version) first and the distance text (local vs. global) second might be more effective in sensitising people to the risks of personally and locally relevant climate change and motivating them to take action. However, these effects were not anticipated and it is unclear why they occurred. There is some support in the literature suggesting that nonanalytic (i.e., emotional) thinking has a stronger primacy effect than analytic thinking (Bolton, 2003). Put differently, the (nonanalytic or emotional) video and the (analytic) text might have activated different processing styles. The video could have focused people's attention to information that is diagnostically relevant (cf. Pham, 2007); watching the video first might have made people pay more attention to the subsequent text and remembering more facts about climate change. However, it is important to remember that the reported order effects did not emerge consistently. Before speculating more about

other possible format-based and concept-based explanations it would therefore be advisable to replicate the findings first and then explore possible processes.

The finding that localising can initiate defensive processing raises an important question: How can researchers and practitioners increase adaptive responses to localising and minimise maladaptive responses? One strategy, predominantly employed to reduce the negative effects of fear appeals on healthy behaviour, seems particularly recommendable: Increasing efficacy beliefs (Witte, 1998). If people have insufficient confidence in the effectiveness of possible responses their personal ability to act, then they are more likely to engage in maladaptive response and to do nothing about climate change (Brody et al., 2012; Brody, Zahran, Vedlitz, & Grover, 2008; Moser, 2007). It is therefore essential that people know about possible mitigating actions, believe that these are effective, and that they can perform them personally (cf. Maibach et al., 2008). As noted in the Methods, in our study the capacity to act was emphasised. However, there is more room to explore to mechanisms and benefits of this strategy in the context of climate change. For example, it would be interesting to know how the balance between adaptive and maladaptive responses would shift if efficacy had not be highlighted. Would the fear and localising manipulations have had a different impact?

Related to this, van Zomeren and colleagues (2010) found that beliefs that society is capable to prevent the negative consequences of climate change increased intentions to act environmentally friendly. More importantly, they found that these group-efficacy beliefs had a stronger influence on behavioural intentions than self-efficacy beliefs. One explanation for this finding is that climate change can be seen as a societal problem that requires collective action (Homburg & Stolberg, 2006; van Zomeren et al., 2010). To some extent the relative importance of self- vs. group-efficacy beliefs might be moderated by the specific context. For example, if the focus was more on personal consequences and behaviour change, self-efficacy beliefs might be more important, while in settings where the community is more salient



group-efficacy beliefs might prevail. Testing these propositions seems a fruitful avenue for future research and climate change communication.

### **Conclusion**

Despite the almost commonsense idea that localising climate change should increase risk perceptions and willingness to act, existing studies do not seem to support the effectiveness of this strategy. In the present research, we aimed to provide some explanation for this lack of support for localising. Specifically, we argued and showed that localising climate change can initiate similar defensive processes as those known from fear-appeal studies. These processes can counteract and cancel out the positive effects of localising. This finding is important for research, because it explains why localising has not been as successful as anticipated. For practice, our findings mean that localising alone will not always do the job of motivating people to act on climate change. Precautions – such as maximising people’s sense of efficacy – may be needed to create engaging localised climate change message that do not also elicit defensiveness.

## Supplementary analysis

Based on Study 3 (Chapter 4), which suggested that people rely more on (measured) low-level construal fear when they have a local (vs. global) perspective, it was expected that this pattern would also emerge in Study 4 (Chapter 5), where fear was systematically varied instead of measured. However, as described in Chapter 5, the findings did not reveal any distance (local vs. global) by fear (low vs. high) interaction. To explore further whether this difference might be due to differences between manipulated and measured fear, additional interaction analyses were carried out, using the same regression analysis approach as in Chapter 4.

When risk perceptions were used as the dependent variables, it was found that people were differently influenced by fear depending on whether they thought in terms of local or global climate change ( $\beta = -.15, t = -1.95, p = .05, \Delta R^2 = .01, \Delta F(1, 325) = 3.82, p = .05$ ; Figure 8): For participants with a local perspective (low-level construal) fear was positively associated with risk perceptions ( $\beta = .36, t = 4.61, p < .001$ ), that is, the more people were afraid of climate change, the more they perceived it as a risk. Although fear was also

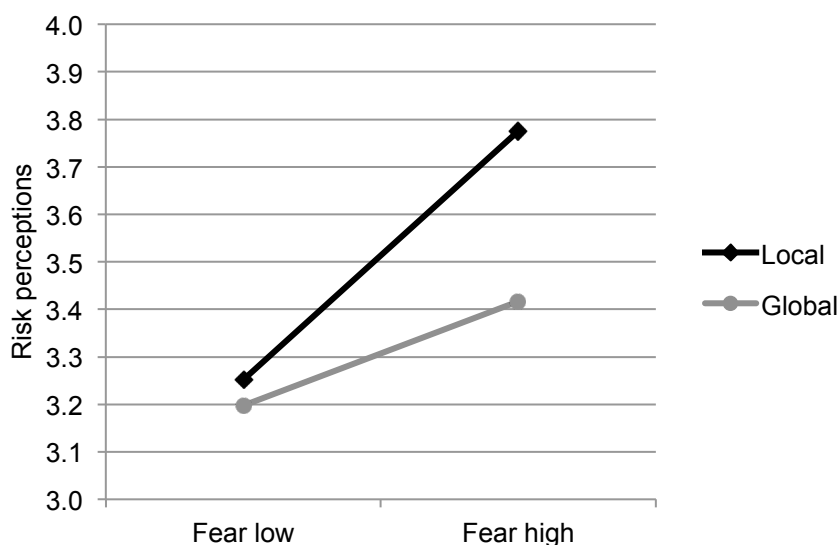
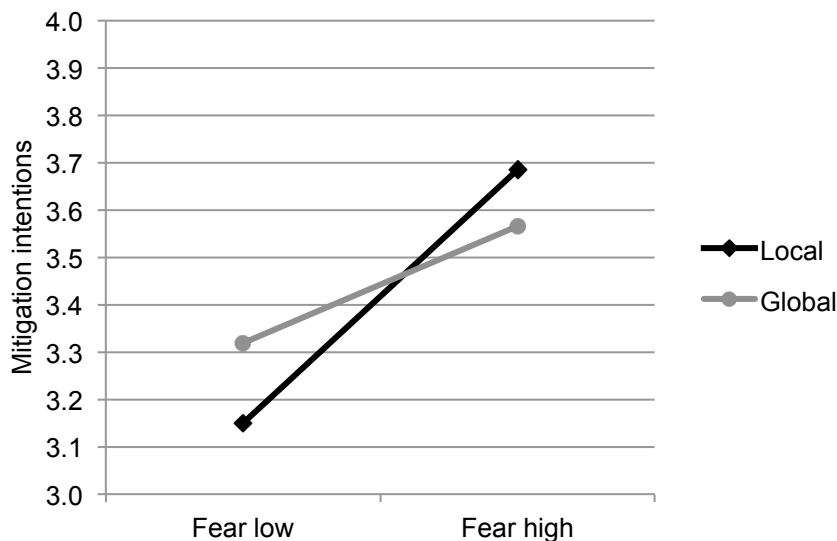


Figure 8. Simple slopes of condition predicting risk perceptions for 1 SD below the mean of low-level construal fear and 1 SD above the mean of fear.

positively related to risk perceptions among participants with a global mind-set ( $\beta = .15$ ,  $t = 2.05$ ,  $p = .04$ ), this relationship was less strongly pronounced than among participants with a local perspective (Figure 8). This pattern is consistent with the prediction that low-level construal fear was more informative for participants with a local perspective.

In terms of personal mitigation intentions, a similar interaction between distance and fear was found ( $\beta = -.15$ ,  $t = -1.95$ ,  $p = .05$ ,  $\Delta R^2 = .01$ ,  $\Delta F(1, 325) = 3.80$ ,  $p = .05$ ; Figure 9): The more people reported fear in the local condition, the more they were willing to take personal actions ( $\beta = .39$ ,  $t = 4.97$ ,  $p < .001$ ). A similar trend was found in the global condition, although again less strongly pronounced than in the local condition ( $\beta = .18$ ,  $t = 2.44$ ,  $p = .02$ ; Figure 9). Thus, participants who received local information again relied more strongly on fear when thinking about personal actions than those who received global information, which is consistent with the expectation based on Construal Level Theory and the findings from Chapter 4.



*Figure 9.* Simple slopes of condition predicting personal mitigation intentions for 1 SD below the mean of low-level construal fear and 1 SD above the mean of fear.

With regard to support for mitigation policies, the analysis did not reveal a significant interaction ( $\beta = -.05$ ,  $t = -.65$ ,  $p = .52$ ,  $\Delta R^2 = .00$ ,  $\Delta F(1, 325) = .42$ ,  $p = .52$ ). Put differently, the relationship between manipulated distance and measured fear was additive rather than multiplicative.

All in all, this supplementary analysis revealed very similar patterns to those found in Study 3 (Chapter 4) and provided additional evidence suggesting that psychological distance moderates what information people rely on when they make judgments and decisions. However, the absence of this interaction when fear was manipulated raises the question as why manipulated fear leads to different results than measured fear. In what follows, four explanations are provided that may help illuminating these differences.

First, it is possible that the assumed causal relationship between fear and the variables that were treated as dependent variables is actually reversed. More specifically, it could be that increased risk perceptions lead to more fear. If it were so, it would not be surprising that eliciting fear does not increase risk perceptions. However, while this explanation is plausible with regard to risk perceptions, it is less intuitively obvious why personal intentions to mitigate and stronger support for policies should lead to more fear – and yet, interactive effects of fear on each of these variables were also observed. Nonetheless, reverse causality is not entirely implausible since people do sometimes use their past behaviours to infer how they feel about an issue (Bem, 1972).

The second explanation for the slightly inconsistent pattern is that the fear manipulation did not affect the same aspect of fear that is captured when people report their spontaneous levels of fear. For example, it could be argued that spontaneously occurring fear reflects individuals' enduring tendencies to experience fear (i.e., trait fear) while the part of fear that is influenced by the manipulation is a more situational and therefore ephemeral fear experience (i.e., state fear; see also Lerner & Keltner, 2001). Differences between trait and state fear could lead to different outcomes. To illustrate, people who are generally fearful (i.e.,

for whom fear is a trait) pay more attention to negative information (Cisler & Koster, 2010), rely more strongly on fear to make judgments and decisions (Gasper & Clore, 1998), and also tend to avoid risks (Maner et al., 2007). Thus, it could be that fearful individuals are more likely to rely on their feelings of fear and to avoid risks than non-fearful individuals. It is unclear, though, why this tendency would be more pronounced when fearful individuals have a local perspective and think concretely as compared to when they have a more distant perspective and think more abstractly (as was found in Study 3 and 4).

From the perspective of Construal Level Theory, enduring individual characteristics – such as traits – represent high-level features which seem to be more relevant for psychologically distant judgments and decisions (cf. Trope & Liberman, 2010). This implies that – contrary to the findings from Study 3 and 4 – trait fear would be expected to be more relevant in the global rather than in the local condition. One rather speculative explanation for what was actually found – trait fear being more relevant in the local (vs. global) condition – is that different traits might vary with regard to their levels of concreteness or abstractness. Values, for example, are commonly regarded as broad and very general life orientations. In contrast to these, differences in the tendency to experience fear seem indeed more concrete. Thus, even though trait fear may be an individual characteristic that is stable over time and across different situations, the emotional component may still make this trait a concrete or low-level feature.

Third, it is possible that another process than fear is responsible for the effects observed when spontaneous (measured) fear was used as moderator (Chapter 4 and 5). For example, the extent to which people value their (local) natural environment or have strong social ties to people in their (local) community could increase their fear of the negative consequences of climate change. This could explain why measured fear of (local) consequences is more important when local (vs. global) consequences are made salient. Concomitantly, if another process than fear is responsible for the observed interactions

between psychological distance and spontaneous (measured) fear, then manipulating fear is obviously not tapping into the “right” process. Thus, this would also explain why manipulating fear does not lead to the same results as when fear is measured.

The fourth explanation for why purposefully elicited fear did not lead to the same patterns as spontaneously experienced fear is that elicited fear may have triggered processes that concealed the expected psychological distance by fear interactions. As illustrated in Study 4 (Chapter 5), one possibility is that increasing fear may elicit antagonistic processes that effectively cancel each other out. More specifically, the perception that the fear video was manipulative could have prevented people from experiencing fear or neutralized these effects. This, in turn, could have prevented the expected distance by fear interactions.

More generally, these findings suggest that the two theoretical perspectives adopted in this thesis, Construal Level Theory and the dual-process perspective, may complement each other in some situations. It could be argued, for example, that while psychological distance influences how much people rely on different types of information in general (an assumption based on Construal Level Theory), the expected patterns may be disturbed in certain conditions, for example when people draw on their feelings as source of information. In terms of the patterns studied in this thesis, this could mean that while participants with a local perspective may generally rely on fear as source of information, too much fear or the feeling of being manipulated may interfere with this general tendency. In this regard it is also interesting to note that some studies suggest that when people are in a negative mood, they are more likely to engage in “rule-based” (i.e., analytical) processing than in “associative” (i.e., affective) processing (see E. R. Smith & DeCoster, 2000). Thus, to the extent that fear can be considered as “negative mood”, it is possible that this emotion also shifts the balance away from affective processing – which was expected in this thesis – towards analytical processing, which probably corresponds more strongly with high-level than low-level construal thinking. This would imply that the general tendency to rely more strongly on concrete emotions when

one has a proximal psychological perspective is inhibited when these emotions are strongly negative.

At least one other specific process should be mentioned that could be elicited when fear is manipulated and that may conceal the expected interactions. A number of researchers have argued and shown that people tend to process information about climate change in a way that is consistent with their existing beliefs, attitudes, values, and their identity (Cook & Lewandowsky, 2011; Hart & Nisbet, 2011; Hoffman, 2012; Kahan, 2010, 2012; Kahan et al., 2012; Kahan, Jenkins-Smith, & Braman, 2011). To illustrate, people who are sceptical about climate change tend to rate messages that are in line with their view as more reliable and convincing, while those who are less sceptical rate pro-climate change information as more reliable and convincing (Corner et al., 2012). Such motivated reasoning processes can even influence how personal experiences of climate change are interpreted (Myers et al., 2013). This suggests that depending on individual characteristics, fear appeals used in Study 4 may have tapped into different associations and may have motivated people to process and interpret the information in a way that is consistent with their beliefs (cf. Chen & Chaiken, 1999). By contrast, when spontaneous fear was measured, and fear was less salient, similar motivated reasoning processes were probably not involved and people relied more strongly on their spontaneous feelings of fear (i.e., the affective system, see also E. R. Smith & DeCoster, 2000).

## **Summary**

In order to increase public engagement with climate change, communicators can draw on a number of persuasive strategies. Two often-suggested strategies to increase the public's motivation to act on climate change are emphasising the local and proximal (versus global and distant) consequences of climate change and using emotive, fear-arousing messages. To successfully use these persuasive techniques, however, it is crucial to fully understand the

processes that they initiate. To explore these, an online experiment (N = 330) manipulated both the presence (or absence) of fear appeals and the distance framing (local versus global) in a climate change message. Structural equation modelling revealed that both fear appeals and “localising” initiated processes that worked against each other. On the one hand both strategies activated relevant emotional or perceptual processes that increased risk perceptions and the willingness to act on climate change. On the other hand, both strategies also increased the perception of being manipulated that inhibited such message-consistent responding. These antagonistic processes effectively cancelled each other out. If fear appeals and “localising” are to be successful strategies to engage people with climate change, communicators need to acknowledge the complexity of these strategies and to make a real effort to suppress the inhibiting processes.



## Chapter 6 – General Discussion

*“Almost all climate scientists are of one mind about the threat of global warming:*

*It’s real, it’s dangerous, and the world needs to take action immediately.”*

*(Kerr, 2009, p. 927)*

As the above quote by Kerr emphasizes, climate change poses a great threat to natural and human environments (IPCC, 2007c) and humans need to respond to this threat urgently. Importantly, at least some of the negative consequences of climate change can be attenuated or even avoided if societies around the world take corresponding measures and reduce the greenhouse gas emissions released into the atmosphere or find ways to extract it from there (see for example the different scenarios in IPCC, 2007d). Generally speaking, the earlier and more comprehensively humans act against climate change, the less extreme future changes will be (IPCC, 2007c). In line with Kerr’s (2009) plea for urgency, Stocker (2012) recently wrote an article with the telling title “The closing door of climate targets” in which he made clear that further delaying effective mitigation measures will make it impossible to limit average global warming to certain temperature targets.

Given the expected negative consequences of climate change, which will affect everyone directly or indirectly (cf. Kirby, 2008), it is surprising that individuals are not more concerned about this issue and are not more motivated to take relevant action. For example, an analysis of public perceptions of climate change between 2008 and 2011 in several developed countries showed that public concern about climate change declined in the last few years (Ratter, Philipp, & von Storch, 2012; see also Pidgeon, 2012). Similarly, a recent international opinion poll showed that only a minority of the public is willing to spend money to address climate change (PEW research center, 2010). In line with this, several studies

suggest that currently people are not sufficiently motivated to respond to climate change (e.g., Bord et al., 2000; O'Neill & Hulme, 2009; Whitmarsh, 2009a).

It is against this backdrop of urgent need combined with relative inaction that the current research took place. In this final concluding chapter, I briefly restate the main goals of this work and I summarize the main outcomes of each empirical chapter. Following on from this, I consider the theoretical and practical implications of my work and propose possible directions for future research. Finally, a short overall conclusion is presented.

### **Rationale and goals**

As the introduction of this thesis (Chapter 1) showed, there are a large number of structural (i.e., external) and psychological (i.e., internal) barriers that prevent people from seeing climate change as an urgent issue and, more importantly, reduce the likelihood of taking action. Among these barriers one cluster of factors seems particularly relevant to understanding and increasing people's motivations to act on climate change. Because climate change is an abstract phenomenon (i.e., the average weather over a period of three decades), it is very difficult to directly experience (e.g., Marx et al., 2007; Swim et al., 2010; Weber, 2010). This barrier is strongly associated with the cognitive appraisal of climate change as a distant threat that is not personally relevant (cf. Lorenzoni et al., 2007; Milfont, 2010). An important consequence of climate change being "intangible" and distant is that this issue does not lead to levels of worry that are high enough to motivate action (e.g., Weber, 2006).

This thesis was interested in two commonly suggested solutions to overcome this cluster of barriers to action on climate change. The first solution is to focus on locally and personally relevant consequences of climate change (CRED, 2009; Moser & Dilling, 2007; Nicholson-Cole, 2005; O'Neill & Nicholson-Cole, 2009; Spence et al., 2011; Weber, 2010). The second solution to increase action on climate change is to induce relevant emotions such as fear (e.g., Maibach et al., 2008; Spence & Pidgeon, 2009). Somewhat paradoxically, the

climate change communication community seems to almost universally see the localising approach as a highly promising strategy (cf. Devine-Wright, 2013), even though there is little empirical evidence for it; at the same time, the approach to use emotions such as fear, which is successfully employed in other domains (e.g., promoting health-related behaviours, Witte & Allen, 2000), is typically received very critically within the climate change communication community (e.g., Hulme, 2008; Moser, 2007; O'Neill & Nicholson-Cole, 2009; Wolf & Moser, 2011).

The main goal of this thesis was, therefore, to explore in more detail how fear and psychological distance influence the ways in which people think about climate change and how they respond to it. To this end, the relevant barriers (i.e., the difficulty to experience climate change, the corresponding lack of affect, and the perception of climate change as a distant threat) and their proposed solutions (i.e., fear appeals and localising) were considered from two theoretical perspectives: Dual-process theory (Epstein & Pacini, 1999; Evans, 2008) and Construal Level Theory (Trope & Liberman, 2003, 2010).

Dual-process theories argue that people have an affective and an analytical processing mode (Epstein & Pacini, 1999; Slovic et al., 2004). From the dual-process perspective, both processing modes should be implicated in effective responding to climate change. Analytical processing helps to deal with abstract information and may contribute to a better factual understanding of climate change as a risk. Conversely, affective processing seems indispensable because it motivates action. Thus, from the dual-process perspective, the lack of affective processing seems to be the main reason for why people do not act more on climate change (e.g., Weber, 2006); accordingly, what needs to be done is increase affective engagement, for example by making the local and personal consequences of climate change more salient (e.g., Swim et al., 2010, 2010; Weber, 2006) or by directly eliciting relevant emotions (e.g., Maibach et al., 2008; Moser, 2007; Spence & Pidgeon, 2009). Exploring (the lack of) action on climate change from this perspective and testing the potential of two

strategies (i.e., localising and fear appeals) was therefore one of the crucial theoretical goals of this thesis.

The second theoretical perspective, Construal Level Theory (Trope & Liberman, 2010), argues that humans can only directly experience the present situation and that everything that is removed from the current situation needs to be mentally construed. More specifically, the further away an object is from the individual's present situation, the more abstractly the object needs to be construed and the more generalised the resulting mental representation will be (high-level construal). Conversely, the present situation offers a lot of context-specific information and objects in this situation require no, or only very little, mental construal to be imagined (low-level construal). Importantly, the psychological distance and the corresponding level of mental construal influence what information people preferentially attend to when they think about an object or when they make decisions (e.g., Eyal et al., 2009; Ledgerwood, Trope, et al., 2010): distant objects and events require abstract construals whereas proximal object and events can be construed concretely.

These propositions about how psychological distance influences mental processes cast a different light on the perceived distance of climate change, and the lack of experience and affect connected to this, than does the dual-process perspective. When considered from this perspective, people do not necessarily require personal experiences to be sufficiently motivated to act; nor does distance per se represent a barrier to action (see Chapter 4). Instead, Construal Level Theory suggests that even when people have a distant perspective, they are likely to take action, especially when the “right” type of information is salient (i.e., high-level construal information such as values or attitudes). Similarly, from this perspective affective processes such as experiencing fear do not necessarily and always motivate action. Assuming that fear represents a low-level construal, this affective process should mainly be relevant for decisions that are psychologically proximal (cf. Chang & Pham, 2013). Conversely, when

people have a distant psychological perspective, high-level construals are more likely to influence perceptions and decisions than low-level construal affect.

Accordingly, from this theoretical perspective, neither reducing the psychological distance of climate change by localising its effects nor increasing affective engagement by eliciting fear is likely to have a direct positive effect on people's willingness to address climate change. Rather psychological distance and affective processes would be expected to interact. Psychological distance should determine when affect is important for perceptions and decision-making and when it is not. Specifically, concrete (i.e., low-level construal) emotions should be more relevant when people have a proximal perspective on climate change than when they have a more distant perspective. Investigating these assumptions was a second major theoretical goal of this thesis.

### **Summary of findings**

A series of four studies, presented across three chapters, address the two goals outlined above. Studies 1 and 2 (Chapter 3) drew on large-scale public surveys to explore and compare the different social-psychological predictors of public support for reducing greenhouse gas emissions (mitigation) and for preparing for climate change impacts (adaptation). Importantly, these studies included first proxies to fear (i.e., negative affect) and psychological distance (operationalized as two independent risk assessments, i.e., local vs. global risk perceptions). The findings of these studies suggested that people endorse mitigation and adaptation for similar reasons: People who believe that climate change is real and dangerous, who have positive attitudes about protecting the environment and the climate, and who perceive climate change as a risk, are willing to respond to climate change. These motivations to respond to climate change were found on personal-level responses (i.e., changing one's behaviour) and on societal-level responses (i.e., supporting policies).

Beyond this broad picture, and contrary to what could be expected based on the dual-process perspective, negative affect about climate change played a small to negligible role in predicting support for the various ways of responding to climate change. However, on reflection, the weak relationship between affect and support for mitigation and adaptation was most likely due to methodical shortcomings of the affect measures (i.e., the unspecific way it was measured).

Distinguishing between local and global risk perceptions revealed an interesting pattern between distance and level of implementation, that was interpreted from the perspective of Construal Level Theory (Trope & Liberman, 2010). Specifically, the findings revealed a strong association between local risk perceptions and personal intentions, and a strong association between global risk perceptions and policy support. It was argued that these associations may be due to spontaneous matches with regard to psychological distance: Local risk perceptions are psychologically proximal on the spatial dimension and personal intentions can be regarded as proximal on the social dimension (it is the individual who forms the intentions). Likewise, the spatially remote global risk perceptions can be matched to support for policies, which can be regarded as distant on the social dimension (policies involve strangers and collective action). Importantly, the proposed spontaneous matches would be consistent with the empirically corroborated proposition of Construal Level Theory that different dimensions of psychological distance (e.g., social and spatial distance) are related to each other (Trope and Liberman, 2010). In sum, this pattern of findings gave rise to the idea that the extent to which people perceive climate change as a proximal or distant risk may be related to how people think about climate change and different options to respond to it. The subsequent experimental studies were design to delve more closely into this possibility.

The main goal of Study 3 (Chapter 4) was to learn more about the causal influence of psychological distance on how people think about climate change and possible response

measures. To this end, an experiment was conducted in which climate change was described with either a local or global focus. Based on Construal Level Theory, and in contrast to the dual-process perspective, it was hypothesized that reducing the psychological distance of climate change would not necessarily increase individuals' (affective) engagement with climate change and their motivation to respond to it. Instead, it was argued that when people have a psychologically proximal perspective on climate change, they would construe this issue concretely and base their risk perceptions and their willingness to respond to climate change on corresponding concrete construals, more specifically, on the emotional response of fear. Conversely, when people have a distant perspective on climate change, they should base their perceptions and decisions more on abstract construals, which were operationalized as the extent to which people hold generalized sceptical beliefs about climate change.

As predicted, it was found that focusing on local climate change (vs. thinking about worldwide climate change) did not straightforwardly increase participants' perceptions of risk and their mean-level support for response strategies. Instead, the experiment revealed partial support for the expected interactions between psychological distance and type of information (i.e., the concrete emotion of fear vs. abstract sceptical beliefs). Specifically, participants with a local perspective relied more on low-level construal fear when they made risk judgments whereas those with a global focus were more influenced by high-level construal scepticism. To some extent this pattern was also found when people decided whether they wanted to support policies intended to mitigate climate change and to facilitate adaptation.

A fourth study (Chapter 5) had two main goals: first, to replicate the findings of Study 3 (Chapter 4) and to extend these by also manipulating fear in addition to distance, and, second, to explore more closely the processes that determine the effects of these manipulations. Specifically, Study 4 drew on research on fear appeals (e.g., Neuwirth et al., 2000; Witte & Allen, 2000; Witte, 1998) and argued that the two commonly suggested strategies to increase action on climate change – fear appeals and localising – are likely to

trigger parallel processes that work against each other. It was expected that each strategy would elicit a process that increases the level of perceived risk and the willingness to support climate change mitigation and another process that decreases these tendencies.

Consistent with these predictions and previous research (e.g., Witte & Allen, 2000), it was found that fear appeals elicited processes that increased risk judgments and people's willingness to support climate change mitigation by means of personal actions and policies (i.e., experienced level of fear). Importantly, fear appeals also elicited processes (i.e., reactance, in the form of perceived manipulateness) that decreased risk perceptions and the tendency to support protective measures. Importantly, localising was also found to trigger these antagonistic processes. Making climate change more personally relevant by focusing on its local consequences increased the perceived psychological proximity of climate change which, in turn, increased both perceptions that climate change was a personally and locally relevant risk and support for mitigation policies and people's intentions to personally act on climate change. However, counteracting this productive pathway via proximity, localising climate change also triggered antagonistic responses: Locally framed climate change messages were evaluated more negatively than globally framed messages, and negative evaluations of the message, in turn, predicted reduced risk, reduced motivation to act on climate change, and reduced support for policies addressing climate change.

In terms of the second major goal of this study, which was replicating the finding that people rely on different information when they have a proximal (i.e., low-level construal) perspective as compared to when they have a distant perspective (i.e., high-level construal; see Study 3, Chapter 4), the findings of Study 4 were somewhat disappointing: A two-way Analysis of Variance (ANOVA) with psychological distance of climate change (local vs. global) and levels of fear (low vs. high) as factors did not reveal any significant interactions with either risk perceptions, personal intentions, or policy support as dependent variables. In



other words, the effects of fear and distance were additive and not interactive as was predicted.

However, when – analogously to Study 3 (Chapter 4) – measured fear was substituted as a moderator, interactions emerged that were almost identical to those in Chapter 4 and, more importantly, that were consistent with the expectations based on Construal Level Theory (see supplementary analysis in Chapter 5). More specifically, it was found that for participants with a local perspective (low-level construal) fear was positively associated with risk perceptions and personal mitigation intentions. Fear was also positively related to the dependent variables for participants in the global condition; yet, in this condition the relationships between (measured) fear and risk perception / personal intentions were attenuated. Possible explanations of why measured fear and manipulated fear may have lead to different outcomes are discussed in the next section, which aims to integrate the findings from the different studies in overall theoretical conclusions.

### **Theoretical and practical conclusions**

This thesis offers two perspectives on the role psychological distance may play in the context of climate change. These two perspectives ascribe distance and affect quite different roles in motivating people to act on climate change. In a nutshell, from the dual-process perspective (e.g., Darlow & Sloman, 2010; Epstein & Pacini, 1999; Slovic et al., 2004) it can be argued that both distance and affect should increase the personal relevance of climate change, initiate affective processing, and translate directly into more action (cf. Weber, 2010). Based on Construal Level Theory (Trope & Liberman, 2010), however, it seems more likely that distance acts as a moderator of *how* people think about climate change, *what* information they preferentially rely on when they represent this issue, and accordingly the role of affect in guiding individual decisions in this domain.

Because these theoretical perspectives make quite different predictions, one might expect that only one of these would stand up to empirical testing. Yet, it seems that the findings to emerge from this package of studies lend some support to both perspectives, but also reveal findings that contradict each of these.

In terms of the *dual-process* perspective, Study 3 (Chapter 4) suggested that fear was associated with increased risk perceptions, adaptation intentions, and to a lesser extent to mitigation intentions (see regression coefficients in Table 4). However, the strongest support for the possible role of affective processing in bridging the psychological distance of climate change was found in Study 4 (Chapter 5), where fear appeals were successfully used to elicit affective processing which then increased risk perceptions and the willingness to respond to climate change. Importantly, Study 4 also suggested that *localising* climate change has similar positive effects: Localising increased the perception that climate change is a psychologically proximal issue and this in turn increased perceived risk and support for response measures.

Yet, importantly, this study also found evidence that the two strategies simultaneously initiate other processes with antagonistic effects on risk perceptions and willingness to respond to climate change. Because of these multiple effects engaging the affective route to increase action on climate change seems complex. While this is already known with respect to fear appeals (e.g., Witte & Allen, 2000), this thesis is, to the best of my knowledge, the first that presents evidence suggesting that localising also initiates antagonistic processes, and therefore this strategy is considerably more complex than it is often portrayed.

The finding that localising triggers parallel and antagonistic processes is one of the most important insights for theory and practice. Establishing that localising can initiate processes that decrease protective behaviour is an important step to a more complete theoretical understanding of what happens when the psychological distance of climate change is purposefully decreased. Moreover, these findings may help to explain why previous localising attempts were not as successful as expected (Shwom et al., 2008; Spence &

Pidgeon, 2010; as well as Study 3 of this thesis). It is possible that the manipulations used in these studies triggered similar antagonistic processes that effectively cancelled each other out (see also Study 4, Chapter 5). On the whole, the findings presented in this thesis suggest that engaging the affective processing mode (i.e., via fear or localising) may indeed be helpful for increasing action against climate change. However, when using either of these strategies, it would also seem important to anticipate – and to account for – possible negative responses that might also be triggered by these and that can interfere with positive action.

While these antagonistic processes are well documented in terms of fear (e.g., Witte & Allen, 2000) and probably known to most people working in the field of climate change communication, the finding that localising also seems to trigger antagonistic processes (see Chapter 5) is new and to some extent probably also surprising to many people.<sup>12</sup>

Acknowledging this complexity of the localising approach may help communicators to make better decisions. For example, a failed attempt to increase people's engagement with climate change when it is framed in regional terms may lead to the idea that zooming in more closely, let us say to the level of cities and towns, may further increase the personal relevance and be more effective. However, this zooming in may actually intensify the defensive processes, for example because climate change becomes more threatening or because people are unfamiliar with this local framing (cf. Alter & Oppenheimer, 2009; see also Chapter 5).

With regard to Construal Level Theory, the findings of the first three studies (Chapter 3 and Chapter 4) quite clearly supported the general predictions derived from this perspective. Specifically, Studies 1 and 2 (Chapter 3) suggested that there might be a spontaneous match of psychological distance on a spatial (local vs. global risks) and social dimension (personal actions vs. measures implemented as a society). Next, Study 3 revealed that participants with

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<sup>12</sup> However, note that people tend to consider proximal environmental problems as less severe than more distant environmental problems (e.g., Gifford et al., 2009; Schultz et al., in press). This *spatial optimism* bias could suggest a similar spontaneous resistance to evaluating local environmental problems as being “serious”.

a local perspective relied more on (low-level construal) fear when they made judgments and decisions whereas those with a global focus were more influenced by (high-level construal) scepticism.

Together these findings replicated insights on the impact of psychological distance on mental processes (e.g., Eyal et al., 2009; Ledgerwood, Trope, et al., 2010) within the context of climate change. Importantly, the findings of Chapter 3 and 4 strongly suggest that the role of psychological distance and the effects of “localising” are more complex than is commonly assumed: Rather than straightforwardly increasing action on climate change, decreasing distance changes what people act on.

These findings strongly point to the possibility that distance (i.e., the global condition) can also increase responses to climate change provided it is combined with the “right” information (i.e., high-level construal information). As Chapter 3 suggested, it is possible that the “right” distance also depends on what measure is to be promoted (i.e., individual action vs. policy support and what scale each of these relate to). More specifically, when the goal is to promote support for broader societal responses, then distance framings could be a more effective than proximal framings of climate change.

Against this background, it was unexpected and somewhat disappointing that Study 4 (Chapter 5) did not also reveal the predicted interaction when the two factors of psychological distance (local vs. global) and fear (low vs. high) were systematically varied. However, additional analyses (see supplementary analyses in Chapter 5) did reveal a pattern consistent with expectations and with the findings of Study 3. When measured fear was substituted for the manipulated factor, interactions with distance were again observed. Participants in the local (vs. global) condition relied more on fear when they made risk judgments and when they decided about whether they wanted to take personal actions on climate change. This raises the question as to how the differences between measured fear and manipulated fear can be explained. The supplementary section of Chapter 5 discussed different possible explanations

of these differences, for example that the fear manipulation may have affected another aspect of fear than what is captured when people report their spontaneous levels of fear. Another possible explanation of the differences between manipulated and measured fear was that purposefully elicited fear may have triggered processes that concealed the expected psychological distance by fear interactions. More specifically, the perception that the fear video was manipulative could have prevented people from experiencing fear or neutralized these effects. This, in turn, could have prevented the expected distance by fear interactions. The differences between spontaneously occurring and manipulated fear strongly suggest that more research is needed to better understand how psychological distance and emotions interact. However, it is also important to note that the studies presented in this thesis consistently showed the same patterns that is line with the predictions derived from Construal Level Theory. And even though there are some inconsistencies, the general conclusion that the role of psychological distance is more complex than what many people seem to assume, still holds.

### **Suggestions for practice and directions for future research**

A crucial question for practice is how the knowledge about the complexities connected with fear appeals and the localising approach may be incorporated into the planning and implementation of interventions and campaigns. How can climate change communicators make the most of fear appeals and localising as strategies to increase action on climate change? The ideal procedure to optimize the use of these strategies is probably to develop different messages, pre-test these with different groups of people, analyse which message works best for whom, and then provide people with those messages that are most likely to increase their motivation to act on climate change (cf. Bostrom, Böhm, & O'Connor, 2013; Corner & Randall, 2011; Moser, 2010). In what follows, I will elaborate more on how this procedure could look like in practice and how future research could contribute to make it

effective. However, because this procedure is costly in terms of time and money, I will also discuss less demanding ways of how the findings of this thesis may be useful to practice and which other directions future research could take.

One dimension that seems particularly interesting to pre-test and tailor to different groups is the geographical scale of climate change. To illustrate, communicators could craft messages that frame climate change at various distances (e.g., urban, region, county, country, continent, planet). Next, it could be analysed which distance is most appealing to people with different characteristics. For example, it is possible that people who do not travel a lot care most about proximal consequences of climate change, while more mobile people respond more strongly to framings that use larger scales (cf. Devine-Wright, 2013). Different individual responses to distance framings may also be expected in terms of how strongly individuals identify with proximal others (e.g., with members of their community or citizens of the same nation) versus humanity as a whole (McFarland, Brown, & Webb, 2013). Again, it is likely that people respond more strongly to messages that describe climate change on a geographical scale that corresponds with their social bonds. This reasoning implies again that, sometimes, greater distance could be a good thing. In this regard, rather than simply localising (or globalising) all messages, it would seem important to direct messages to the identities that are most meaningful for people and therefore most likely to inspire action (Rabinovich & Morton, 2011).

Another dimension that may be optimized by systematic pre-testing and tailoring is the degree of message vividness (see Chapter 5). How much visual information such as animations and visualizations is productive? How do music or different accents modify the effect of localised messages? Again, it is plausible that to some extent individual characteristics (e.g., level of education, numerical competence) influence what message format a person finds most useful. Importantly, because it is probable that some framings elicit more defensive processing than others, it would be crucial to also compare different

framings in terms of how strongly they trigger adaptive and maladaptive response (see Chapter 5).

An important goal of this thesis was to learn more about how psychological distance (in particular spatial distance) influences the way people think, decide, and act in the context of climate change. To explore the influence of distance, “local” perceptions and framings of climate change were compared with “global” ones. More specifically, when “local” risk perceptions were assessed and when climate change was framed as a “local” issue, terms such as “where I live” and names of cities and regions in the UK were used. By contrast, “global” climate change was operationalized with terms such as “worldwide” and by naming cities and regions in other countries. These operationalizations were effective in meeting the main goal of comparing *relatively* proximal versus *relatively* distant climate change. One might, however, raise the question as to whether the term “local” is adequate for experimental manipulations and risk assessments that include references to cities and regions in one’s country or whether the term “national” would be more adequate. To some extent, the answer to this question depends on what “local” means – a question which is difficult to answer as the concept is poorly defined (cf. Devine-Wright & Wiersma, 2013). Moreover, the question of what “local” means points to interesting possibilities for future research. How would the findings presented in this thesis change when people were presented with information about climate change that is “more local”? For example, how would people react to the prospect of negative urban or regional climate change impacts? In short, it would be interesting for theory and practice to systematically vary the psychological distance of climate change (e.g., neighbourhoods, towns, regions, nations, international, global) and explore how this affects how people think and act on climate change. In this regard, it could also be instructive to refine the spatiality of the operationalization of the local and to conduct studies that consistently (and exclusively) refer to urban, regional, and national locations.

Exploring the effect of different formats of localising climate change is also an important avenue of future research. Remember that the effects of localising were rather weak in Studies 4 and 5. To some extent the weak effect of the psychological distance – or rather *proximity* – manipulation seems to be due to the plain text-format that was used (see Chapters 4 and 5). Relative to the more vivid videos used to induce different states of fear, these text manipulations were rather dull. Experimenting with more vivid formats such as videos would therefore be one important step to increase the effectiveness of the proximity manipulation. Allowing people to have experiences in virtual realities or by providing narrative accounts from others may be other viable options to strengthen the effect of the manipulation (see Marx et al., 2007; Weber & Stern, 2011). However, strengthening the manipulation is also likely to increase defensive processes (see the discussion section in Chapter 5). Thus, it is essential to closely examine these potential undesired effects when exploring different formats.

Pre-testing and tailoring messages to individual characteristics is a very promising procedure but because of limited financial resources, time constraints, or lacking access to different groups of people, it is often not possible to undergo such a time consuming and extensive procedure. How may the findings of this thesis be useful when this ideal procedure is not feasible? In this case, one possibility is to implement this procedure in a slimmed-down or simplified version. Instead of focusing on individuals, this simplified version could look at larger groups of people. To illustrate, it would be helpful to know more about how distant or proximal the places are to which people feel most attached. How prevalent are strong local, regional, national, continental, or global attachments? Knowledge about such distributions in larger groups of people may be helpful to create messages that members of these groups can relate to. Because people may feel attached to several places that are located at varying distances, it could also be interesting to explore possibilities to create messages referring to



places that are located at various distances. This mixed-message approach could increase the effectiveness of messages that are directed at heterogeneous groups of people.

Another way to implement the present thesis' findings in practice that is less demanding than the described "ideal" approach is to create "fit" between psychological distance and the desired responses. More specifically, Studies 1 and 2 suggested that localised messages may be more effective to increase personal action while more distant framings may facilitate action on a more aggregate level (e.g., collective actions, support for policies). Further evidence of this would suggest that different strategies may be needed to elicit personal actions versus more policy relevant responses. In short, the finding that people preferentially rely on different information when they have a proximal versus distant perspective on climate change is interesting for practice because it suggests that distance not only presents a challenge – but also an opportunity (see the discussion section in Chapter 4 for more details).

Putting aside the idea of pre-testing and tailoring messages, the most important lesson learned and the greatest challenge for practice is probably that fear and localising can initiate different processes, some of which decrease people's motivation to act on climate change. Reducing these undesired effects seems of utmost importance for practice. In terms of fear appeals there is abundant research and there are some guidelines as to how fear appeals should be designed in order to be effective – which includes reducing their negative effects on people's motivation to act. For example, Moser (2007) listed seven requirements for fear appeals to lead to constructive behaviour change: (1) feeling personally vulnerable to the risk, (2) know exactly what to do to prevent the threat, (3) feeling able to carry out these preventive actions (self-efficacy beliefs), (4) believing that the suggested preventive actions are helpful to reduce the threat (response efficacy beliefs), (5) believing that the costs of these actions are low or acceptable, (6) viewing the alternative of doing nothing as unappealing, (7) processing the information about the threat consciously and carefully. Most of these

requirements focus on increasing beliefs about the usefulness and feasibility of response options rather than to the processes specific to fear appeals. Thus, they should also contribute to positive evaluations of response options when the localising approach is used to encourage action. However, the relevance of each of these processes for maximising the impact of localised messages, and avoiding the pitfalls of these, remains to be tested. In addition, it would seem useful for future research to consider whether there are further unique attributes that determine the effectiveness of localised messages.

A prominent aspect among these guidelines and a factor that could play a role in supporting the motivating effect of localising is the extent to which people believe that there are measures that are helpful to reduce the threat and that they are personally able to implement them. There is abundant evidence in the health promotion literature showing that increasing these efficacy beliefs is beneficial to motivate self-protective action (e.g., Witte & Allen, 2000; Witte, 1998; however, for a different view, see de Hoog et al., 2007). Given that there is some evidence suggesting that efficacy beliefs are also helpful to increase action within the context of climate change (Brody et al., 2012, 2008; Moser, 2007), efficacy beliefs may be a strategy that can help motivating constructive responses to this threat (see also Maibach et al., 2008). However, one study that distinguished between self-efficacy beliefs and group-efficacy beliefs with regard to climate change found that self-efficacy beliefs were irrelevant in terms of behavioural intentions; by contrast, group-efficacy predicted people's intentions to act environmentally friendly (van Zomeren et al., 2010). This finding is interesting because it suggests that in the context of climate change self-efficacy might not be as important as it is for healthy behaviour. Van Zomeren and colleagues (2010) speculated that the relative importance of group-efficacy and self-efficacy beliefs might depend on whether people see a threat as an individual or as a collective problem. When people see a threat as an individual problem, self-efficacy beliefs should predict action. Conversely, when they see it as a collective problem, group-efficacy beliefs should better predict action. This

second view would also be consistent with Lorenzoni and colleagues (Lorenzoni et al., 2007; for a similar finding, see also Darier & Schüle, 1999) finding that respondents in their study

“felt that individual action would have little effect in comparison to other, larger scale emitters. Participants generally argued that it was not worthwhile taking action at this individual level given its limited efficacy [...]. They certainly saw climate change as a collective problem to be tackled at a collective level” (p. 453).

This perception of climate change as a collective problem and the idea that group-efficacy beliefs are central to promote action suggest that it may be helpful to take social aspects of responding to climate change generally more strongly into account. For example, localising messages could be complemented with appeals to people’s sense of community and solidarity. Positive feelings like these may be helpful to increase preventive action (cf. Terpstra, 2011). Similarly, positive visions of a healthy future society and the belief that one can contribute to the welfare of society could also help to maximize the positive effects of the localising approach. To illustrate, Bain and colleagues (Bain et al., 2012; Bain, Hornsey, Bongiorno, Kashima, & Crimston, 2013) have explored the extent to which different dimensions of anticipated societal change influence people’s attitudes and behavioural / voting intentions towards various social issues (e.g., abortion, legalizing marihuana, climate change). They found that the outlook for a positive development of society, especially in terms of people becoming “warmer” and more “moral”, consistently increased attitudes and behavioural intentions towards various issues, including climate change mitigation. Put differently, visions of the future – specifically of future morality – have a powerful potential to motivate people. Consider Barack Obama’s “Yes We Can” slogan as an example. Visions like these are full of hope and appeal to people’s belief that together they can form a better future. Thus, a better understanding of different types of efficacy beliefs and the potential role of positive visions of the future as a means to empower people (see also Moser, 2007) seem to

be promising possibilities to assist the localising strategy (and probably also fear appeals) in increasing action on climate change.

Another area that could be interesting for practice and future research is the interplay between emotions and psychological distance. In respect of this, one crucial question that could not be answered is why Studies 3 and 4 (Chapter 4 and 5) revealed different results for measured and manipulated fear. As discussed in detail in Chapter 5, there are a number of possible explanations for these differences (e.g., differences between trait and state fear, motivated reasoning after fear appeals). To better understand the role of fear as a source of information, it would be helpful to explore the validity of the explanations in future studies.

In addition to this, it would also be interesting to more systematically investigate the interplay between psychological distance and low-level construal emotions (fear, sadness, and anger) versus high-level construal emotions (guilt, shame, and hope; for more background on this differentiation, see Chapter 4). Because people rely more strongly on information that is consistent with their current mind-set, it can be expected that low-level construal emotions in general (not only fear) should be more relevant for judgments and decision-making when people have a psychologically proximal perspective, while high-level construal emotions should be more relevant when people have a more distant perspective. Future research could test these expectations by combining different low-level and high-level emotions with psychological distance and proximity. Because currently there is only little research available on this theoretically assumed differentiation of low-level and high-level construal emotions, investigations into this direction would also benefit our understanding of Construal Level Theory more generally.

Exploring other low-level construal emotions than fear may have the additional advantage that they circumvent some of the problems that may be specific to the emotion of fear (i.e., defensive processes such as feeling manipulated or denying the threat). In the absence of such specific fear-related reactions it should be possible to investigate how

emotions and psychological distance interact when the effects of the emotion are less intrusive.

## **Overall conclusion**

A frequent explanation for why people do not act more strongly on climate change is that people perceive it as a distant threat, something that will be dangerous only in future, in distant places, and for other people. Two strategies seem particularly suitable to bridge this distance. The first strategy is to make the local and personal consequences of climate change more visible. The second strategy is to elicit a sense of worry or even fear. This thesis was interested in exploring the utility of each of these proposed strategies for increase people's motivation to respond to climate change.

Contrary to what is typically assumed, the research reported in this thesis suggested neither that distance is an insurmountable obstacle nor that decreasing this distance, for example by describing what climate change means for one's own country or by emotionally involving people with the issue, is a panacea to motivate action. Distance does not always represent an obstacle because some stable personal orientations and goals can very effectively motivate action, even when people think about distant threats, objects, or goals. Conversely, reducing distance is not a panacea for inaction because just as focusing people's attention on what climate change means for places that are close to them has motivational benefits, this strategy has also triggers responses that reduce the motivation to act. Indeed, the mixed effects of distance, and the dual pathways that explain this, were equally apparent for the strategy of engaging negative emotions, like fear, in order to stimulate action.

In a nutshell, then, the roles of distance (i.e., "localising") and fear appeals are considerably more complex than people seem to assume. This may imply dashed hopes and expectations on the one hand; but the complexities revealed in this thesis also offer room for creative and innovative new avenues to communicate climate change. More generally, this

work suggests that it may be time to put accepted wisdom more fully to the test when applying established psychological theories to the task of improving climate change communication.

## Appendix

### *Appendix A. Items used in Studies 1 to 4.*

Scales and items	Studies			
	1	2	3	4
<i>Local and personal risk perceptions</i>				
Water shortages will occur where I live	X	X	X	X
Starvation and food shortages will occur where I live	X	X	X	-
Standard of living of many people in the UK / Switzerland will decrease	X	X	X	X
Health problems in the UK / Switzerland will increase	X	X	X	X
Number of species lost in the UK / Switzerland will increase	X	X	X	X
The UK's / Switzerland's economic situation will deteriorate	X	X	X	-
More flooding will occur where I live	X	X	X	X
Climate change will have negative consequences for me	-	-	-	X
Certain effects of climate change will impair my health	-	-	-	X
I will experience the consequences of severe weather events	-	-	-	X
I will experience more heat-waves because of climate change	-	-	-	X
<i>Global risk perception</i>				
Worldwide water shortages will occur	X	X	X	X
Starvation and food shortages will occur in much of the world	X	X	X	-
Standard of living of many people in the world will decrease	X	X	X	X
Health problems in the world will increase	X	X	X	X
Number of species lost in the world will increase	X	X	X	X
The worlds economic situation will deteriorate	X	X	X	-
More flooding will occur worldwide	X	X	X	X

Appendix A continues

## Appendix A continued

Scales and items	Studies			
	1	2	3	4
<i>Fear items</i>				
Tense	-	-	X	X
Nervous	-	-	X	X
Anxious	-	-	X	X
Fearful	-	-	X	X
Frightened	-	-	-	X
Threatened	-	-	-	X
<i>Personal involvement</i>				
Climate change is important to me	-	-	X	-
I am interested in the issue of climate change	-	-	X	-
Climate change is personally relevant me	-	-	X	-
<i>Psychological distance</i>				
To me, climate change feels very close ... very distant	-	-	-	X
To me, climate change feels like here ... like at the other end of the world	-	-	-	X
To me, climate change feels like tomorrow ... like thousands of years away	-	-	-	X
To me, climate change feels like affecting me ... like affecting distant strangers	-	-	-	X
To me, climate change feels very real ... very hypothetical	-	-	-	X
<i>Perceived manipulateness</i>				
This text (video) was manipulative	-	-	-	X
This text (video) tried to influence my opinion	-	-	-	X
This text (video) tried to change my thoughts	-	-	-	X

Appendix A continues



## Appendix A continued

Scales and items	Studies			
	1	2	3	4
<i>Mitigation policy support (N = 14)</i>				
Ban the driving of cars in certain areas	X	X	X	X
Ban the production of vehicles with gas / fuel mileage below 75 miles per gallon (very fuel efficient)	X	X	X	X
Increased fuel and diesel taxes	X	X	X	X
Increased household electricity taxes	X	X	X	X
Congestion charging on busy roads	X	X	X	X
Air travel taxation (e.g. on ticket prices)	X	X	X	X
Subsidies for electric (emission-free) vehicles	X	X	X	X
Subsidies for house insulation	X	X	-	-
Information campaigns about negative climate effects caused by car and aeroplane travel	X	X	-	-
Introducing labels stating carbon content	X	X	X	X
Teach children about the causes, consequences, and potential solutions to climate change	X	X	X	X
Subsidies for the household production of green energy (e.g., small wind turbines and solar panels)	X	X	X	X
Tax for the protection of tropical rain forests	X	X	-	-
Increasing general taxation to pay for public transport	X	X	-	X
Requirement for fossil fuel power stations to implement carbon capture and storage procedures	-	-	X	-
<i>Adaptation policy support (N = 16)</i>				
New spatial planning to reduce the risk of flooding	X	X	-	-
Obligatory integration of climate risk and adaptation assessments into business planning	X	X	-	-

Appendix A continues

## Appendix A continued

Scales and items	Studies			
	1	2	3	4
Train Health Services staff to identify and advise on heat stress risks	X	X	-	-
Upgrade all flood defences to a higher standard	X	X	X	-
Protection and creation of wetlands (improves flood protection and contributes to biodiversity)	X	X	X	-
Requirement to fit houses with water resistant door and window frames in flood risk areas	X	X	-	-
Close access to vulnerable places, including some recreation areas, marinas, and hiking trails	X	X	X	-
Reduce pressure on systems or areas at risk (e.g. fewer fishing and hunting licences)	X	X	X	-
Relocation of dwellings away from flood-prone areas	X	X	X	-
Increase prices for water consumption (helps to avoid water shortages)	X	X	X	-
Increase national development assistance to help developing countries to adapt to climate change	X	X	X	-
Produce and distribute guidance on how to avoid heat stress	X	X	X	-
Hosepipe restrictions during the summer	X	X	X	-
Introduce building codes to make houses more thermally comfortable with longer and hotter summers	X	X	X	-
Tax to establish a fund to alleviate unavoidable climate change impacts in the UK / in Switzerland	X	X	X	-
Creation of habitat corridors for animals (e.g. bridges over motorways)	X	X	X	-
<i>Mitigation intentions</i>				
Choose a car that gets good fuel mileage	X	-	X	X
Install (more) insulation at home	X	-	X	X
Car sharing / Use car sharing pools	X	-	X	X

Appendix A continues

## Appendix A continued

Scales and items	Studies			
	1	2	3	4
Using public transport (more often)	X	-	X	X
Walking and cycling (more)	X	-	X	X
Replace older appliances with more energy efficient new models (e.g. refrigerators)	X	-	X	X
Join an environmental group	X	-	X	-
Carbon offset flights	X	-	X	X
Eat less meat	X	-	X	X
Reduce the number of new things you buy	X	-	X	X
Spend holiday in the UK rather than abroad	-	-	-	X
Ask your MP to support a strong climate change bill	-	-	-	X
<i>Adaptation intentions</i>				
Repaint your (future) house in a lighter colour (less heat absorption in the summer)	X	-	X	-
Buy a flood insurance for your (future) house	X	-	X	-
Install a water re-use system at home (avoid water shortages during droughts)	X	-	X	-
Donate money to preserve species at risk from climate change	X	-	X	-
Persuade relatives or friends to move away from flood plains	X	-	X	-
Fit water saving device in your cistern to save when flushing	X	-	X	-
Read about how to avoid heat stress during heat waves	X	-	X	-
Donate money for settlement relocation projects in developing countries	X	-	-	-
Find out how much your (future) house or flat is at risk from flooding	-	-	X	-
Donate money for projects in developing countries that move housing estates away from areas at risk	-	-	X	-

Appendix A continues

## Appendix A continued

Scales and items	Studies			
	1	2	3	4
<i>Scepticism</i>				
Climate change is caused only by natural processes	X	X	X	X
Experts are agreed that climate change is a real problem (recoded)	X	X	X	X
The media is often too alarmist about issues to do with climate change	X	X	X	X
The evidence for climate change is unreliable	X	X	X	X
I am uncertain if climate change is happening	X	X	X	X
There's no such thing as climate change	X	X	-	-
The cold and snowy winter was a proof that climate change is not happening	X	X	-	-
Climate change is caused only by human activity (recoded)	X	X	-	-
I do not believe climate change is a real problem	-	-	X	X
<i>Attitude addressing climate change</i>				
I do not mind if it gets a bit warmer in the UK	X	-	-	-
New technologies can solve global warming, without individuals having to make big changes in their lives	X	-	-	-
I feel a moral duty to do something about climate change (recoded)	X	-	-	-
Radical changes to society are needed to tackle climate change (recoded)	X	-	-	-
<i>Attitude towards environmental protection</i>				
50 items, see Kaiser & Wilson (2004)	-	X	-	-
<i>Attitude towards nature</i>				
40 items, see Brügger et al. (2011)	-	X	-	-
<i>Personal efficacy</i>				
I am able to act effectively on climate change	-	-	-	X
Making a contribution to reduce climate change is easy for me	-	-	-	X
I can easily adopt a low-carbon lifestyle	-	-	-	X
Reducing carbon emissions is extremely difficult for me	-	-	-	X

Appendix A continues

## Appendix A continued

Scales and items	Studies			
	1	2	3	4
General action efficacy beliefs				
If everyone does <i>their bit</i> we can reduce climate change	-	-	-	X
Individual behaviour change (e.g., driving less) is effective in combatting climate change	-	-	-	X
Introducing new carbon regulations will significantly decrease greenhouse gas emissions	-	-	-	X

*Note.* 1 = UK Study (Chapter 3), 2 = Swiss Study (Chapter 3), 3 = Study 3 (Chapter 4), 4 = Study 4 (Chapter 5); X = item used; - = item not used.

## Appendix B. Exploratory principal components analysis with oblim rotation of mitigation and adaptation intentions (UK Study).

Policies	Strategy	<i>M</i>	<i>SD</i>	Factors	
				1	2
Persuade relatives or friends to move away from flood plains	Ad	2.64	1.11	<b>.92</b>	-.21
Buy a flood insurance	Ad	2.34	1.05	<b>.75</b>	-.26
Install a water re-use system at home (avoid water shortages during droughts)	Ad	2.95	1.14	<b>.72</b>	-.02
Repaint your house in a brighter colour (less heat absorption in the summer)	Ad	2.54	1.21	<b>.67</b>	-.07
Read about how to avoid heat stress during heat waves	Ad	3.16	1.21	<b>.66</b>	-.06
Donate money for settlement relocation projects in developing countries	Ad	2.74	1.16	<b>.61</b>	.09
Donate money to preserve species at risk from climate change	Ad	2.85	1.18	<b>.58</b>	.12
Fit water saving device in your cistern to save when flushing	Ad	3.67	1.13	<b>.35</b>	.32
Using public transport (more often)	Mi	3.65	1.21	.31	.27
Join an environmental group	Mi	2.38	1.17	-.25	<b>.78</b>
Install more insulation at home	Mi	3.75	1.05	-.11	<b>.69</b>
Car sharing	Mi	3.15	1.23	-.11	<b>.65</b>
Replace older appliances with more energy efficient new models (e.g. refrigerators)	Mi	3.91	1.00	-.04	<b>.62</b>
Reduce the number of new things you buy	Mi	3.42	1.13	-.02	<b>.60</b>
Walking and cycling (more)	Mi	4.04	0.97	-.01	<b>.57</b>
Choose a car that gets good gas mileage	Mi	4.01	1.00	.10	<b>.56</b>
Eat less meat	Mi	3.09	1.31	.30	<b>.38</b>
Carbon offset flights	Mi	2.9	1.21	.35	<b>.37</b>
Eigenvalue				5.69	1.51
% of variance				31.63	8.41

Note. Mi = Mitigation, Ad = Adaptation.

## Appendix C. Exploratory principal components analysis with oblim rotation of mitigation and adaptation policy support.

Policies	Strategy	Swiss Study		UK Study		Factor loadings Swiss Study		Factor loadings UK Study	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	1	2	1	2
Increased fuel and diesel taxes	Mi	3.49	1.39	2.54	1.33	<b>.91</b>	-.27	-.23	<b>-.94</b>
Increased household electricity taxes	Mi	2.69	1.20	2.35	1.15	<b>.81</b>	-.25	-.29	<b>-.96</b>
Congestion charging on busy roads	Mi	3.41	1.36	3.14	1.34	<b>.78</b>	-.18	-.12	<b>-.83</b>
Air travel taxation (e.g. on ticket prices)	Mi	3.64	1.28	3.03	1.35	<b>.78</b>	-.22	-.03	<b>-.77</b>
Increasing general taxation to pay for public transport	Mi	3.31	1.28	2.91	1.37	<b>.69</b>	-.05	-.19	<b>-.86</b>
Increase prices for water consumption	Ad	2.43	1.18	2.5	1.16	<b>.67</b>	-.24	-.15	<b>-.85</b>
Ban the driving of cars in certain areas	Mi	3.41	1.24	3.14	1.32	<b>.65</b>	-.06	.10	<b>-.64</b>
Ban the production of vehicles with gas / fuel mileage below 75 miles per gallon (very fuel efficient)	Mi	3.38	1.32	3.37	1.26	<b>.63</b>	-.03	.24	<b>-.48</b>
Increase national development assistance to help developing countries to adapt to climate change	Ad	3.65	1.13	3.58	1.11	<b>.60</b>	.18	.28	<b>-.44</b>
Tax for the protection of tropical rain forests	Mi	3.15	1.24	3.05	1.22	<b>.58</b>	.11	-.04	<b>-.72</b>
Introducing labels stating carbon content	Mi	4.00	1.07	3.61	1.08	<b>.56</b>	.17	<b>.47</b>	-.26
Information campaigns about negative climate effects caused by car and aeroplane travel	Mi	3.82	1.17	3.58	1.14	<b>.51</b>	.31	.26	<b>-.51</b>
Tax to establish a fund to alleviate unavoidable climate change impacts in the UK	Ad	3.04	1.05	2.94	1.18	<b>.49</b>	.24	.05	<b>-.70</b>
Teach children about the causes, consequences, and potential solutions to climate change	Mi	4.59	0.70	4.29	0.93	<b>.48</b>	.31	<b>.50</b>	-.22
Protection and creation of wetlands (improves flood protection and contributes to biodiversity)	Ad	4.23	0.79	4.08	0.87	<b>.47</b>	.10	<b>.73</b>	.02
Restricted hose use during the summer	Ad	3.76	1.04	3.68	1.10	<b>.46</b>	.12	.35	<b>-.35</b>
Reduce pressure on systems or areas at risk (e.g. less fishing and hunting licenses)	Ad	4.04	0.97	3.67	1.08	<b>.42</b>	.19	<b>.48</b>	-.21
Creation of habitat corridors for animals (e.g. bridges over motorways)	Ad	4.15	0.91	3.85	1.06	<b>.42</b>	.15	<b>.65</b>	-.02
Obligatory integration of climate risk and adaptation assessments into business planning	Ad	3.74	1.02	3.73	1.00	<b>.40</b>	.31	<b>.58</b>	-.20
Subsidies for the household production of green energy (e.g. small wind turbines and solar panels)	Mi	4.20	0.90	4.03	1.02	<b>.36</b>	.26	<b>.53</b>	-.02
Subsidies for house insulation	Mi	4.22	0.83	4.14	0.90	<b>.35</b>	.16	<b>.54</b>	-.03
Produce and distribute guidance on how to avoid heat stress	Ad	3.43	1.01	3.64	1.02	.01	<b>.76</b>	<b>.60</b>	.01
Train Health Services staff to identify and advise on heat stress risks	Ad	3.41	1.02	3.79	0.96	-.15	<b>.74</b>	<b>.74</b>	.10
Requirement to fit houses with water resistant door and window frames in flood risk areas	Ad	2.84	1.07	3.71	1.04	-.10	<b>.60</b>	<b>.69</b>	.15
Introduce building codes to make houses more thermally comfortable with longer and hotter summers	Ad	3.15	1.07	4.01	0.92	-.15	<b>.58</b>	<b>.72</b>	.06
Upgrade all flood defences to a higher standard	Ad	3.28	0.89	3.94	0.90	-.14	<b>.56</b>	<b>.77</b>	.36
New spatial planning to reduce the risk of flooding	Ad	2.87	1.00	3.98	0.82	.10	<b>.51</b>	<b>.73</b>	.14
Relocation of dwellings away from flood-prone areas	Ad	3.75	0.93	3.76	0.99	.15	<b>.47</b>	<b>.69</b>	.14
Close access to vulnerable places, including some recreation areas, marinas, and hiking trails	Ad	2.91	1.12	3.08	1.10	.15	<b>.47</b>	<b>.30</b>	-.29
Subsidies for electric (emission-free) vehicles	Mi	3.94	0.98	3.81	1.05	.26	<b>.29</b>	<b>.56</b>	-.10
Eigenvalue						8.64	2.85	10.43	3.39
% of variance						28.81	9.49	34.75	11.28

Note. Mi = Mitigation, Ad = Adaptation.

*Appendix D. Relationships between individual policies and local and global risk perceptions.*

Policy	Strategy	Scale	Correlations policy support – risk perceptions			
			Switzerland		United Kingdom	
			Global risk	Local risk	Global risk	Local risk
Teach children about the causes, consequences, and potential solutions to climate change	Mi	national	.54	.31	.43	.31
Information campaigns about negative climate effects caused by car and aeroplane travel	Mi	national	.45	.39	.37	.31
Introducing labels stating carbon content	Mi	national	.45	.24	.40	.34
Obligatory integration of climate risk and adaptation assessments into business planning	Ad	national	.43	.30	.46	.39
Increase national development assistance to help developing countries to adapt to climate change	Ad	international	.43	.27	.41	.31
Tax for the protection of tropical rain forests	Mi	international	.42	.31	.39	.33
Air travel taxation (e.g. on ticket prices)	Mi	international	.42	.30	.37	.35
Increased fuel and diesel taxes	Mi	national	.42	.31	.35	.34
Restricted hose use during the summer	Ad	local-regional	.39	.25	.39	.30
Ban the production of vehicles with fuel mileage below 75 miles per gallon (very fuel efficient)	Mi	national	.39	.36	.34	.30
Subsidies for electric (emission-free) vehicles	Mi	national	.37	.21	.32	.19
Tax to establish a fund to alleviate unavoidable climate change impacts in the UK	Ad	national	.37	.26	.32	.33
Subsidies for the household production of green energy (e.g. small wind turbines )	Mi	national	.37	.29	.29	.17
Reduce pressure on systems or areas at risk (e.g. less fishing and hunting licenses)	Ad	local-regional	.36	.23	.37	.30
Increased household electricity taxes	Mi	local-regional	.35	.27	.26	.28
Increasing general taxation to pay for public transport	Mi	national	.35	.22	.33	.32
Congestion charging on busy roads	Mi	local-regional	.35	.24	.34	.29
Subsidies for house insulation	Mi	national	.34	.19	.32	.19
Ban the driving of cars in certain areas	Mi	local-regional	.34	.20	.36	.34
Produce and distribute guidance on how to avoid heat stress	Ad	national	.32	.24	.28	.23
Protection and creation of wetlands (improves flood protection and contributes to biodiversity)	Ad	local-regional	.32	.11	.35	.18
Creation of habitat corridors for animals (e.g. bridges over motorways)	Ad	local-regional	.31	.10	.26	.16
New spatial planning to reduce the risk of flooding	Ad	local-regional	.31	.17	.30	.20
Close access to vulnerable places. including some recreation areas. marinas. and hiking trails	Ad	local-regional	.28	.20	.23	.18
Increase prices for water consumption	Ad	national	.24	.23	.33	.32
Train Health Services staff to identify and advise on heat stress risks	Ad	local-regional	.22	.09	.30	.21
Relocation of dwellings away from flood-prone areas	Ad	local-regional	.17	.22	.22	.17
Introduce building codes to make houses more thermally comfortable with hotter summers	Ad	national	.17	.11	.31	.22
Requirement to fit houses with water resistant door and window frames in flood risk areas	Ad	local-regional	.14	.19	.14	.16
Upgrade all flood defences to a higher standard	Ad	local-regional	.13	.08	.12	.06

*Note.* Mi = Mitigation, Ad = Adaptation.



*Appendix E.* Texts used to explain what adaptation to climate change is.

**UK Study:**

Scientists argue that due to past emissions of greenhouse gases the planet is already committed to a certain amount of climate change over the next couple of decades. This makes adaptation to the positive and negative impacts of climate change unavoidable. There are many steps we can take as a society to adapt to climate change.

**Swiss Study (translated):**

Adaptation to climate change refers to measures that support natural and human systems (e.g., agriculture) to suffer as little as possible from the consequences of climate change. Scientists argue that because of past greenhouse gas emissions a certain extent of climate change is already expected within the next decades. It is therefore unavoidable to adapt to the negative (and positive) consequences of climate change. There are many possibilities of how we as a society can adapt to climate change.

*Appendix F.* Manipulation of psychological distance (Study 3; global condition in italics):

**What is climate change and what are the consequences?**

‘Climate’ is defined the average weather experienced in a region over a long period (usually more than 30 years). ‘Climate change’ refers to changes in the Earth’s temperature and other climate-related phenomena (e.g., rainfalls, wind, humidity) since the end of the 19<sup>th</sup> century.

In the UK (*Across the globe*) average temperatures have risen by about 0.7°C from 1900 to 2000. It is important to note that changes in average temperatures are associated with other climatic changes. For instance, in the UK (*all over the world*) summers have already become hotter and drier whereas winters have become milder and wetter.

There is now very strong evidence that the observed changes in the climate cannot be explained by natural causes alone. Scientists attribute climate change to human past and present behaviour, especially to greenhouse gas emissions (i.e., CO<sub>2</sub>, methane), which artificially warm the earth’s atmosphere. Scientists also argue that due to past emissions of greenhouse gases the UK (*planet*) is already committed to a certain amount of climate change over the next couple of decades. This will have impacts on humans, animals, and plants.

*Appendix G.* Manipulation of psychological distance (Study 4; global condition in italics):

### **What is climate change?**

‘Climate’ is defined as the average weather experienced in a region over a long period (usually more than 30 years). ‘Climate change’ refers to changes in the Earth’s temperature and other climate-related phenomena (e.g., rainfalls, wind, humidity) since the industrial revolution.

In the UK, average (*Average global*) temperatures have risen by about 1°C between 1900 and 2010. It is important to note that changes in average temperatures are associated with other local (*global*) climatic changes. For instance, in the UK (*many places around the world*) summers have already become hotter and drier. The average duration of very hot summer days has increased significantly (*worldwide*) since 1961 in all regions of the UK.

There is growing evidence that these observed changes in climate cannot be explained by natural causes alone. Most scientists attribute recent climate change to human behaviour, especially to greenhouse gas emissions (i.e., carbon dioxide, methane), which artificially warm the earth’s atmosphere. A substantial proportion of these emissions are caused by deforestation and burning fossil fuels – such as oil and coal – to produce food, heat buildings, and drive cars.

### **What are the consequences of climate changes for the UK (*world*)?**

Experts expect that (*average global*) temperatures in the UK could rise further between 1°C and 8°C by 2100. Such temperature rises will have impacts on humans, animals, and plants:

- Hot and dry summers will become much more frequent. The effects of heat-waves will not only be experienced in large cities like London, Birmingham, or Manchester (*New York, Delhi, or Tokyo*), where buildings and streets absorb and radiate the energy from the sun, but also in small villages. People living in rural areas will also have their share of the heat. Droughts and water scarcity will occur more regularly, especially in the south of Britain (*Central America, Southern Africa, and Southeast Asia*). As a consequence, local councils (*international governments*) will need to restrict water use

within their communities. Although some agricultural areas in North England and Scotland (*Scandinavia or northern Russia*) may benefit from warmer temperatures and longer growing seasons, overall climate change will decrease agricultural yields in the UK. For example, yield of wheat (*rice*) could decrease by up to 5% across Britain (*Southeast Asia*).

- Winters and springs will become wetter. Climate change will bring more frequent and heavy downpours. More intense rainfalls are likely to be followed by surface water as well as sewer and groundwater flooding. Currently, one in six people in England and Wales (*around the world*) are at risk from flooding. Climate change will increase the number of buildings and infrastructure at risk from flooding and even threaten people's lives.

- Sea-levels will rise. Scientists predict that the average sea-level around the UK (*world*) will rise by 20 to 60 centimetres or even more in the next 100 years. The following regions would be particularly at risk from rising sea-levels and erosion:

- south Wales (*Bangladesh*)
- north-west Scotland (*China*)
- Yorkshire and Lincolnshire (*Philippines*)
- East Anglia (*Tuvalu*)
- Thames Estuary (*Maldives*)

All in all, climate change will have many different impacts on the natural and human environment in the UK (*around the world*). Some of these consequences may seem positive (i.e., increased warmth *in currently cold regions*). But, the majority of changes will be negative.

*Appendix H. Pilot Study for Study 4 (Chapter 5).***Overview**

Two pilot studies were conducted to find out whether the manipulations designed to influence fear and psychological distance were effective. Participants were recruited by three emails and an advertisement on a website that collects online studies. One email was sent to all students within the College of Life and Environmental Sciences of the University of Exeter. A second email was sent to students who had provided their contact details in order to participate in psychological studies. Finally, participants from a previous study who were interested in taking part in further studies were contacted. As an incentive, the first 30 participants received Amazon vouchers worth £5 and all participants entered a lottery to win one of three additional Amazon vouchers worth £20.

Each participant was randomly directed to one of four conditions: Two fear conditions (low vs. high) and two distance conditions (local vs. global). Each condition contained general information about climate change (its definition and causes) and condition-specific elements. After watching the condition-specific information, participants completed the manipulation checks and indicated how they generally perceived the video / text.

The number and order of questions was very similar in all conditions. However, the distance conditions contained additional questions that were intended to measure how abstractly or concretely people were thinking. Participants needed approximately 15 minutes to complete the questionnaire.

**Pilot Study to evaluate the fear manipulation**

*Participants and procedure.* Sixty-one students participated in the online pilot studies. Of these, fifty-three (27 women, 25 men, 1 person did not indicate his/her gender; age 18-47) watched the whole video they were randomly assigned to and were included in the analyses.

*Fear manipulation.* The same videos were used as described in Study 4 (Chapter 5).

*Manipulation check.* To measure the extent of elicited *fear*, we presented participants with 15 different emotions and asked them to “make a fast and spontaneous assessment of how much this video makes you feel...”. Six emotions were used to measure fear (tense, frightened, threatened, nervous, anxious, fearful), the other nine emotions (e.g., compassion, comforted) were added to make the intention of the video less salient. The six fear items formed a reliable scale, Cronbach’s  $\alpha = .92$ .

*Results.* The fear manipulation showed the intended effects: Participants in the *high fear* condition reported higher levels of fear ( $M = 2.65$ ,  $SE = .22$ ) than those in the *low fear* condition ( $M = 1.99$ ,  $SE = .15$ ,  $t(51) = -2.49$ ,  $p = .02$ ; effect size:  $r = .33$ ). With regard to *perceived psychological distance*, there were no significant differences between the low ( $M = 3.69$ ,  $SE = .26$ ) and high fear conditions ( $M = 3.31$ ,  $SE = .28$ ,  $t(51) = 1.00$ ,  $p = .32$ ,  $r = .14$ ). Thus, the two videos elicit different levels of fear without having unintended effects on perceived psychological distance.

### **Pilot Study to evaluate the manipulation of psychological distance**

*Participants and procedure.* One hundred twenty-five students participated in the online pilot studies. Of these, 36 were excluded because their reading speed during the manipulation was implausibly high (faster than 800 words per minute), which made it unlikely that they processed the information. The remaining eighty-nine (56 women, 29 men, 4 persons did not indicate their gender; age 18-66) were randomly assigned to one of the two distance conditions where they read a text and then evaluated it.

*Distance manipulations.* The same manipulation of psychological distance was used as in Study 4 (Chapter 5).

*Manipulation check.* We used two approaches to evaluate the effect to the distance manipulation. First, we directly asked participants the same semantic differential-type questions about psychological distance used in Study 4 (Chapter 5,  $\alpha = .90$ ). Second, we included a measure that was intended to measure the distance manipulation’s influence on

people's way of thinking (i.e., concrete vs. abstract). More specifically, we included 11 pictures from the Picture Completion Test (a sub-test from a German version of the Wechsler Intelligence Scales for Children; Petermann & Petermann, 2007). According to Construal Level Theory, people in the local condition should experience less psychological distance than those in the global condition. Given that psychological proximity is associated with a more concrete and detailed thinking style than psychological distance, we assumed that participants in the local condition should perform better (i.e., get more correct answers) in detecting missing parts in the 11 pictures than those in the global condition (see also Wakslak et al., 2006). We coded the answers according to the test manual: 0 points for incorrect answers and 1 point for each correct answer. Participants could maximally get a score of 11 points. To make sure that possible differences between the two conditions do not stem from the fact that participants were more motivated in one condition than in the other, we also counted the amount of missing values for each participant.

*Results.* Somewhat unexpectedly, the ratings of *perceived psychological distance* did not differ between participants in the local condition ( $M = 3.28$ ,  $SE = .18$ ) and participants in the global conditions ( $M = 3.17$ ,  $SE = .17$ ,  $t(86) = 0.43$ ,  $p = .67$ ,  $r = .05$ ).

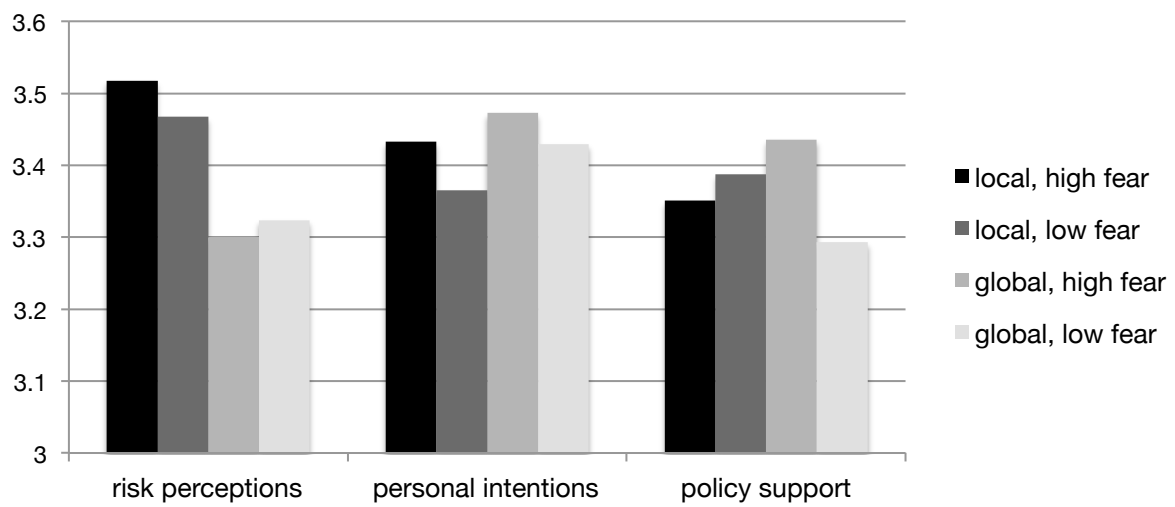
By contrast, there were differences between the two groups in terms of *how concretely they were thinking*. In line with Construal Level Theory, those in the local condition performed better in detecting missing parts in a selection of pictures taken from the Picture Completion Test ( $M = 7.73$ ,  $SE = .26$ ) than those in the global condition ( $M = 6.80$ ,  $SE = .03$ ,  $t(87) = 2.32$ ,  $p = .02$ ,  $r = .24$ ).

To rule out the possibility that people in the local condition were simply more motivated and engaged than those in the global condition, we compared the number of missing values. Participants in the local condition ( $M = 1.45$ ,  $SE = .19$ ) did not significantly differ with regard to how many of the pictures they tried to complete when compared to those in the global condition ( $M = 1.53$ ,  $SE = .21$ ,  $t(87) = -.28$ ,  $p = .78$ ). In other words, it does not

seem that participants in the local condition achieved higher scores in the picture completion task because of a higher motivation and more attempts to find the missing parts in the pictures.

The distance manipulation did not have an effect on the level of *fear* (local:  $M = 2.13$ ,  $SE = .12$ ; global:  $M = 2.42$ ,  $SE = .13$ ,  $t(86) = -1.62$ ,  $p = .11$ ,  $r = .17$ ). Thus, the distance manipulation elicit different levels of concrete versus abstract thinking without having unintended effects on fear.



*Appendix I. Combined effects of distance and fear.*

*Note.* The combination of locally framed climate change and high fear did not result in higher risk ratings ( $M = 3.52$ ,  $SD = 0.77$ ) than the combination of the locally framed message and low fear ( $M = 3.47$ ,  $SD = .78$ ),  $t(158) = .41$ ,  $p = .68$ .

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